Rhizomatic Healthcare: The Digital Transformation of France’s Medical Landscape

Abstract: This paper explores the implications of the digital advancements on patient empowerment and the role of healthcare professionals. It examines the challenges and opportunities presented by this digital shift, including data privacy concerns, the need for continuous technological adaptation, and the potential for increased healthcare accessibility. The paper underscores the critical importance of legal and ethical considerations in shaping a sustainable and equitable digital healthcare landscape. Through this exploration, the paper aims to provide a comprehensive overview of the ongoing digital revolution in French healthcare and its broader implications for the global healthcare sector.

Keywords: telemedicine; digital health record; patient empowerment; data privacy; healthcare accessibility; legal and ethical considerations

1 Rhizomatic Shifts: Societal Evolution and the Transformation of Healthcare

In the contemporary world, the evolution of healthcare systems is emblematic of broader societal changes, particularly those influenced by the principles of rhizomatic structures as conceptualized by philosophers Deleuze and Guattari. This rhizomatic perspective, which views social systems and knowledge as non-hierarchical, interconnected networks, akin to the sprawling root systems of plants, offers a profound lens through which to understand the dynamic shifts in healthcare. The transition in healthcare is not just a technological or medical
phenomenon; it is deeply rooted in societal evolution, mirroring the ever-changing, interconnected fabric of our global community:

Signs are not signs of a thing; they are signs of deterritorialization and reterritorialization, they mark a certain threshold crossed in the course of these movements.²

This societal evolution towards a more integrated and networked world finds a direct parallel in the transformation of healthcare systems, especially evident in the way countries like France have embraced telemedicine and digital health records. These advancements in healthcare are not mere adaptations to new technologies; they represent a fundamental shift in how healthcare is conceptualized and delivered. It is a shift from a traditional, centralized approach to a more decentralized, patient-centric model, much like the rhizome that extends in multiple directions, forging new pathways and connections:

the rhizome is an acentered, nonhierarchical, nonsignifying system without a General and without an organizing memory or central automaton, defined solely by a circulation of states.³

The rhizomatic nature of this evolution is crucial to understanding the current and future state of the healthcare landscape. It is an evolution that transcends geographical barriers, bringing together diverse elements of the healthcare ecosystem to create a more accessible, efficient, and inclusive system. This transformation is not just about the digitalization of health services but is also about how these services reconfigure relationships between patients, healthcare providers, and technology.

As we delve into the specific changes in France’s healthcare system, it is important to keep this broader context in mind. The move towards telemedicine and digital health records reflects a larger societal shift towards a more interconnected and accessible world. This introduction sets the stage for exploring how these changes, underpinned by rhizomatic theory, mean a significant evolution in healthcare, reshaping the way health services are accessed and delivered in the modern age.

2 Bridging Healthcare Gaps with Telemedicine

In France, the disparity in healthcare access is a significant concern. As of 2019, approximately 7.4 million people, or 11% of the population,⁴ were living in areas

² Ibid 88.
³ Ibid 42.
known as ‘medical deserts’ (underserved areas), where healthcare services are notably limited. This issue is further exacerbated by the fact that a third of French towns are experiencing a shortage of general practitioners. The overall medical density is decreasing, primarily due to the retirement of current practitioners, the capping of students enrolled in medical studies, and the aging of the population with 3.4 doctors per 1000 people according to the figures from the Organisation for Economic Co-Operation and Development.\(^5\) The challenge of medical deserts in France is largely associated with the availability of general practitioners, rather than just geographical accessibility, as noted in the DREES report (2021).\(^6\)

Confronted with the dual pressures of ongoing urbanization and a growing elderly population, France grapples with the expanding problem of these medical deserts. The scarcity of healthcare access in such areas, alongside the dwindling number of general practitioners in many towns, presents a daunting challenge for the nation’s healthcare system. This situation is anticipated to worsen in 2024, with an increasing number of practitioners reaching retirement age and fewer new doctors entering the field.

To combat these issues, various strategies have been proposed, with telemedicine emerging as a particularly effective solution as from 2018. This forward-thinking approach is deemed crucial for mitigating regional health disparities and improving healthcare access, especially in underserved regions. Teleconsultation emerges as a crucial tool in reforming the healthcare system. On the one hand, it enables rapid care management, including diagnosis and prescriptions, for benign pathologies. On the other hand, it also allows for the telemonitoring of chronic diseases. While teleconsultations do not replace traditional consultations, they help overcome logistical barriers, such as travel or excessive waiting times, to see a general practitioner or specialist.

The healthcare sector in France is in the midst of a significant transformation, propelled by rapid advancements in digital technology and artificial intelligence. The adoption of telemedicine, akin to a ‘rhizomatic’ structure, marks a substantial shift in healthcare delivery method. This shift represents a progression towards a more interconnected, efficient, and dynamic healthcare system, which is vital for tackling the current challenges in healthcare and enhancing patient safety in an increasingly digital era.


Given the unique challenges faced by France, telemedicine has emerged as a vital tool in addressing the limitations posed by underserved areas. Digital platforms, like Doctolib, together with advanced solutions are instrumental in bridging the gap in healthcare accessibility. These technological advancements play a pivotal role in reducing regional healthcare disparities, ensuring the provision of vital medical services to remote and underserved communities. This approach not only broadens the scope of healthcare services but also underscores a commitment to equitable and comprehensive healthcare for every segment of the French population.

3 Rhizomatic Healthcare Legal Evolution

The evolution of telemedicine and digital health record policies in France, analyzed through the lens of Deleuze and Guattari’s rhizome theory, illustrates a profound transformation in healthcare. This theory, emphasizing non-hierarchical, interconnected networks akin to root systems, helps to conceptualize the healthcare system’s transition from traditional, in-person practices to digitally integrated models.

The pivotal change began with the issuance of Decree No. 2010–1229 on October 19, 2010, signaling a deterritorialization of healthcare services. This decree disrupted the conventional, centralized model, facilitating remote consultations and diagnoses and breaking down physical and geographical barriers. This shift is reflected in the decree’s articulation of telemedicine:

Art.R. 6316-1. Telemedicine, as defined in Article L. 6316-1, encompasses medical acts performed remotely using information and communication technologies. The following are considered acts of telemedicine:

1. Teleconsultation, which aims to enable a medical professional to provide a consultation to a patient from a distance. A healthcare professional may be present with the patient and, if necessary, assist the medical professional during the teleconsultation. Psychologists mentioned in Article 44 of Law No. 85–772 of July 25, 1985, covering various social provisions may also be present with the patient;

2. Tele-expertise, which aims to allow a medical professional to seek remotely the opinion of one or more medical professionals due to their specific training or skills, based on medical information related to a patient’s care;

3. Remote medical monitoring, which aims to enable a medical professional to remotely interpret data necessary for a patient’s medical follow-up and, if necessary, make decisions

regarding the patient’s care. The recording and transmission of data can be automated or carried out by the patient himself or a healthcare professional;

4. Tele-assistance in medicine, which aims to enable a medical professional to remotely assist another healthcare professional during the performance of an act;

5. The medical response provided within the framework of the medical regulation mentioned in Article L. 6311-2 and the third paragraph of Article L. 6314-1.8

This definition further establishes the foundation for France’s evolving telemedicine landscape.9 Further deterritorialization is also observed in Decree No. 2022-1434, which underscores the digitalization of occupational health records. This decree facilitates the flow of healthcare data across a decentralized, digital network, embodying the rhizomatic model’s non-linear connections:

Article 5

I. - Medical records in occupational health created as of the publication of this decree, as well as those established before this date for workers who are still being followed by an occupational health and prevention service, or an agricultural occupational health service, on this same date, must comply with the provisions of articles R. 4624-45-3 and R. 4624-45-4 of the Labor Code or those of I and II of Article R. 717-27 of the Rural and Maritime Fishing Code, in their wording resulting from this decree, by no later than March 31, 2023.

II. - Occupational health medical records, established before the publication of this decree, for workers who are no longer being followed by an occupational health and prevention service, or by an agricultural occupational health service as of this same date, remain governed by the provisions of the Labor Code and the Rural and Maritime Fishing Code, in their wording prior to this decree, with the exception of provisions related to the communication, hosting, and conservation of the records.10

The mandate for mobile applications in France to comply with the RGAA – known as the General Framework for the Improvement of Accessibility – and European Directive 2016/210211 represents another deterritorialization, dismantling barriers

that limited access for individuals with disabilities. This aligns with the rhizome’s attribute of expanding inclusive connections.

Compliance with these mandates involves adherence to the Harmonized European standard EN 301 549,\textsuperscript{12} which outlines specific technical requirements for digital content accessibility, ensuring usability for people with disabilities. It serves as a comprehensive guide for developers, and its implementation requires transparent declarations of compliance, enhancing accountability in accessibility.

However, vulnerable individuals,\textsuperscript{13} due to age and financial limitations, can benefit from other solutions like ‘tele-cabins’ at post offices or vans with public service agents or individuals trained in new technologies.\textsuperscript{14} This should be considered before the agreement and funding from local government bodies. Expanding on this idea, it suggests the implementation of innovative and accessible services to assist those who may face challenges in accessing traditional services due to age-related mobility issues or financial constraints. The use of ‘tele-cabins’ in public spaces, like post offices, Town Halls, mall centers or even railway station offices\textsuperscript{15} could offer a novel approach to making these facilities more accessible to elderly or disabled individuals, particularly in areas with challenging topography.\textsuperscript{16}

Additionally, the concept of vans staffed with public service agents or those trained in new technologies could serve as a mobile solution to bridge the digital divide. These vans could travel to various neighborhoods, providing assistance and access to technology and government services for those who might otherwise struggle to access them. This service would be especially beneficial in rural or underserved areas. Before such initiatives can be implemented, they would require the agreement and financial backing of local government bodies,\textsuperscript{17} and the National Health Agency. This process would involve assessing the needs of the community, the


\textsuperscript{17} L’Assurance Maladie, La Téléconsultation (3 Octobre 2023), https://www.ameli.fr/medecin/exercice-liberal/telemedecine/teleconsultation/teleconsultation.
feasibility of the solutions, and the allocation of necessary resources. By gaining local government support, these services could be effectively integrated into existing public service frameworks, ensuring sustainability and accessibility for those in need.

This policy evolution in France marks a significant stride toward a more inclusive digital environment, reflecting a commitment to legal and ethical standards and societal recognition of the importance of digital inclusivity. By adhering to these standards, mobile applications in France are not only fulfilling legal obligations but also contributing to a more accessible, equitable digital world for all users.

4 Navigating Cybersecurity in a Rhizomatic System

Digital platforms in the healthcare sector, integral to the efficient management of patient data, have become prime targets for cyber-attacks. The rhizomatic nature of these systems, characterized by their extensive and interconnected data pathways, has facilitated the unauthorized access and manipulation of sensitive information. These breaches have serious repercussions, including compromised patient confidentiality and the potential for misdiagnoses and inappropriate treatments due to the alteration or loss of critical data.

The concept of a rhizome, with its interconnected and non-hierarchical nature, aptly describes the current structure of the French healthcare system in the digital era. This rhizomatic structure, while fostering extensive connectivity and integration, has also been a critical weak point in the face of escalating cyber threats impacting both digital platforms and physical clinics and hospitals.

The impact of these cyber threats extends beyond digital realms, affecting physical clinics and hospitals. In several instances, healthcare facilities have had to urgently reorganize their operations in response to cyber-attacks. The rhizomatic interconnectedness of their digital and physical systems means that a breach in the digital sphere can cripple their operational capabilities. Hospitals and clinics have found themselves reverting to manual systems, leading to significant operational slowdowns and impacting patient care. This is especially critical in emergency situations, where the rapid retrieval of patient data is essential.  

This emergency reorganization highlights the vulnerabilities inherent in the rhizomatic structure of the healthcare system. The interconnectedness that facilitates efficiency also creates multiple points of failure, where an attack on one node can disrupt the entire network. Consequently, healthcare facilities have faced not only the immediate challenge of maintaining patient care during cyber-attacks but also the long-term challenge of rebuilding and reinforcing their digital infrastructure.

Addressing these vulnerabilities requires a comprehensive approach that acknowledges the rhizomatic nature of these systems. Strengthening cybersecurity involves not only implementing robust security measures like encryption and secure access controls but also developing contingency plans for rapid response and recovery during cyber incidents. Regular training for healthcare staff is crucial, preparing them to maintain patient care and manage data effectively during disruptions.

Furthermore, collaboration across the healthcare sector is essential. Sharing knowledge and resources among healthcare providers, cybersecurity experts, and policymakers can lead to the development of more resilient systems. Such collaborative efforts can help mitigate the inherent weaknesses of the rhizomatic structure, ensuring the continuity and reliability of healthcare services in the face of cyber threats. In addition to these measures, the establishment of organizations like Cybermalveillance.gouv.fr, launched in 2017 by the French National Cybersecurity Agency (ANSSI), plays a critical role. This national platform offers assistance and support to victims of cyber incidents. Moreover, the creation of the “Commandement de la Gendarmerie dans le Cyberespace (ComCyber-Mi)”, on November 23, 2023, marks a significant step in combating cybercrime. This unit centralizes all digital components of the gendarmerie to effectively tackle criminal activities in cyberspace.

While the rhizomatic structure of the French healthcare system in its digital transformation offers many advantages, it also presents significant challenges in cybersecurity. The recent cyber-attacks on both digital platforms and physical healthcare facilities highlight the urgent need for robust security measures and emergency response strategies. Balancing the benefits of a highly interconnected system with the need for security and resilience is crucial in safeguarding the health and well-being of the population.

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5 Embracing Changes: Balancing Progress and Challenges

The digital rhizomatic healthcare revolution in France, with its decentralized, interconnected structure, represents a significant transformation with both positive and negative implications.

On the positive side, this digital transformation has significantly improved healthcare accessibility, especially in underserved or remote areas, by overcoming geographical barriers. The adoption of telemedicine and digital health records has not only facilitated more efficient patient care management but also allowed for more personalized patient experiences. This shift towards a patient-centric model represents a progressive step in healthcare delivery, aligning with broader societal changes towards a more interconnected and accessible world.

However, this digital evolution also brings with it notable challenges, particularly in cybersecurity. The interconnected nature of the rhizomatic structure, while beneficial for information flow and accessibility, also makes the system more vulnerable to cyber threats. These threats can lead to compromised patient confidentiality, disrupted healthcare services, and potentially life-threatening situations in emergency cases. Addressing these vulnerabilities requires comprehensive cybersecurity strategies, including robust protection measures and regular training for healthcare staff to manage data effectively during disruptions.

Furthermore, the digital transformation introduces a need for continuous technological adaptation, placing a demand on healthcare providers to stay abreast of the latest developments and integrate them into their practice. This can be both a logistical and financial challenge, particularly for smaller providers.

In conclusion, while the digital rhizomatic healthcare revolution in France heralds a new era of improved access and efficiency in healthcare, it also brings to light the critical importance of cybersecurity and the need for ongoing adaptation to technological advancements. Balancing these aspects is essential to harness the full potential of this digital transformation while safeguarding the integrity and reliability of the healthcare system.

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Bionote

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