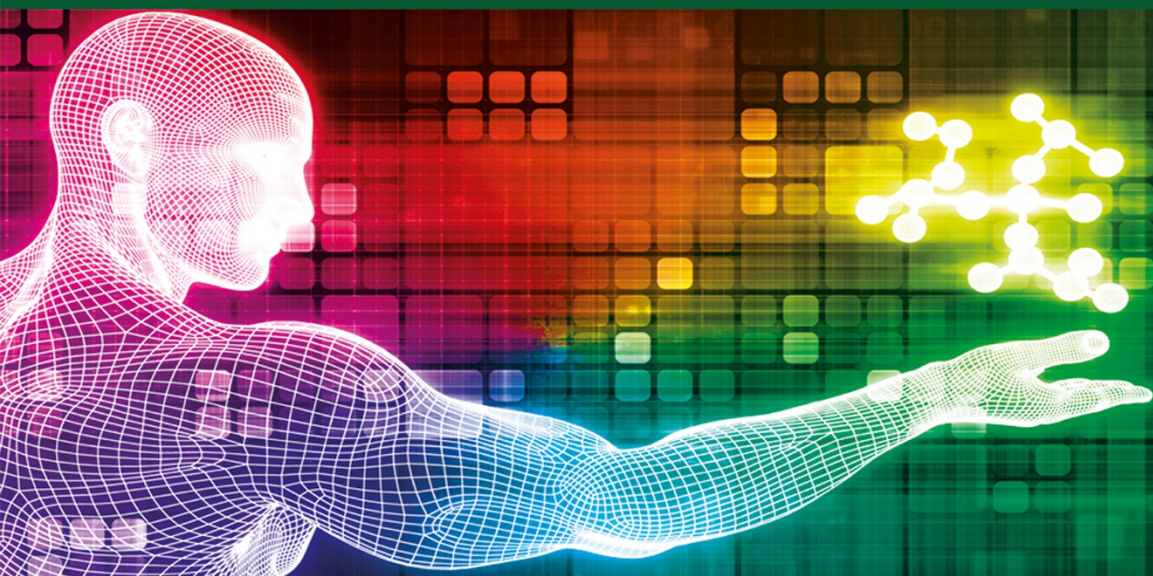


**HEALTH ENGINEERING AND SOCIETY SERIES**

**HEALTH AND PATIENTS SET**



**Volume 4**

# **The Covid-19 Crisis**

*From a Question of an Epidemic  
to a Societal Questioning*

**Edited by  
Bruno Salgues  
Jacques Barnouin**

**ISTE**

**WILEY**



## The Covid-19 Crisis



**Health and Patients Set**

coordinated by  
Bruno Salgues

Volume 4

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Library of Congress Control Number: 2022933262

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British Library Cataloguing-in-Publication Data  
A CIP record for this book is available from the British Library  
ISBN 978-1-78630-726-2

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# Introduction

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## The World after the Coronavirus Pandemic

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Observations and facts have taught us that human societies are never ready for change. “[...] the new does not grow out of the old but appears alongside of it and eliminates it competitively” is how Schumpeter described change. The project initiated by this book seeks to reflect on the changes and questions generated by the SARS-CoV-2 pandemic, by analyzing the facts and their consequences on society and institutions, as well as on individual behavior.

The current pandemic can only be the ignitor of the necessary break with the old social, economic and cultural paradigm. It will be a question of describing, guiding and analyzing this break, as well as of contributing to its inevitability, while maintaining it within the framework of the Declaration of the Rights of Man and of the Citizen<sup>1</sup>. To this end, we could take up the intellectual framework defined, deployed and supported by Saint-Simonism in its humanist version. This ideological current had an important influence on the development of industrial society in the 19th century. It thought both of the future and of the individual in that future. This new ignition – post-coronavirus – cannot be unrelated to knowledge, science and the state of the art of technology.

So the global pandemic is here. It is a new threat. However, we are not at the end of *the* world, but at the end of *a* world, hence the importance of

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Introduction written by Jacques BARNOUIN and Bruno SALGUES.

1 A human civil rights document from the French Revolution.

asking ourselves about the “day after”. This is why it is essential to take a forward-looking approach, in which science and technology will take on their full meaning, namely in the service of shared progress and not just the financialization of the innovations they lead to. The Saint-Simonians provided a positive framework for the notion of progress – later taken up by Auguste Comte – in which talent and solidarity, as well as entrepreneurship and general interest, are linked.

However, the view of these political, social and cultural aspirations remained indicative and critical. For half a century, especially during the Second Empire, all Saint-Simonian action was to be systematically devoted to developing “material” networks (communication infrastructures) and “immaterial” networks (institutions of knowledge and credit), which were linked and necessary for the balance between science and society, markets and human communities.

In order to talk about the “day after”, multi-author books will have to address the scientific issues linked to information and communication technologies (ICTs) in the major fields of security, health and education and culture, but also analyze the role and actions of these technologies in relation to work and social cohesion. Furthermore, we must not forget the question of the reinvention of democracy in the face of otherness and the need to adapt, under the weight of the influence of technologies with an absolutely manifest power to transform.

Living is an individual risk. Living in a human community is a collective risk.

In this respect, contemporary geopolitical divides have, in recent years, led to the emergence of violence and reality in our domestic spheres, in Europe, but not only so. Therefore, we are witnessing:

- the emergence of a culture of risk and of threat. Threats have indeed started a cycle of psychological changes in the individual;
- an evolution in the way of thinking about our space and intimate domain, through the use of technologies;
- the obligation to look at the political object and its different figures of power through science and knowledge.

These fields inevitably come into contact with the underlying questions of algorithms, heuristic models and artificial intelligence. Above all, they call into question the individual as a citizen with regard to their public liberties and the illusory control of their private data. Here again, the pandemic has raised questions, for health purposes, about the data from applications for tracking movement.

After all crises, new technological and global companies are born. Thus, Watson federated companies in 1914 and proposed the first computer, the Mark I, in 1945. As for Microsoft, the company appeared after the 1973 oil crisis, and the same was true of Uber and WhatsApp in 2009, after the subprime crisis. The list goes on. What companies will emerge as a result of the Covid-19 crisis and, in turn, in which sectors should the biggest research efforts be made?

Finally, the world in disarray will disrupt the notion of territory. On this point, we should not forget the notions of threat and risk, as well as the socio-political context. During the Cold War, the “communist threat” led to the creation of the Coordinating Committee for Multilateral Export Controls (COCOM), a Paris-based organization whose initial goal was to prevent countries under the influence of the Soviet Union or China from importing scientific knowledge and technology. This included goods, materials and technologies of a military nature and of strategic interest, such as transport technology, computers, software and sophisticated telephone exchange equipment. However, COCOM was dissolved on March 31, 1994. Its successor, the Wassenaar Arrangement, was established in 1996 to counter the threat of state terrorism. Are pandemics our new threats?

Historical sequencing is possible between:

- the beginning of the Enlightenment and the rise of industrialization;
- the de-industrialization of the Western world to the benefit of other countries during the 1980s and 1990s, while during this same period, the regalian domains, such as health or education, did not industrialize;
- the situation imaginable after the Covid-19 crisis.

This current and historical sequence is at the origin of refoundations to which we want to contribute, in various scientific and technical fields. These refoundations will not only be enriched by reflections and the putting forward of principles, but also by scientific and sociological creations, the

creation of technological tools and state, entrepreneurial and inter-civilizational rules of operation. Basically, the Covid-19 crisis appears to be a sort of avatar of *laissez aller*, *laissez faire*<sup>2</sup> or *laissez-faire, laissez passer*<sup>3</sup>, according to the formula attributed to Vincent de Gournay, who is considered to have introduced economic liberalism to France in the 18th century. Thus, it does not seem conceivable that we will be able to overcome future health crises, whether their origin is microbiological, toxic, linked to unconventional pathogens (let us recall the prion), climatic, economic, political or technological – or multifactorial – without forcing ourselves to fundamentally question ourselves through the implementation of a new social contract shared by nations.

This book brings together the analyses, ideas and proposals of contributors from different backgrounds, including business, academia, research and civic life, who bring experience and expertise from various specialties and life experiences ranging from biology to sociology and technological and organizational sciences. It is therefore a work “written on the spot” that the reader will discover, a work updated at the time of publication, but which, in addition to analyzing the epidemic and its “side effects”, aims to lay down milestones, relating experiences and reporting reactions with the idea of proposing and building. As for the writing of the text, itself marked by the diversity of the themes, the statements and the authors, it ranges from the scientific style to that of the academic essay, passing through the style of testimonies, the reporting of experiences and personal reflections.

Our thoughts are with all those who left this world – much too soon – because of the pathogenicity of the SARS-CoV-2 virus, its unfavorable biological and health traits, the unpreparedness of health systems and the lack of scientific knowledge. As for the contributors of this book, they have experienced, like so many, painful and significant losses and difficult separations, whether from parents, loved ones, acquaintances or iconic figures. Losses and separations reveal, on the one hand, dysfunctions (imperfections, unconsciousness, rapacity) and, on the other hand, magnificence (caregivers, helpers, the voices of the lonely). May the Covid-19 crisis, which could have been mastered, prove to be an opportunity to develop new practices, new solidarities, new antivirals, new technologies

---

2 Literally, this means “letting go, leaving alone”.

3 Literally, this means “leaving alone, leaving it to happen”.

of care and new tools for epidemic prevention, in which everyone should be an actor, insofar as health is everyone's business. May it be an opportunity to act in order to protect the stakes of public health from commercial competition and economic deregulation, through the implementation of an organized and obligatory cooperation of States around these stakes, cooperation concerning, at the same time, research, production and distribution of molecules and essential materials. All this with the aim of turning the health crisis into an opportunity for the human race.

This book is built around Covid-19. The first finalized texts serve as reflections, complements and elements of controversy for other researchers, and also for actors from the economic and social sphere. New ideas may be added in future texts, thus constituting a body of ideas and proposals for the "day after". The announcements of prolonged states of health emergency in many countries, as we finish this book, suggest that this day after is not for tomorrow.



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# Deciphering the Covid-19 Epidemic and Analysis of Its Controllability

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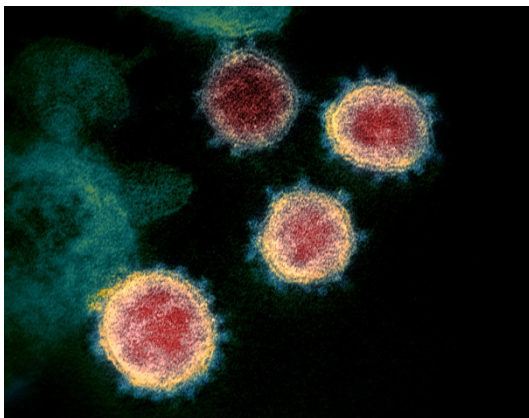
## 1.1. Facts and lessons learned from the emergence of Covid-19 in France

### 1.1.1. SARS-CoV-2 and emerging risks

The emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus (Figure 1.1), which resulted in the appearance in central China in fall 2019 (Wu and McGoogan 2020) of an atypical pneumonia, coronavirus disease 2019 (Covid-19), was followed by its development into a major pandemic. This pandemic, which had a particular impact on France, led to a strong health mobilization throughout the world. Before developing the subject, it is appropriate to pay tribute to the victims of Covid-19, that is, officially, about 6 million people worldwide (between January and September 2020, while 1 million people had already lost their lives as a result of SARS-CoV-2, there were also 320,000 victims of malaria, 340,000 victims of influenza, 780,000 victims of AIDS, 1.2 million deaths linked to road accidents and 3.6 million deaths linked to smoking (Planetoscope 2020)).

Covid-19 disease is the consequence of infection by a virus: emerging (new and with uncertain consequences) from the *Coronaviridae* family; single-stranded RNA (ribonucleic acid), like the influenza virus; highly contagious (one infected person can infect two to four or even eight healthy people, depending on the strain), probably because it settles in the upper

respiratory tract and is thus easily re-excreted via coughing or sneezing; average incubation time of two to six days (Sanche et al. 2020); highly resistant in the environment (resistant for up to 28 days at 20°C on smooth surfaces, but only 24 h at 40°C) (Riddell et al. 2020); potentially seasonal (Amani et al. 2020); believed to use a bat host (Hussain et al. 2020) and the relay host to humans could be mink (Faure and Sciamma 2021), whose farms in China may exceed 100,000 per head – however the analysis of recombinations observed in SARS-CoV-2 does not yet provide any certainty about the interspecific links from which the virus originated (Liu et al. 2020). The symptoms of SARS-CoV-2 mainly affect the respiratory system and the elderly (in France, 75% of deaths involved people over 75 years of age), with a severity linked, in addition to the existence of comorbidities (present in 2 out of 3 victims), to a strong exacerbation of the inflammatory response (Émilie et al. 2020) and also to Kawasaki-like vascular damage in some children (Jones et al. 2020). Mortality associated with SARS-CoV-2, which mainly affects older people, is expected to result in only a moderate decline in average life expectancy, which in France is expected to be in the order of 0.2 to 0.6 years in 2020 (Guillot and Khiat 2020).



**Figure 1.1.** SARS-CoV-2 viruses and their crown-shaped spicules, as seen by transmission electron microscopy (source: NIAID 2020)

With regard to the prevention of epidemics and health crises – and based on France – the INRAE (*Institut national de recherche pour l’agriculture, l’alimentation et l’environnement*, National Research Institute for Agriculture, Food and the Environment) conducted a research program (EpiEmerge) in 2002–2004, within the framework of a conceptual reflection

on epidemiological emergence, focusing on methods for studying emerging plant, animal and human diseases (Sache and Barnouin 2006); this was done using a conceptual approach that was at once biological, biomathematical, environmental, sociological and in terms of public management (Barnouin and Sache 2010). In addition, following the A/H1N1 influenza pandemic of 2009–2010, a national prevention and control plan, known as the *Pandémie grippale* (influenza pandemic), was established and subsequently revised in 2011 (SGD 2011); this plan constituted the reference for public authorities with regard to the Covid-19 crisis. In addition to the field of health and food safety, emerging technological risks are studied in France: at the École des Mines de Nantes by the chair “Emerging Risks and Technologies, from Technological Management to Social Regulation” (Guimard 2016), and in the nuclear safety and insurance sectors, via “risk barometers” (Chubb 2018). As for climate risks, they are monitored by the ONERC (*Observatoire national sur les effets du réchauffement climatique*, National Observatory on the Effects of Global Warming) (ONERC 2020). Despite these notable initiatives, significant progress seems to be required if we are to have, in France and elsewhere in the world, optimal operational capacities with regard to the harmful consequences of emerging risks on health.

The aim of this chapter is to draw lessons from the Covid-19 crisis, based on the history of the disease in France and its distribution throughout the world. Based on information disseminated by the authorities and the press, or from unpublished interviews with the actors of the epidemic, this work, which takes stock of the health crisis, is intended to be a combat tool for the fight against future emergencies.

### **1.1.2. The emergence of the emergence**

#### **1.1.2.1. The facts**

The first three cases of Covid-19 were announced in France on January 24, 2020 by health authorities, while the first Chinese cases, reported in Wuhan (Hubei province), officially date from November 17, 2019, that is, 78 days before the first official French cases were announced.

The French cases concerned in particular a 48-year-old man from Bordeaux, of Chinese origin, who had traveled to Wuhan and Shanghai (China), returning to France on January 22 via the Bordeaux-Mérignac airfield (Gironde), and worked in the wine trade. The 40-year-old, who was

treated at the Pellegrin hospital after consulting SOS Médecins, was released on February 13 after spending 22 days in quarantine. On leaving the Bordeaux University Hospital, the patient, a commercial intermediary between Bordeaux winegrowers and Chinese wishing to invest in wine estates, told a journalist:

This forced isolation made me realize how precious daily life is. I was locked up. It was hard. That mundane, but fundamental freedom to be free to move, like going out on the street, going back and forth, is essential (Goinière 2020).

Previously, the salesman had stated, in reference to his hospitalization conditions at the Pellegrin University Hospital:

Here, everyone who comes in is in a suit, with masks, gloves and glasses. We have no physical contact (Castera 2020).

The communicative inhabitant of Bordeaux, treated at the tropical and traveler diseases unit of the university hospital with the help of an antiviral, remdesivir (Cristiani 2020) – and who has since completely recovered from his infection – had moreover specified, speaking about China:

At the beginning of last week, everyone knew that this virus existed, but people were not worried. In fact, very few people outside were wearing masks.

Believing that he was infected in the area of the Wuhan bus station, where the fish market is located and where the virus was reportedly detected – or even on the train – the patient stated: “I started coughing a few days later” (Castera 2020).

The other contaminations announced on January 24 concerned a Chinese couple, aged 30 and 31, from Wuhan, who arrived in Paris on January 18 and were treated at the Bichat hospital, from where they were discharged on February 12 (Mari 2020). In addition, an 81-year-old Chinese tourist from Hubei province, 400 km from Wuhan, who arrived in Paris on January 23 with his 50-year-old daughter, was diagnosed with the coronavirus on January 24 and hospitalized on January 25 at Bichat Hospital, where he died on January 28, becoming the first victim of Covid-19 in France and Europe. As for his daughter, she was cured after her stay at Bichat (France info

2020). One day after the Chinese tourist's death, Air France suspended its flights from Wuhan, with the destinations of Shanghai and Beijing being reduced in frequency from January 31 (Samama 2020).

In addition, a businessman from Servomex (a company specializing in gas analysis), who had just returned from Singapore where he had attended a conference at the Grand Hyatt hotel from January 21 to 23, went to the Contamines Montjoie ski resort in Haute-Savoie on January 24. He stayed there for four days, the time it took to infect five British people, including a child, who tested positive on February 8 and were hospitalized in Grenoble (Isère), Lyon (Rhône) and Saint-Étienne (Loire). The businessman then returned to England, where he was declared positive and was the source of at least five English cases, two of which were linked to doctors (Dugit 2020; Mc Lean and Feleke 2020), and of a cluster involving several municipalities in Haute-Savoie. During the conference organized by Servomex, a 27-year-old Singaporean contracted the virus via a conference employee living in Wuhan, and as a result, two South Koreans and a Malaysian tested positive on return to their countries (Mei and Taj 2020). In addition, the sequencing of SARS-CoV-2 by the Pasteur Institute was announced on January 29, and on January 30 the contamination of a Parisian doctor infected by Chinese patients who had left for Taiwan after having consulted him, a country in which one of them was declared infected (Mari 2020). January ended with the repatriation of Europeans living in Wuhan through the transport squadron 03.060 Estérel from Air Base 110 "Lieutenant-colonel Guy de La Horie" at Creil (Oise) (Ministère des Armées 2020b).

The history of initial cases of Covid-19 in France was called into question in May 2020 (Roy 2020). Indeed, a 42-year-old man living in Bondy (Seine-Saint-Denis), initially diagnosed with influenza on December 27, 2019, was recognized as suffering from Covid-19 on that date via analyses carried out a posteriori (the infected person's children also showed symptoms). The patient's wife, suspected asymptomatic, was declared to be in contact with Asian salesmen in her workplace. Other early cases were reported in Alsace via the hospital in Colmar (Haut-Rhin) on May 7: a 57-year-old man confirmed positive on December 2, 2019 and more than a dozen other cases – including two suspicions on November 16–17 and a suspect scan on November 1 (Haby 2020). As for a retrospective epidemiological study conducted on data from Haut-Rhin, it indicated that SARS-CoV-2 appeared to be circulating in this department as early as January (Gerbaud et al. 2020). In addition, French athletes who participated

in the Military Games in Wuhan during the second half of October (the source of a Sino-American controversy on the possible epidemiological role of this event) (de Sèze 2020) believe that some of them were infected by Covid-19 following their stay in China, although their symptoms could not be validated as corresponding to this disease (Opoczinski 2020).

#### 1.1.2.2. *Lessons learned*

The period from January 23 to February 1, 2020 corresponds to the epidemic peak of Covid-19 in China, essentially in Wuhan and Hubei, with an average of over 2,500 new cases per day (Wu and McGoogan 2020). There is then little doubt about the possible consequences of the viral emergence in France, which appears to be Wuhan-dependent, as confirmed by a sequencing study of SARS-CoV-2 conducted by the Pasteur Institute (Gámbaro 2020; Institut Pasteur 2020).

Furthermore, the first stage of the French emergence highlights, in addition to the risk of transmission via the Chinese epicenter of the epidemic, certain characteristics of the infection already observed in China: the significant contagiousness of the virus; a duration of a few days for incubation; greater involvement of men; severity in the elderly; the role of tourism and air transport; the risk for general practitioners; the effectiveness of strict isolation in preventing new contaminations; the tendency for initial underestimation of the danger of the epidemic and the acceleration of contagion by “congregated communities” comprising infected and non-sick – or unrecognized sick – individuals from various horizons who, on their return to their places of origin, could have been the agents of the outbreak or aggravation of a national epidemic – this being like the role played by the Metropole Hotel in Hong Kong (China) in the epidemic due to the SARS-CoV coronavirus (whose animal emergence chain may have involved the bat and the webbed civet), which caused nearly 900 deaths worldwide in 2002–2003 (Fraissard 2004). Thus, a probable health catastrophe was knocking on the door in France in the first phase of the epidemic.

In order to measure an emerging risk, it is necessary to have pre-positioned mobile teams capable of investigating, via legally enshrined intervention capacities, wherever the risk needs to be assessed. These teams must have investigative capabilities via dedicated logistics (servers, laboratory, means of transport) and varied skills. As we will see later, such an organization needs to be fully operational in order to control an emerging epidemic agent,

in addition to the constitution of a multidisciplinary monitoring committee responsible for advising the State authorities. If such a committee appears to be indispensable, it seems nevertheless useful that it be composed of both confirmed experts and young innovative researchers, in order to be as informed and reactive as possible.

The type of organization mentioned above must allow for defensive measures to be taken that are as adapted as possible to an epidemic situation, following the infection as closely as possible, then overtaking it before “nipping it in the bud” by drying up its transmission. This type of organization requires that operational teams be linked to databases capable of self-modeling based on the current epidemic dynamics or even on those of previous epidemics. Since one of the conditions for successful infection control is the avoidance of contact and the protection of caregivers, the development of telemedicine and artificial intelligence, as well as the use of robots capable of performing certain medical procedures, should also be promoted in the initial epidemic phase (Saltmarsh 2020b). Nevertheless, the fact that the action of an emerging pathogen generally contains many gray areas may mean that the most appropriate decisions to counter its spread may not always be taken.

### **1.1.3. Oise cluster**

#### **1.1.3.1. *The facts***

On January 31, 193 Frenchmen were repatriated from Wuhan by the A340 of the Estérel squadron (Figure 1.2) from the Creil defence base (2,800 employees, including 800 civilians and 1,300 people assigned to military base 110). While Air Base 110 houses part of the military intelligence services – and should host the army’s spy training center – its airstrip is hardly used anymore, which implies that the repatriation plane was stationed at the Roissy-Charles-de-Gaulle airport (Val-d’Oise), like the other planes of the squadron (assigned to military missions, transporting officials or repatriation) (Ministère des Armées 2018). The personnel of the Creil base, having taken charge of the flight to Wuhan, did not get off on arrival in China, the repatriated being, for their part, considered not sick, as they tested negative before boarding. Disembarking at Carry-le-Rouet (Bouches-du-Rhône) on their return to France, the repatriates remained in quarantine in closed buildings for 14 days and came out of the quarantine with no illness.