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A Sociohistorical Approach: Moving Closer Together Through Detachment from Care Practices

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To analyze the conditions surrounding the introduction and spread of connected objects in healthcare (i.e. connected digital objects), we considered it necessary to avoid developing an approach focused solely on this innovation. Instead, we chose to recontextualize it by situating connected objects within a broader dynamic and a longer timeframe, not only within the healthcare sector, but more broadly within the field of health. To this end, we adopt a communicational perspective that accounts for a recurring theme in discourse: the modernization of healthcare as a promise of better health outcomes, whether through production, prevention, monitoring or support for care.

To describe the conditions for integrating this type of technology, our first step is to adopt a broader lens and revisit the 1980s to understand how what we term "moving

Chapter written by Dominique CARRÉ.

closer together through detachment[1]" emerged and evolved.

Next, we examine how, during the 2010–2020 decade, connected objects – in a broader sense – became part of, extended, challenged or failed to align with this process.

Finally, we explore how connected objects reinforce this process of moving closer together through detachment – notably by introducing more sociotechnical mediations – limiting the production of sensitive data while aligning with a usage-based logic that gradually took shape during the development of remote health services.

What should be understood by "moving closer together" through "detachment"? It is the promise of remaining as close as possible to the patient while care practices and health organizations simultaneously withdraw, establishing a sociosanitary distance from bodies and individuals.

What is proposed here is, in a sense, a sociological interpretation that combines "moving closer together" and "distancing" in healthcare – highlighting the role of digital communication. It should be noted that this concept emerged from research conducted with our colleague Robert Panico and was later explored in a French follow-up publication titled "Informationalization in Healthcare or Moving Together through Detachment? Elements of an Analysis of the Economic and Organizational Management of Healthcare Distance" (Carré and Panico 2003). That study sought to describe "the terminological indeterminacy that arises from the combination of two terms that appear both contradictory and simultaneous: beyond the spatial metaphor, it is a

1 This concept refers to the promise of being as close as possible to the patient (in rhetoric and policy) while healthcare practices and organizations are moving further away (closure of local units, such as maternity wards, or consolidation of hospitals), thus creating a significant socio-medical distance from bodies and individuals.

matter of interrogating this semantic ambiguity…" (Carré and Panico 2003, p. 102).

There were two objectives to this research. On the one hand, we deliberately posed a somewhat provocative question about detachment, taking a contrarian stance towards a reform agenda which, under successive governments, aimed to link system modernization with improved access to care and closer proximity to healthcare through the territorial reorganization of health services and the new coordination of healthcare providers centered around the patient. On the other hand, we sought to examine a less frequently discussed aspect of modernization – less celebrated because it is more pragmatic – namely, cost control, which is now less of a taboo, as the rationalization of actions and increased oversight of care practices have become standardized.

1.1. The shift to ambulatory care: digitalized as a structuring framework

Faced with rising public healthcare expenditures, which in France account for nearly 10% of GDP[2], public authorities, among others, came to view the sector as in need of reorganization to restore order, as it was becoming ungovernable (Julien et al. 1987). At that time, public authorities began to adopt a stricter, accounting-based logic, leading to a more quantitative and enduring vision (Morel 1997), which has only grown stronger. This drive for reorganization centered around what became known as the "Bostonian" model, and the following series of objectives: hospital closures or consolidations, fewer doctors, shorter hospital stays, increased patient involvement and expanded outpatient surgery, among others.

2 Whereas they only represented 7.6% of GDP in 1980 and 4.4% in 1960.

All of this was captured in the term "shift to ambulatory care," which rested on four key pillars (Carré and Lacroix 1999): the establishment of technical networks in the healthcare sector; the creation of a computerized patient record, initially shared, then more recently integrated into an online personal health account; more collaborative care pathways involving healthcare professionals; and finally, increased patient autonomy and task externalization. These developments encouraged the entry of new actors into the healthcare field, allowing for short-term experimentation and the gradual rollout of remote services (e.g. remote monitoring, remote consultations, tele-diagnosis, etc.).

Here, the concept of remote services should be understood in a broad and generic sense, often situated at the intersection of market-based and non-market-based models (Carré 2001). These changes are thus part of a dual process: the implementation of healthcare administration and oversight[3] through the establishment of sociotechnical mediations between healthcare providers and patients.

The sociosanitary crisis, as Carré and Lacroix (2001a) remind us, is politically driven. The arguments put forward are not based on a need to respond to malfunctions in the healthcare sector, but rather stem from the view that health costs (i.e. budgetary concerns) are too high and, as some

3 By way of examples: Various regulations have been enacted to reform the French healthcare sector. These include: the law of July 31, 1991, which obliges health establishments to analyze and evaluate their activities – a law that followed the adoption of the Medicalization of Information Systems program (PMSI) in the late 1980s; the law of January 4, 1993, which established coding for medical procedures and pathologies, thereby implementing a generalized, standardized assessment of care practices aimed at controlling healthcare spending; a Social Security reform that requires doctors to digitize their practices to facilitate data exchanges between patients and health insurance providers; the circular of May 10, 1995, which extended the PMSI nationwide; and the ordinance of April 24, 1996, which reformed both public and private hospital care to promote greater cooperation among institutions.

claim (specialists, experts, public authorities), threaten to slow France's economic growth and competitiveness. As a result, budgets must be cut and streamlined[4]. The solution is imposed without public debate, and implemented through the technical networks of healthcare actors.

Four communicational strategies will be implemented, more or less chronologically:

– de-singularizing the healthcare sector to make it more ordinary, with the aim of treating it like any other sector – allowing comparisons that highlight its lower productivity;

– assigning individual responsibility to healthcare actors, using approaches that induce psychological discomfort to promote personal changes in attitude or behavior. In other words, individuals are held accountable, particularly in cases of medical nomadism or excessive medication use;

– imposing regulations, sanctions or threats to incentivize those who are reluctant to comply;

– promoting telemedicine. This final point highlights technical achievement and noble goals – such as improving healthcare quality, humanizing medicine and enhancing patient autonomy – while downplaying less acceptable, more industrial or labor-intensive goals that are harder to justify to the public and healthcare professionals.

1.2. Innovation and technology: the position given to digital ICT

The healthcare sector, and particularly hospitals, is a major driver of innovation in our societies, adopting emerging technologies across many disciplines (surgery, radiology, hematology, among others). It is worth noting that hospitals were among the first institutions to computerize

4 This process is taking place in most Western countries because healthcare expenditure is rising significantly faster than GDP.

their administrative systems and exchange data electronically. These technical innovations extend traditional methods of examining the human body while also improving and streamlining them to enable more accurate diagnoses, as seen in the evolution of radiography, particularly ultrasound, MRI and CT scans.

These tools have gradually become diagnostic aids (expert systems of varying complexity), but a key shift occurred at the turn of the 21st century with the rise of digital information and communication technologies (ICTs). Their introduction began to influence not only care delivery but also administrative and financial systems (healthcare economics), and even served as communication tools – through secure messaging platforms, digital portals and other interfaces – between institutions, professionals and patients.

All of this has had a significant impact on operating methods, team dynamics and modes of cooperation, progressively integrating into patient interactions. The phenomenon intensified throughout the 2010s and particularly during the Covid-19 pandemic.

Thus, digital information and communication technologies hold an important position in health modernization, since they are both the result of reform; modernization requires digitization and the use of networking by stakeholders and, in turn, they drive reform by introducing new actors and strategic logics that were, until recently, foreign to the healthcare sector.

According to public authorities at the time, the goal of these techniques, among others, was to reshape the delivery of care around the patient, ensuring the closest possible proximity (Carré and Panico 2003). This process of social digitization even extends beyond traditional care settings (clinics, hospitals) to reach medical practices where community-based medicine is provided.

The modernization deemed necessary thus encourages networked healthcare, enabling information exchange and the expansion of so-called remote services, contributing to a new vision of care access and practices, in which health becomes integrated into the so-called digital society.

All of this is accompanied by the slogan "Make information travel instead of patients," which promotes the de-territorialization of care. While the healthcare sector faces this transformation, it is not alone; automation, rationalization and the externalization of informational and communication networks are part of a broader, cross-cutting social logic that has gradually imposed itself on other sectors, including businesses, government agencies and local/regional authorities.

1.3. Distance and proximity: medical biology and medical imaging

While technical–organizational tools such as remote monitoring have impacted doctor–patient relationships, earlier technologies had already introduced similar dynamics. Pharmaceutical testing and medical imaging are key examples.

For many years, aside from the stethoscope and visual observation, care practices lacked tools to truly investigate the internal human body. The most essential method was palpation, accompanied by the patient's medical history, varying levels of detail about the family context and, crucially, the spoken information collected during the medical visit – a defining difference between doctors and veterinarians.

Few tools were available, and diagnoses were based on relatively simple assessments. This began to change over the course of the 20th century with advances in sampling and

testing technology – refined by the pharmaceutical industry – and the emergence of urban medical biology laboratories conducting substance measurements, tissue analyses and more). More recently, the pharmaceutical industry has also developed self-administered tests for general public use.

Medical testing and imaging have become increasingly central to the patient–doctor relationship, to the point of becoming dominant, often at the expense of in-person, location-based examination.

Doctors now prescribe many additional tests with specialist colleagues and/or medical biology laboratories before making a diagnosis, monitoring changes in a patient's health or even for preventive purposes. The importance of the doctor–patient relationship, and the unique nature of in-person interactions between doctors and patients, has begun to fade.

While pharmaceutical tests and medical imaging expand the traditional "face to face" meeting, shifting the highly individualized doctor–patient relationship towards a more collective one, public authorities support this shift by calling for smoother exchanges between professionals and institutions.

The family doctor, now acting as a referring physician before treatment is initiated, remains the patient's primary point of contact, the "conductor" coordinating these other interactions with various specialists.

Let us take a moment to consider the contribution of medical imaging to advancing our understanding of the human body. Tomography, which provides images of thin slices through the body, exemplifies this progress, revealing connections that are sometimes invisible in standard images.

However, in the context relevant to our discussion, the contribution of medical imaging is above all symptomatic of

the instrumentalization of networking: medical imaging, an inter-disciplinary specialization that supports other specializations, (i) requires the establishment of specific connections between various actors in the treatment pathway, centered around the patient; (ii) relies on the hybridization of management data (administrative tracking of patients) and medical data (examination reports, digitized imaging files); and (iii) encourages the convergence and aggregation of multiple information systems.

The imaging file plays a key role in setting up a shared medical record. The digital health record, rolled out in 2022, bears testimony to this. Building on the computerized patient record, and later the shared record, it allows all relevant parties to store information and documents among health professionals. These professionals are encouraged to complete it.

All that remains is for patients – and also health professionals – to actually use it, which is no easy task given the repeated failures of past system implementations.

1.4. Distance and proximity: development of remote health services between the pandemic and a shortage in care provision

As we have just seen, the doctor–patient relationship has been reconfigured by the sudden emergence of medical biology and the significant contribution of medical imaging. The broad development of remote services has continued this trend, creating increasing numbers of sociotechnical mediations that symbolize a more liberal healthcare economy. These can be grouped into four main configurations:

– Remote patient monitoring is associated with the convergence between the modernization of the healthcare sector, patient-centered re-engineering and improvements in the quality of care.

– The creation of technical networking in the health industry is associated with the convergence between the circulation of information and promotion of care management methods.

– Remote appointments are associated with the substitution of the traditional physical meeting between doctor and patient in what is known as the patient–doctor relationship.

– Remote services (in the strict sense) are closely linked to the convergence between the industrialization of activities and the commercial opening of care services.

The objective: to reduce health expenditure at all costs and in various ways. There can be no doubt that digital, information and communication technologies have played a significant role because, according to Binst and Schweyer, they allowed "structures to be forgotten in order to improve the way requirements are considered in healthcare" (1995) and brought a progressive vision to the forefront by developing "cutting-edge medicine".

The available offerings are either intended for health professionals for their own use, intended for health professionals to prescribe to their patients, or addressed directly, with no intermediary, to patients.

Let us take a moment to focus on remote patient monitoring. At once a technical, organizational and informational device, it enables remote medical assistance and/or monitoring by connecting a patient with data about their health status. The data are collected using sensing, recording and automated transmission tools designed for healthcare personnel (doctors, nurses, technicians) who are in a position to analyze the patient's condition and remotely initiate appropriate urgent actions, or other interventions of various kinds.

This device, which may vary in sophistication, clearly illustrates that the way remote monitoring is discussed warrants its inclusion in the implementation of the shift to ambulatory care. In this way, it enables hospital stays to be shortened, patient travel to and between care units to be reduced, and it even allows patients to remain at home. In the latter case, it is considered capable of engaging and involving the patient and/or their close family and friends in treatments that are less costly because they are carried out outside of medical facilities – with corresponding impacts on the organization of care delivery and on the doctor–patient relationship (Carré and Lacroix 2001b).

Five key changes explain the increase in remote services and, indirectly, pave the way for the arrival of connected objects in healthcare and their future uses:

– The expansion of the legislative and regulatory framework from telemedicine to e-health, beginning in the 2010–2020 decade, reflects the government's commitment to deploying digital health in France. For example, remote medical appointments have been authorized and reimbursed by French national health insurance since September 15, 2018. This practice became significantly more common during the Covid-19 pandemic and the associated lockdowns.

– The implementation of the GDPR (granting rights of access, correction and objection to data processing) is a key factor in ensuring that data and data processing remain confidential. A contributing factor is the deployment of the French National Health Data System (SNDS).

– Advances in technology have encouraged increasingly individualized uses through the widespread adoption of smartphones and apps[5], the development of digital platforms

5 Referring to software that can be downloaded to a smartphone or tablet and accessed via an internet connection, offering specific functionality and a defined user experience. An app is also distinct in its ability to collect data.

and the emergence of connected objects – alongside the acceptance of the TCP-IP dual communication protocol for all actors in the healthcare sector.

– The Covid-19 pandemic, which required restrictions on movement and/or lockdowns to prevent transmission, forced healthcare professionals and patients to rely on digital tools for remote appointments.

– A shortage of doctors, driven by an imposed *numerus clausus* policy designed to limit the number of medical graduates, has for years reduced the availability of care and made access more difficult – especially given the uneven distribution of doctors across the country. Facing an insufficient number of physicians, disengagement by public authorities and growing patient dissatisfaction, some see remote services as a way to resolve, or at least mitigate, the shortage of general practitioners and specialists. Others, often newcomers to the healthcare field, have seized the opportunity, including GAFAM, Doctolib and various industrial or financial groups. Examples include healthcare clinics offering appointments seven days a week, managed by financial groups that had previously not been involved in the healthcare sector.

1.5. Connected objects?

Before we go any further with our analysis, it is necessary to make a quick detour to clarify what we mean by "connected objects." The goal here is not to provide a detailed analysis of the connected object market and their adoption, but rather to offer some useful information for consideration.

To draw up a general overview, let us look at some information highlighted in the 2022 report by *France Stratégie*, entitled "The World of the Internet, Objects and Dynamics to Be Mastered." What does this report show us? That the reality is complex to observe and define. That there

is no globally accepted definition on a worldwide scale. That there is a notable lack of reliable statistics tools to quantify them. Estimates vary widely, and data fluctuate from one research organization to another. The number of connected objects, "according to the sources consulted in 2020, ranges from 18 billion to 78 billion" (*France Stratégie* 2022, p. 12). According to one estimate, there are 1.8 billion in Europe, including 244 million in France (ADEME and ARCEP 2022). All sources agree that the market is expected to more than double between 2020 and 2030 (AIE 2019)[6].

The main sources of divergence come from whether studies include only complex, traditional digital objects (computers, telephones, televisions, etc.) or focus solely on new categories of connected objects, such as sensors, smart meters, glasses, watches, RFID chips, voice assistants and vehicles, among others (*France Stratégie* 2022, p. 33). As a result, there are many futurological debates, recommendations and prescriptions that, with rare exceptions, reflect a bias in favor of these objects and the development of what is expected to be a highly promising future market. Some see these technologies as a form of disruptive innovation capable of creating ecosystems. Connected objects – supported by digital technology, connectivity and interactivity – are credited with improving or fostering the development of new products and services (CNUCED 2021).

In spite of all these reservations and apprehensions, we can estimate that connected objects are devices that are connected – most often by a wired or wireless connection – to the Internet, enabling data to be collected, stored, viewed, transferred and processed (interoperability). These devices

6 We also note the difficulty of accessing the most recent studies, which are not publicly available and may only be viewed after paying a fee. Given the amounts requested, these studies are often out of reach for researchers, particularly in the Humanities and Social Sciences.

are most often connected for the general public via a smartphone, tablet, watch or ring, along with a mobile app and a web platform through which assistance or an opinion on the collected data can be obtained, based on indicators with varying degrees of sophistication. The architecture consists of sensors, networks, software applications, private and sensitive data, and services. Connected objects have six characteristics specific to their use that facilitate their widespread adoption, the well-known 6 As: *Anything*, *Anyone*, *Anytime*, *Anyplace*, *Anyservices* and *Anynetwork*.

What about in the healthcare sector? While connected objects have developed significantly in the domestic field (home automation), in the field of the quantified self (quantification or automatic self-measurement), in industrial sectors (maintenance and logistics), and to a lesser extent in transportation and travel, the healthcare sector was still, in 2024, only marginally affected, even though experimentation has become more frequent in recent years and the first applications are beginning to appear.

In any case, in the eyes of the public authorities, they are part of a "new" direction in medicine. Namely, the so-called "5 Ps": personalized, preventive, predictive, participatory and proven.

1.6. Connected objects at the frontiers of "well-being" and "healthcare"[7]

It is useful to distinguish between two types of connected objects in healthcare:

– connected objects directly tied to a specific medical protocol and operating within a legal and legislative framework for data monitoring and oversight – a framework

7 Note that from this section onward, most of the data used in the analysis come from research carried out by Carré et al. (2021).

that, it must be said, is still not fully consolidated. These devices are used to monitor patients' health by tracking specific measurements such as blood pressure, heart rate and sleep quality, among others;

– connected objects that do not have medical device status (no medical purpose in the strict sense) and instead fall within the "well-being" category. It is worth noting that the boundary between "well-being" and "health" is often blurred, creating a "gray zone" in classification;

– a note of caution: a connected object will not do everything – its functionality depends on the applications and services it supports. Regarding health-related software, the French National Agency for Medicines and Health Products Safety (ANSM) follows the legal precedent established on December 7, 2017. According to this agency, the following devices must not be considered medical devices[8]:

- those intended only for observing the patient to ensure treatment adherence,

- those whose sole purpose is to communicate data to a doctor, without an alert function,

- those used during sports or physical training, or with functions aimed at aesthetics, comfort or improving sports performance,

- those producing results that lead only to a generic diagnosis (e.g. for a group of patients for statistical purposes or for an epidemiological field of study),

- those intended solely for administrative management such as storing or archiving data (e.g. a database or digital library containing medical information) without actively processing or using them.

8 "Software and mobile applications in health". See: https://ansm.sante.fr/documents/reference/logiciels-et-applications-mobiles-en-sante.

To make sense of this, we can look at the case of sleeptech as an example. According to a survey conducted in France by the French National Institute for Sleep and Vigilance (INSV), "36% of French people suffer from at least one sleep disorder"[9]. The global market is promising, estimated at $80 billion at the end of 2020, with a growth rate of 5.82% between 2017 and 2021[10]. This market is still emerging in Europe, whereas in North America it was already valued at $60 billion in 2018.

The market is evolving in two distinct directions: connected objects that are part of a medical protocol, and connected objects that are part of a well-being approach.

– In the first example, concerning the treatment of sleep apnea, this condition is often underdiagnosed or insufficiently addressed from a medical perspective[11] compared to other pathologies such as diabetes. It nevertheless represents a promising market. A doctor specializing in the field prescribes a monitoring protocol that includes a connected night-time ventilation device (PPC), provided by a recognized healthcare service provider, along with a software application. The data are sent and stored with an approved host. The patient is supported by the doctor and/or their team for ongoing clinical monitoring. The deployment of connected objects in healthcare is also intended to facilitate, among other things, the treatment of chronic illnesses (Simon 2017).

– In the second case, we are in a different configuration. Here, we see a new practice that is being developed: the quantified self (self-quantification or self-measurement)

9 See: https://www.geo.fr/voyage/le-sommeil-des-francais-en-12-chiffres-cles-186164.

10 See: https://www.businesswire.com/news/home/20171222005186/en/Global-Sleeping-Aids-Market-2017-2021-Increasing-Technological.

11 According to Pierre Escourrou, a cardiologist and sleep specialist at the Interdisciplinary Center for Sleep in Paris, training in this pathology is recent: it began in 2017.

enables individuals to act (empowerment) on their own bodies. In this case, there are no third-party prescribers; anyone can equip themselves with a connected object for a wide range of reasons – to listen to their body, prevent a heart attack, assess their heart rate, improve their sleep, monitor their physical performance (sports), or maintain their health and a healthy lifestyle. This practice contributes to greater self-awareness of our own capacities and body (Pharabod et al. 2013; Arruabarrena 2016; Lupton 2016). Informed digital advice is provided following a personalized assessment of the data sent. There are two trends: one involves reappropriating knowledge of our body to seek or return to a healthy lifestyle, and the other involves improving the body's performance potential (body-as-factory).

Thus, blood pressure monitors, pedometers, smart watches, etc., which can be used for remote monitoring for preventative purposes or to support treatment of chronic illnesses or disorders – encouraging on-site observation, measurement and assessment – become ways to implement prevention and provide assurance or reassurance. Some industrial insurance providers have understood this very well, as we will see in section 1.8.

1.7. Illustration of a "gray" zone

Let us consider for a moment a smart watch, the Apple Watch Series 4, to more closely examine the position of connected objects between "well-being" and "health." This is the first connected object not originally designed for the healthcare sector but which nevertheless has a health function recognized as a medical device. The U.S. Food and Drug Administration (FDA) was the first to recognize its capacity as a medical device for performing an ECG (electrocardiogram) via an application. In March 2019, this functionality was also recognized as a medical device in Europe.

The "ECG1" app and the atrial fibrillation (AF) feature issue an alert to users if signs of AF – the most common form of arrythmia – are detected. Untreated AF is considered one of the main causes of stroke and is the second leading cause of death worldwide. The Atrial Fibrillation Association (AF) estimates that nearly 1.5 million people in the United Kingdom alone suffer from AF, with about one-third likely unaware of it[12].

What can be said about the effectiveness of this ECG device? While it can detect certain conditions, it is worth remembering that in 2018, Dr. Leenhardt, a cardiologist at Bichat Hospital in Paris, noted: "With a cardiologist or in a hospital, electrocardiographs use twelve leads (measurement points). An electrocardiograph provided by an Apple Watch uses only one, which does not allow for detection of a myocardial infarction or other serious cardiac irregularities"[13].

The Apple Watch's ECG capability raises questions about the permeability of the boundaries between connected objects for "health" and those for "well-being". The CE mark obtained by Apple undoubtedly inspires confidence among the public and institutions in relation to e-health. Currently, we are in a "gray zone", acknowledges Pierre Trudelle[14] of the HAS. Only a "medical purpose" defines a medical device, and this purpose can be interpreted as treatment or diagnosis. This is why, according to him, a patient education tool would not require a request for medical device classification.

12 See: https://www.apple.com/fr/newsroom/2019/03/ecg-app-and-irregular-rhythm-notification-on-apple-watch-available-today-across-europe-and-hong-kong/.

13 Words gathered by Marine Benoi in her article "The Apple Watch Electrocardiogram, a Gadget or a True Medical Advance", *Sciences et avenir*, April 11, 2019.

14 Interview of Pierre Trudelle by Sarah Sandré on March 18, 2021.

1.8. Arrival of new disruptive inputs in the healthcare field

Even if developments are taking place, connected objects are much more numerous in the field of "well-being" than in the field of "health". Industrial companies have fully understood that well-being is the first step on the path to good health. This is not incorrect. Indeed, in 1946 the World Health Organization (WHO) defined health as "a complete state of physical, mental, and social well-being, and not just a lack of illness or infirmity"[15]. On this point, a trend reversal has been seen in recent years in the United States. IQVIA[16] observes that the development of applications in "health" is now dominant, to the detriment of so-called "well-being" applications.

Certain industrial pharmaceutical companies have begun to take into account the permeability of barriers between "health" and "well-being". As an example, Sanofi brought out a chatbot in 2017, i.e. a conversational agent, to support people suffering from insomnia while recommending that they take food supplements. Others, such as software developers, who had previously participated in the development of remote services in healthcare, now offer their assistance with the implementation of devices in association with connected objects. Regarding the industrial company Air Liquide, which has expertise in healthcare, it is turning towards start-up acquisitions as a business strategy. This strategy is widely used to appropriate new expertise in a key field. In 2018, Air Liquide purchased the start-up EOVE, which designed a digital device intended for use by patients suffering from respiratory distress.

15 Constitution of the World Health Organization, 45th edition, October 2006.

16 See: https://www.iqvia.com/insights/the-iqvia-institute/reports/the-growing-value-of-digital-health. The report only takes into account information from the United States of America.

We now turn to new inputs, as they demonstrate the changes occurring in the healthcare field. This is primarily the case for insurers, start-ups and industrial companies in communications and networking (GAFAM).

Insurers have been taking an interest in digital healthcare for a number of years. They have recognized the advantage of connected objects, applications, and devices for remote monitoring, remote appointments and remote services. This is why they have invested in incubators and created partnerships with various actors in the digital field. AXA was the first French insurer to offer smart bracelets to its clients. Fitbit, a bracelet that counts steps, provides an indication of an individual's daily physical activity. Starting from the principle that an insured person in good health is financially preferable to one who does not make an effort to maintain a healthy lifestyle, in return, clients of companies providing supplementary health insurance are given advantages in the form of indirect rewards for insured persons who provide their data (bonuses, reductions, free connected objects) regarding good physical performance[17]. Malakoff Médéric is not to be outdone. It provides its clients with a smart belt[18] (LUMOBack), which has a sensor that tracks the daily movements of an individual and vibrates when it detects poor posture. Combined with a smartphone app, it helps the user correct their posture and relieve back pain. This insurer was also the first to have their application on an Apple Watch. Harmonie Mutuelle has developed a connected health guide and remote medicine solutions. This insurance provider also develops partnerships with start-ups or incubators in the same way as Malakoff Médéric. In addition, we would note that remote appointments and remote medicine devices are increasingly integrated into

17 See: https://www.meilleure-innovation.com/axa-objet-connecte/.
18 See: https://www.silvereco.fr/ids-sante-et-malakoff-mederic-unis-autour-de-la-sante-connectee/3147561/.

supplementary health insurance offers[19]. The e-health services thus occupy an increasingly important position in the differentiation strategy used by different insurers. A field where they are far from being the only ones to invest, as we will now see.

Start-ups are actors who develop innovative projects, whether digital or not. The French Public Investment Bank (BPI) published a map summarizing start-ups in e-health in March 2018. There were 297 of them. In France, the most well-known start-ups in "health" among the wider public are Fitbit and Dreem, whose innovations are more closely related to "well-being" than to medical devices. By way of illustration, Dreem sells a band containing sensors and an algorithm that analyzes sleep phases. An application is associated with this connected object, offering a user support program to improve sleep quality[20]. All of this comes with a personalized coaching program.

GAFAM (Google, Apple, Facebook, Amazon, Microsoft), etc., are industrial communication and digital networking companies and, a priori, have no expertise in healthcare. However, some of them have adopted positions in a range of ways via digital devices. Health is therefore affected by the incursion of new actors from the digital world. Since more often than not, they do not have any expertise, they undeniably face difficulties understanding the rules, protocols and codes that govern organizational modes and care practices.

19 See: https://www.argusdelassurance.com/acteurs/e-sante-quand-les-assureurs-s-initient-a-la-telemedecine.118218 ; https://www.argusdelassurance.com/assurance-de-personnes/sante/telemedecine-la-prise-en-charge-de-la-teleconsultation-medicale-prolongee.166941.

20 See: https://www.sciencesetavenir.fr/sante/sommeil/nous-avons-teste-le-bandeau-de-sommeil-dreem-2_133955.

This is why some establish partnerships. As is the case with Google, for example, which has increased its number of collaborations with several pharmaceutical laboratories, in particular Sanofi and Novartis, and stands out due to its multiple collaborations, especially with the National Health Service (NHS) in Great Britain. This does not eliminate the question of health data sovereignty. This industrial communication company has also created its own investment fund for e-health and biotechnology: Google Ventures – a $100-million fund started in 2017[21]. Regarding Amazon, Facebook and Apple, they have attempted to make headway into the e-health market in another way via their expertise acquired in logistics: this is the case with Amazon, which is developing a medication sales platform and the delivery of pharmaceutical products. Facebook brings its expertise in advertising spaces and data collection. Apple stands out due to its smartwatch, the Apple Watch. This is an innovation for the general public consisting of a medical device, the ECG, which enables electrocardiograms to be performed, as we saw earlier, since the application has been recognized as a "medical device" on a connected object intended for the general public[22]. It is interesting to note that this watch has progressively integrated into other health applications, which have not yet been designated medical devices: oximeter (able to continuously measure the quantity of oxygen circulating in the arteries) and nightware (an application to study sleep quality). For the moment, the BATX (Baïdu, Alibaba, Tencent, Xiaomi), in other words the Chinese equivalent of GAFAM, are not yet present in the healthcare field in Europe.

Aside from GAFAM, the IT firm IBM, for example, is not to be outdone. Through IBM Watson, this large company

21 See: https://www.frenchweb.fr/le-fondateur-de-google-ventures-lance-un-fonds-de-100-millions-de-dollars-pour-la-sante/284487.

22 See: https://www.sciencesetavenir.fr/sante/coeur-et-cardio/que-vaut-vraiment-la-fonction-ecg-de-l-apple-watch_132938.

invests in the healthcare sector by developing many partnerships around the world with hospitals or companies. In 2018, IBM Watson announced a partnership with the company Guerbet[23], which specializes in medical imaging. IBM Watson also distinguishes itself from its competitors by having launched one of the main partnerships in terms of artificial intelligence (AI) between a digital company and actors in the healthcare sector.

1.9. Increase in data and data sovereignty in healthcare

The importance of industrial communication and networking companies, such as GAFAM, raises questions about dependence on globalized companies collecting, hosting and processing sensitive data and about the type of protection in place for patients' personal data. Following a decision in July 2020 by the European Court of Justice regarding the invalidation of the Privacy Shield, a legal mechanism that allowed the personal data of Europeans to be used by non-Europeans (particularly the GAFAM), the French data protection organization *Commission nationale de l'informatique et des libertés* (CNIL) issued an opinion stating that an American company would no longer be able to host a French or a European database:

> European citizens' data may no longer be entrusted to an American company, even if this company has a headquarters and servers within the European Union. This situation must result in modification of the hosting conditions of the health data platform, and the conditions of other

23 See: https://www.guerbet.com/fr/actualites/guerbet-et-ibm-watson-health-annoncent-un-partenariat-strategique-alliant-l-intelligence-artificielle-a-l-imagerie-medicale/.

> health data storage facilities hosted by companies subject to United States law[24].

Many healthcare actors using, for example, Microsoft solutions have been obliged to review the hosting conditions at the risk of being refused, by the CNIL, their "processing authorizations for these data, particularly in the context of scientific research"[25]. Despite the opinion of the CNIL, the French State Council has rejected the idea of suspending the conditions for hosting and data processing that were implemented by Microsoft, partly due to the health situation (pandemic related to Covid-19). On the other hand, it has preliminarily estimated, regarding the contract concluded between France and Microsoft[26], that no data will be transferred outside the European Union. This is important because the convergence between connected objects, artificial intelligence (AI) and processing of megadata is already drawing up what some are calling an "Internet of Behaviors" (Arruabarrena 2021–2022). Thus, connected objects, applications and services contribute to a greater datafication of the healthcare field (sensing, transmission, processing, storage and circulation of sensitive data that can be personalized). And it raises questions when "general public" connected objects nourish and feed industrial communication or networking companies but elude the healthcare sector.

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24 Cited in the article by Alice Vitard, "Microsoft Must Remove Itself from the Health Data Hub, According to the CNIL", L'Usine Digitale, October 9, 2020. Available at: https://www.usine-digitale.fr/article/microsoft-doit-se-retirer-du-health-data-hub-d-apres-la-cnil. N1014634.

25 *Ibid*.

26 "The French State Council, the *Conseil d'État*, cites the addendum concluded in early September, which stipulates that "Microsoft will not share the data processed with the public authorities unless required to by law." Contrary to what the requesting parties claim, this exception does not only refer exclusively to American information but also to EU member states, the judge noted. To be sure of this, "it is a good idea to specify it" later, he added (*ibid*.).

1.10. Increase in sociotechnical mediations, strengthening a process of moving closer together through detachment and connected uses

The sudden rise in sociotechnical mediations in the healthcare sector is not new, as we have observed with the development of medical biology and medical imaging initially, and later during the development of remote healthcare services, encouraging new inputs into the healthcare field. In 2025, connected objects and their application software now contribute to this. The increasingly significant involvement of these sociotechnical mediations has progressively broadened the patient–doctor relationship, which in medicine refers to the very particular relationship between a doctor and their patient during an appointment in a specific location.

These mediations also have another characteristic, namely strengthening a process of moving closer together through detachment from medical practices and care. Without a doubt, we can confirm that this change, which was already in place, became highly radicalized during the Covid-19 pandemic and for several years thereafter, with the extreme difficulty that patients have faced obtaining medical appointments within a suitable time frame. The Covid-19 pandemic showcased all the opportunities that remote digital healthcare represents: online appointments, the increase in remote appointments and the multiplication of apps in e-health and in well-being.

As proof of the above, remote appointments[27] by general practitioners increased from 3,000 in 2018 to 13.5 million in

27 Remote appointments comprise four different sociotechnical configurations: with the family doctor via a video appointment; an emergency appointment with a doctor that the patient has sought out, for example, on Doctolib; the use of a specialist digital platform offering an available doctor, as is the case on the Médecin Direct platform; and remote appointments from a station installed inside a pharmacy or in a shopping center with a doctor chosen for you. Some operators, such as Qare, offer

2020 (French Republic and DRESS, 2022). Even though this is considerable progress, it is important to specify that these appointments represented less than 6% of the activity of general practitioners.

Public authorities, such as the medical corps, also see in this a way to facilitate access to care for patients. In this context of the government's "acceleration strategy" for digital health (e-health), in 2021, the public authorities rolled out an incentive-based policy to encourage the deployment of connected objects in healthcare (see the France 2030 roadmap).

No doubt, the process of digitalization has contributed to facilitating the movement of patients closer to care personnel, while moving them further away from care structures (hospitals, clinics, grassroots medical services).

This renewed interest in remote healthcare, which, according to information, is as close as possible to the patients, also plays a role, it must be said, in reducing healthcare costs by integrating digital solutions to seek a better service and, above all, greater productivity[28]. Here, we again see one of the dominant elements that guided the implementation of the sociosanitary reform at the turn of the 1990s.

Undeniably, connected objects in "healthcare" will hold a more important position from now on. Their novelty now resides:

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appointments seven days a week, from very early in the morning until midnight.

28 Words contributed by Charha Louafi, director of the Fonds Patient Autonome, "BPI France Strengthens Its Support for the Healthcare Sector", BPI France website, 6 April 2021. See: https://www.bpifrance.fr/A-la-une/Actualites/Bpifrance-renforce-son-soutien-au-secteur-de-la-sante-52034.

– on the one hand, in the experimentation of care devices that are still tentative, implemented by healthcare personnel, which often requires the provision of real support for the patient in using digital technologies and adhering to protocols that must be followed. This involves developing patient education. Indeed, use studies show that patients are too often left to their own devices and their own digital culture, without taking into account the inequalities in technical skills and access to their data (Carré et al. 2021)[29];

– on the other hand, the installation of a flood wave overwhelming care practices already established within the healthcare sector places connected objects within a desired or imposed societal change, namely the quantified self (quantification or self-measurement of ourselves), practices which are implemented by using connected objects intended for the general public, which cannot be considered devices with a medical purpose, in order to implement coaching, well-being or self-measurement practices in order to train to improve lifestyle or boost good conscience. In this case, self-tracking favors monitoring of the user over a long time period. Certain analysts see a form of "managerialization of oneself" (Dagiral et al. 2019), others a "hygienization" or "medicalization of daily life" (Calvignac 2021). Thus, referring back to the deployment of social norms in terms of healthcare and well-being, the implementation of which is largely facilitated by resorting to connections arising from other information practices on social media networks, as well as online purchasing, remote bank management, etc. The objective of new arrivals in the healthcare field between "well-being" and "health" is to make any individual into a potential client and not a patient, thus marginalizing the medical practices instituted. This disruption is only made possible by implementing digital tools, as has already been the case in other fields or activity sectors, as pointed out earlier in the text.

29 The use studies were carried out by Geneviève Vidal.

1.11. References

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