Transform Health
SENEGAL

Landscape Analysis
Digitisation & Health Data Governance in Senegal

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List of Abbreviations and Acronyms

- ADIE: Sate Computer Agency
- ANACMU: National Agency for Universal Health Coverage
- ANTIM: Agency for Telemedicine and Medical Information Technology
- API: Application Programming Interface
- BI: Business Intelligence
- CEV: Electronic Vaccination Certificate
- CID: Confidentiality, Integrity, Availability
- CIS: Internal Monitoring Committees
- COUS: Health Emergency Operations Centre
- CSeS: Health and Social Map and e-Health Strategy
- CSSDOS: Health and Social Map, Digital Health and Health Observatory
- WEEE: Waste Electrical and Electronic Equipment
- DGPPE: Direction for Planning and Economic Policy
- DGS: General Direction for Health
- DLM: Disease Control Department
- DP: Planning Department
- DPRS: Planning, Research and Statistics Department
- DSISS: Health and Social Information System Division
- EPS: Public Health Establishment
- CMMS: Computerised Maintenance Management System
- HMO: Ouakam Military Hospital
- HPD: Dakar Main Hospital
- CII: Critical Information Infrastructures
- MFB: Ministry of Finance and Budget
- MEPC: Ministry of Economy, Planning and Cooperation
- MSAS: Ministry of Health and Social Action
- CBO: Community Based Organisation
- SDG: Sustainable Development Goal
- WHO: World Health Organisation
- OPTIC: Organisation of Information and Communication Technology Professionals
- CSO: Civil Society Organisation
- PDSS: Health System Digitalisation Programme

- GDP: Gross Domestic Product
- PNA: National Supply Pharmacy
- PPP: Public Private Partnership
- PPS: Health Service Points
- PSE: Emerging Senegal Plan
- DSSP: Digital Health Strategic Plan
- PTN: Digital Technology Park
- SAMU: Emergency Medical Service
- SDIS: Integrated Digital Health System
- SENUM SA: Senegal Digital Company (Société Nationale Sénégal Numérique)
- SG: General Secretariat
- SGG: Secretary General of the Government
- SIGS: Geographic Health Information System
- SN2025: 2025 Digital Senegal
- SNC2022: 2022 National Cybersecurity Strategy
- SNIS: National Health Information Service
- ICT: Information and Communication Technologies
- ITU: International Telecommunication Union

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Executive Summary

The last two decades have been marked by an improvement in Senegal's overall health situation, with most health indicators evolving positively because of overall socio-economic development and specific efforts to improve public health.

However, Senegal has a low level of coverage of social protection. The country's social security system is not very responsive, much less to increase the scale and scope of responses to crises. Formal health insurance systems cover only 20% of the population, leaving out most Senegalese employed in the rural and informal sectors. This situation led the government to introduce the Universal Health Coverage (UHC) programme in 2012[1] to improve people's access to quality health services. Despite that, access to a specialist remains problematic outside of Dakar, as 68% of them are concentrated in the capital[2].

Digital health brings populations closer to healthcare (curative, preventive, promotional), improves the quality of health and social information, enhances the skills of healthcare workers, governance, and thus improves the health status of populations. Digital transformation is reinventing the way we diagnose, treat, and manage medical care, putting digital health at the heart of contemporary medical issues. The widespread availability and usage of mobile phones in Africa present an opportunity for the development of health systems through digital health initiatives. This study provides an overview of health digitisation policies and health data governance in Senegal, aimed at enhancing the health and well-being of the population. It was commissioned by ENDA Santé, the focal point of the Transform health Coalition in Senegal, using collection and analysis tools described in the Methodological Guidance Report.

Understanding the Dynamics of Stakeholder Engagement in Health Digitization

The Ministry of Health and Social Action (MSAS) conducted an evaluation of digital health initiatives and projects in Senegal in 2015[3]. The results revealed the existence of around fifty isolated initiatives, a fragmented ecosystem, and the need for strategic coordination of digital health at the national level. Considering this observation, the MHSA established in 2017 the Health and Social Map, Digital Health and Health Observatory Unit (CSSDOS), responsible for developing, monitoring and evaluating the Digital Health Strategy, organising digital health and developing digital health projects.

Other key state stakeholders in the digital health sector are the Senegal Personal Data Protection Commission (CDP), the Pharmacy and Medicines Department of the MSAS, public health establishments, the Ministry of Higher Education, with its medical faculties and university hospitals, and SENUM SA (Sénégal Numérique SA). Employers' organisations, such as OPTIC, represent most of the private sector companies involved. Remaining stakeholders include Civil Society Organisations (CSOs) and Community Based Organisations (CBOs),

[1] Between 2013, when the programme was launched, and 2018, the national rate of health cover rose from 20.12% to 49.64%. More information here.
[2] See section 1.1.2 of 2018-2023 Digital Health Strategic Plan
[3] Supported by USAID. More information here.

healthcare professionals, private clinics and the population, and development partners. Additional stakeholders are included in the mappings in the appendices.

Driving Digital Health: Senegal's Multi-Stakeholder Approach and Path to Innovation

The CSSDOS is the gateway and contact point for the MSAS on innovation and digital issues. The country has platforms and applications for healthcare digitisation, as well as an active CDP. E-health initiatives and innovations are also growing rapidly, supported by dynamic entrepreneurs. Telemedicine benefits from high-quality national expertise, and the private sector is heavily involved in healthcare digitisation, with strong encouragement from the government and employers for Public-Private Partnerships (PPPs). In addition, CSOs/CBOs have demonstrated their ability to raise awareness and mobilise the population. The national and international context is favourable to the development of a newDigital Health Strategy (replacing plans from 2012 and 2019), as well as the inclusion of digital health investment projects in the Plan Sénégal Emergent (PSE), the overarching national development framework[4]. In addition, the country benefits from feedback from developed countries, from South-South cooperation, and from capitalising on the dynamics of the COVID-19 pandemic, offering unique opportunities for the development of digital health.

Addressing Challenges for Digital Health Advancement in Senegal

Senegal faces a lack of cross-sector governance and coordination, namely the absence of an ICT strategy in the National Health Development Plan, the high cost of access to Information and Communication Technologies (ICTs), and competition between multiple private initiatives. The lack of qualified human resources in digital health, as well as the insufficient technical investment, remains important, especially outside regional capitals. Potential resistance to change among both population and healthcare staff is particularly strong in rural areas. In addition, the lack of specific regulations regarding digital health, as well as the issues of cybersecurity and confidentiality of health data, are major issues that need to be addressed to ensure the success of health digitisation in Senegal.

Integration of Digital Health Policy within National Digital Strategies

To address digital health policy and strategies, it is important to analyse, firstly, its integration into the national digital policy. A summary can be found in Table 2 in Appendix. Since 2014, Senegal's public policies have been aligned with the PSE. The national digital policy is supported by the:

- 2025 National Digital Senegal Strategy (SN2025), which was developed in 2016 by the Ministry of the Digital Economy and Telecommunications (MDET) and includes an objective of healthcare sector digital transformation.
- National Data Strategy, that reflects Senegal's commitment to using data as a lever for greater social inclusion and economic development, and as a driver for research and innovation.
- National Broadband Plan, that aims at promoting and coordinating the deployment of high-quality infrastructure and access to broadband services and applications throughout Senegal.

[4] Since 2014, Senegal has adopted the Emerging Senegal Plan (Plan Sénégal Emergent or PSE), which constitutes the framework of reference for its economic and social policy. This approach reflects the political will to set in motion a dynamic of economic expansion while guaranteeing the well-being of the population. More information here.

- National Cybersecurity Strategy (SNC2022) that commits Senegal to setting up a national cybersecurity structure, to strengthen the legal and institutional framework for cybersecurity in the country, protect critical information infrastructures and the State information systems, promote a culture of cybersecurity, build capacity and technical knowledge in cybersecurity in all sectors, in particular the health sector, and lastly participate in regional and national cybersecurity efforts.

Senegal has also put in place national digital health strategies specific to digital health. The national digital health policy was launched in 2019 by the MSAS through its 2018-2023 Digital Health Strategic Plan (PSSD). The vision of the PSSD is to enable Senegal, by 2023, to sustainably improve universal health coverage for the population and to provide decision-makers with high-quality, secure information. A notable achievement under the PSSD was the introduction of the Single Shared Patient File (DPUP). This project aims to centralise and make accessible medical and paramedical data from patients to authorised actors involved in care.

The action plan for implementing this strategy is the 2023-2028 Health System Digitisation Programme (PDSS). Approved in 2020, the PDSS includes six major digital projects, and a seventh concerning governance, discussed in detail in Section 5.

The 2022-2026 Strategic Plan for the National Health and Social Information System (PSNSISS) confirmed the need to digitise the data collection system, outlined in the PDSS. Furthermore, the diagnosis of the information system analysed in the PSNSISS reveals the existence of several information sub-systems, with software that is not interoperable with the national health statistics database (DHIS2). Digitising data collection cannot solve the problem of data quality in a holistic way. Indeed, only the digitisation of patient medical records and the introduction of a hospital information system can improve data quality and reduce data retention, for instance in the event of a strike among healthcare staff.

Finally, different strategies are currently being studied to complete this set of policies, such as the National Artificial Intelligence Strategy within the Ministry for the Digital Economy. The MSAS is actively updating the 2018-2023 Digital Health Strategic Plan and the 2018-2023 Health Map, which define the policy on access to healthcare for the 2024-2028 period.

Advancing Community Health Digitization Initiatives in Senegal

Senegal has launched several initiatives, with different partners, to strengthen community health digitisation. For instance, to turn the PSSD into digital projects, PanAfricare Senegal has developed a range of community health tools based on the CommCare mobile technology platform. In the same way, an initiative led by PATH, Digital Square, funded by USAID, the Bill & Melinda Gates Foundation, and a consortium of funders, aims to connect healthcare leaders to the resources needed for digital transformation.

Assessing the Global Digital Health Ecosystem

Senegal's level of digital health maturity has been assessed by the Global Digital Health Monitor (GHDM), and Senegal received the score of 3/5[5], on the basis of the following criteria.

[5] More information on Data analysis and scores available here.

1) Data hosting infrastructures (3/5): datacentres, storage capacity, use of the clouds, hospitals and health centres management software, connection of healthcare facilities to fibre.
2) e-health leadership and governance (4/5): CSSDOS, and the leadership issues with the other departments of the MSAS.
3) Architecture and interoperability of existing platforms (1/5): digital ecosystem of the MSAS, the 2023-2028 Senegal Digital Economy Acceleration Project (PAENS).
4) Human resources skilled in digital health professions (2/5): scarcity of human resources among MSAS departments
5) Broadband access infrastructure: submarine cables, 4G coverage.
6) Use of digital healthcare services (3/5): online application form for COVID 19 vaccination, electronic vaccination certificate, risk of resistance to change.
7) Funding digital health (3/5): government investments in the 2000s, need for self-funding arrangements.

Action to be taken

To overcome the many constraints exposed above and detailed below, such as human factors and skills on the field, expressing and assessing needs, leadership and commitment, decentralisation of interventions, electronic governance, or funding issues, this report delivers a set of recommendations, focusing on

1) expediting the adoption of legislation,
2) implementing robust health data governance regulations,
3) enhancing communication for public engagement and
4) strengthening equipment, infrastructure, and funding for healthcare digitization.

Context

Enda Santé is the host organisation of the Transform Health Coalition in Senegal. Enda Santé is an organisation with a sub-regional reach whose main mission is to support populations, particularly vulnerable groups, in defending their rights and accessing information on appropriate health services. Transform Health is a global coalition of organisations, individuals and institutions committed to achieving Universal Health Coverage (UHC) through the use of digital technologies and data. Its mission is to build a global movement that brings together organisations and institutions across different sectors who are committed to achieving UHC by 2030 by expanding the use of digital technology and increasing access to data.

In order to gain a deeper understanding of the digital health context in Senegal, Enda Santé as the host organisation of Transform Health supported a consultant to develop this national landscape analysis. The findings of the analysis informed the development of the Transform Health coalition's two-year strategy (2024-2026). The overall objective of the Landscape Analysis is to provide an overview of health digitisation policy, and the use and governance of health data to promote the health and well-being of the population in Senegal.

Introduction

The Republic of Senegal is located in the most western part of the African continent, in the Sudano-Sahelian zone. The population of Senegal in 2017 was estimated at 15,256,346 million, with an average density of 78 inhabitants per km2, and an annual growth rate of 2.7%. Senegal is in the third phase of its demographic transition, with a falling birth rate and a continuing decline in mortality, leading to a slowdown in population growth. Life expectancy at birth is 64.8 years.

The population is unevenly distributed throughout the country: Dakar stands out from the other regions by far and hosts almost a quarter of the total population in an area that represents just 0.3% of the country's surface area.

While the poverty rate dropped from 55.2% in 2001 to 46.7% in 2011, it is more pronounced in rural areas, with a poverty rate of 57.1%, against 26.1% in Dakar and 41.2% in other cities. In the past few years, the improvement in living conditions, the development of scientific and technical knowledge, and the strengthening of the supply and organisation of health and social services have all contributed to major gains in health and well-being, as well as in the accessibility, continuity, and quality of services in Senegal.

The last two decades have been marked by an improvement in Senegal's overall health situation, with most health indicators evolving positively because of overall socio-economic development and specific efforts to improve public health. For instance:

- The maternal mortality ratio, although still high, has fallen continuously, from 850/100,000 in the years 86-87 to 392/100,000 in 2010-2011 (compared with 7/100,000 in developed countries).
- Infant and child mortality rates, although still high, have fallen significantly, from 121‰ in 2005, to 65‰ in 2012-2013 (infant mortality), and from 61‰ in 2005, to 43‰ in 2012-2013 (child mortality), respectively.

In terms of social protection, Senegal has a low level of coverage. The country's social security system is not capable of reacting quickly, much less increasing the scale and scope of responses to crises. Formal health insurance systems cover only 20% of the population, leaving out most Senegalese employed in the rural and informal sectors. This situation led the government to introduce the Universal Health Coverage (UHC) programme in 2012 to improve people's access to quality health services. As a result, the number of operational mutual health insurance providers has risen from 80 in 2003 to 671 in 2017, with a health insurance coverage rate of 50% of the population.

This UHC means free care for vulnerable people (pregnant women, children under five, the elderly and patients suffering from kidney failure), the introduction of a method of

funding care (health microinsurance) through community health mutuals and the organisation of services. Indeed, the UHC is the government's recommended strategy to increase the use of services, strengthen the monitoring of patients with chronic diseases, and offer a privileged means for patients to access a specialist. Despite this, access to a specialist physician remains problematic outside Dakar.

Public spending on health and social services represented over €200 billion in 2015, i.e. almost 10% of government programme spending. The long-term trend suggests that spending on health and social services will grow faster than government revenue. The current budgetary context, changes in technology costs and free healthcare initiatives raise questions about the sustainability of the government's method of funding the health and social services system.

1. Methodological approach

1.1. General approach

This study was conducted using an evaluation approach agreed with the ENDA SANTE focal point of Transform Health Senegal. The results were presented and validated during a series of sessions, enabling us to follow up the progress of the work. The background to the assignment and mission objectives can be found in the appendix, section 10.1 and 10.2.

1.2. Collecting data

Secondary data were collected through an active search of the literature on healthcare digitisation in general and in Senegal in particular. We also looked at the legal environment applicable to healthcare digitisation in Senegal. The primary data were collected based on questionnaires and/or interview guides administered to the various players identified for this purpose. In addition to data collection, the purpose of these meetings with the stakeholders was to inform them about the study and, if necessary, to raise their awareness of the support provided by such a project and the benefits it would bring in terms of achieving the objectives. All parties contributed to the success of the study.

1.3. Data processing and analysis

Primary and secondary data were compared to identify any inconsistencies and, if necessary, to carry out more in-depth research to clarify the information.
Data was processed according to a certain logic. The first step was to analyse the data to assess the current situation and then to identify the strategic orientations.

1.4. **Data collection and data analysis tools**

Questionnaire as well as collection and analysis tools that were used in the different phases of this study are provided in the appendix of the Methodological Guidance Report (ROM). They were administered to the targets using a combinatorial approach to gather as much existing data as possible from the organisations and to fill in the various tables.
We invited our targets to share their contextual analyses, their digitalisation needs, their strategic orientations, the feasibility of their action plans, the risks linked to internal and external issues, the challenges they face and their tangible and intangible financing needs.

The chain of services in the health value chain, involving direct and indirect players ranging from patients to practitioners, including diagnostic aids and suppliers of goods, enabled us to establish the target audience for the questionnaire we administered to them, including the members of the Coalition. The bulk of our investigations were carried out with the Government of Senegal, which has already received funding of 150 million dollars from the World Bank to accelerate the country's digital transformation. In that envelope, 50 million dollars will be dedicated to the MSAS, which started, through the CSSDOS, a 5-year project (2023-2027) to digitise the healthcare sector. This funding will be used to build, equip, connect, and interconnect the country's hospitals[6].

A list of the components of healthcare digitisation in Senegal can be found in the appendix, section 10.3..

[6] These initiatives are part of the Digital Economy Acceleration Project (Projet d'Accélération de l'Economie Numérique - PAEN), which is part of Axis 1 of the Emerging Senegal Plan PSE. More information here.

2. Overview of the socio-economic and health situation of the Senegalese population

The third sustainable development goal, with its seventeen targets devoted exclusively to the health and well-being of populations, demonstrates the importance attached to health. Improving people's health is a major challenge for Senegal's projects and programmes. The Emerging Senegal Plan (PSE) and the 2019-2028 Health and Social Development Plan are perfect illustrations of this.

To enable the entire population to access this fundamental right guaranteed by the Constitution, several programmes have been developed and implemented with well-defined objectives and targets. Specific structures, such as ANACMU and SAMU National, have been set up to bring people closer to hospitals in the event of medical emergencies, but also to provide care for people living below the poverty line. Table 3 and 4 in appendix illustrate the potential for care in Senegal. According to the statistics, the density of healthcare providers is 4.3 per 10,000 inhabitants, far from the WHO recommended standard of 23 per 10,000 inhabitants. Children, women and the chronically ill are particularly affected by this shortfall.

Medical infrastructures also are unequally distributed. In 2019, there were 40 Public Health Establishments (PHE - Établissement Public de Santé - EPS)) throughout the country. While 40% of them (14) were in the region of the capital, Dakar, the region of Kédougou had no PHE, and the regions of Kaolack, Fatick, Kaffrine, Kolda, Sédhiou and Tambacounda had only one PHE each.

"Providing the means to live a healthy life and promoting well-being for all at all ages is essential for sustainable development" is one of the objectives of the Sustainable Development Goals (SDGs). The digitisation of healthcare would bring patients closer to university practitioners, who are mainly based in Dakar.

3. Mapping of CSOs/CBOs, government departments and the private sector involved in digital health promotion.

Mapping the different stakeholders, Civil Society Organisations (CSOs), Community Based Organisations (CBOs), Public and Private Sector, and international organisations, has provided us with an overview of the state of play and prospects for health digitisation. The stakeholders involved in digitisation in Senegal are essentially:

- the Ministry of Health and Social Action (MSAS), with its departments such as the Health Digitisation Unit, the Pharmacy and Medicines Directorate, and public health establishments,
- the Ministry of Higher Education with the faculties of medicine and university hospitals
- SENUM SA (Sénégal Numérique SA) formerly ADIE (State Computer Agency)
- Development partners and International Organisations (WHO, the World Bank, Bill and Melinda Gates Foundation)
- the Commission for the Protection of Personal Data (CDP)
- Employers' organisations such as the Organisation of Information and Communication Technology Professionals (OPTIC), which represent the bulk of the private sector companies involved in this field.
- SCOs and CBOs
- Health professionals
- Private clinics
- The population

The stakeholder analysis in the appendix, section 11.11 to 10.13, defines their respective roles and level of involvement. The SWOT analysis gives an overview of digitisation in Senegal.

Strengths	Weaknesses
● MSAS's strong leadership and commitment to digital health ● Creation by ministerial decree of the organisation and management of digital health in May 2017 ● Existence of a unit responsible for the digitisation of health, at the MSAS ● Universal Health Coverage Agency, dynamic for Information and Communication Technology (ICT) use ● Existence of platforms and applications for healthcare digitisation ● Existence and dynamism of the Commissioner for Data Protection (CDP)	● Lack of formalised cross-sector governance and coordination mechanisms to involve all stakeholders ● The National Health Development Plan does not include a strategy relating to the use of ICTs ● Lack of coordination mechanisms with the private sector to facilitate investment in digital health ● High cost of access to ICTs in Senegal in relation to minimum income (around 17%) ● Multiple competing private initiatives ● Catalogue of existing e-Health solutions is not being updated; need

• Existence of SENUM SA to store health data but also as a technical arm to support public and private initiatives • Existence of e-health initiatives and innovation in Senegal • Entrepreneurs are highly innovative when it comes to healthcare • Existence of high-quality national expertise in telemedicine practice • Involvement of employers in healthcare digitisation • Public Private Partnerships (PPPs) are strongly encouraged by the government and employers • Existence of CSOs with experience in raising awareness and mobilising the population	for a more in-depth assessment of these solutions • Lack of qualified human resources in digital health • Lack of qualified ICT human resources outside regional capitals • Insufficient technical investment in rural areas • Lack of equipment in schools • Hostility to change from practitioners • Lack of funding mobilisation by CSOs • Lack of criteria for selecting and evaluating CSOs within the Coalition in relation to the health digitisation
Opportunities	**Threats**
• Existence of a clearly defined digital strategic plan for Senegal, with a section on digital health • National and international context favourable to the development of the Digital Health Strategy • PPP law in place • Availability of Technical and Financial Partners to support the implementation of the Digital Health Strategy • Possible inclusion of digital health investment projects in the PSE • Existence of a law on electronic transactions • Existence of a law and a governance body on personal data protection • Global dynamics, and feedback from developed countries • South-South cooperation for systems adapted to the environment and specific characteristics of Africa • Capitalisation on COVID-19 dynamics	• Risk of developing solutions that are not aligned with the strategy • Risk of fundings that are directed towards non-priority concerns • e-Health projects are compartmentalised because they operate in "project mode" • Redundant solutions and user fatigue • Risk of resistance to change among healthcare staff • Insufficient regulatory texts specifically linked to digital health (e-health applications, connected objects, etc.). • Competition with traditional medicine • Public support, particularly in rural areasCyber security and confidentiality of health data

4. Description of the main plans, strategies, and policies for healthcare digitisation currently underway or planned in Senegal.

4.1. Digitisation plans, strategies and policies in the digital sector

Since 2014, Senegal's public policies have been inspired by the PSE, with its three axes: Axis 1: Inclusive growth, Axis 2: Human development and Axis 3: Good governance.
The national digital policy is no exception. Senegal 2025 National Digital Strategy (SN2025), National Data Strategy, National Broadband Plan and 2022 National Cyber Security Strategy (SNC2022) all contribute to the implementation of the PSE vision and directly or indirectly address healthcare digitisation. We summarise these 3 below.

4.1.1. 2025 National Digital Strategy (SN2025): updated action plan

The "Senegal numérique 2025" (SN2025) strategy was drawn up in 2016 as part of the implementation of the PSE to act as a catalyst for modernising the economy and improving competitiveness. Digital technology is one of the driving forces behind the economy, contributing to GDP growth in all other economic sectors. The vision of SN2025 Strategy is *"digital for all and for all uses by 2025 in Senegal, with a dynamic and innovative private sector in a high-performance ecosystem".*

To ensure that the strategy is aligned with the PSE's second priority action plan (2019-2023) and the SDGs as part of the 2030 Agenda, the MCTEN has updated the SN2025, incorporating new trends and relevant ongoing actions.
Healthcare digitisation is included in the action plan of the updated version of the SN2025, through its strategic objective 7.4 (implement the digital transformation of the healthcare sector) and its action 7.4.1 (Operationalise the digital health strategy).

4.1.2. National Data Strategy

The vision of the National Data Strategy is *"to make data a driver of socio-economic growth, inclusiveness, innovation and international openness by 2028 in Senegal"*. It reflects Senegal's determination to use data as a lever for greater social inclusion and economic development, and as a driving force for research and innovation. It also reflects Senegal's ambition to become part of the knowledge society in terms of data and emerging technologies, in an inclusive and sustainable way, to become better connected internationally.

The health sector is an important use case for this strategy, given the importance of health data for the pharmaceutical sector, research and the well-being of the population.

4.1.3. National Broadband Plan

The aim of this long-term strategic document is to promote and coordinate the deployment of high-quality infrastructure, access and affordability of broadband and ultra-broadband services and applications for everyone throughout Senegal.

The National Broadband Plan aims to establish:

- An infrastructure inventory (exhaustive assessment of all existing infrastructure in relation to broadband objectives)
- Senegal regulatory framework for broadband and ultra-broadband
- A regulatory framework favourable to the integration of high-speed and very high-speed services into the universal service
- A stable legal and regulatory framework to stimulate investment in broadband/ultra-broadband infrastructure and related services and applications
- The ideal conditions to encourage the development of broadband/ ultra-broadband infrastructures and promote the adoption of services by the public and private sector
- Broadband/ultra-broadband network architecture
- Key Performance Indicators for measuring progress towards set objectives

4.1.4. National Cybersecurity Strategy (SNC2022)

The National Cybersecurity Strategy 2022 (SNC2022) articulates Senegal's vision and strategic objectives in terms of cybersecurity, reflecting its ongoing support for the priorities and objectives of the SN2025.

The SNC2022 includes the following key elements:

- An assessment of the strategic context of cybersecurity in Senegal, including current and future threats
- the Government's vision of cybersecurity and the strategic objectives to be achieved
- the general principles, roles and responsibilities that can reinforce this strategy
- the logical implementation framework
- Senegal's vision for cybersecurity is entitled "By 2022 in Senegal, a trusted, secure and resilient cyberspace for all".

To implement this vision, the Government of Senegal will strive to achieve the following five strategic objectives:

- Strengthen the legal and institutional framework for cybersecurity in Senegal
- Protect the State of Senegal's critical information infrastructures (ICC) and information systems
- Promote a culture of cybersecurity in Senegal
- Strengthen cybersecurity capabilities and technical knowledge in all sectors
- Participate in regional and international cyber security efforts

In implementing the SNC2022, the Government of Senegal will apply the principles relating to:

- The rule of law
- Shared responsibility
- Risk-based approach
- Universal access to cyberspace and its full exploitation
- Collaboration and cooperation between all stakeholders

To this end, the Government of Senegal will set up a national cybersecurity structure responsible for playing a leading role in cybersecurity issues and leading the implementation and coordination of cybersecurity initiatives for Senegal.

4.2. Digitisation plans, strategies and policies in the healthcare sector

4.2.1. 2018-2023 Digital Health Strategic Plan (PSSD)

For the first time, Senegal is adopting a national strategy for the digitisation of health. The strategic and cross-cutting nature of digital health has led to the adoption of a participatory approach throughout the process of drawing up the strategic plan, involving numerous stakeholders from the health and ICT sectors.

The 2015 draft of the National e-Health Plan was finalised with the creation of the Health Unit for Digital Health and Health Observatory (CSSDOS), by Order N 8299 of 16 May 2017, which called on the expertise of the World Health Organisation (WHO) to align it as closely as possible with the guide for developing e-health strategies. This guide, drawn up by the WHO and the International Telecommunication Union (ITU), is the reference for defining digital health strategies.

The vision of the PSSD is a commitment to ensuring that: "By 2023, the Digital Health Strategy will enable Senegal to sustainably improve universal health coverage for the population and ensure that stakeholders can make decisions based on high-quality, secure information".

The strategic objectives of the PSSD are:

- Encourage and promote access to quality care through telehealth and e-health.
- Promote the prevention and management of health risks through the wider dissemination of digitised health information towards more comprehensive universal health coverage
- Improve the performance of healthcare staff by making optimum use of ICT in their day-to-day work
- Improve health governance through the availability of high-quality, secure information at all levels of the healthcare system

The strategic plan has had the merit of mobilising the players and setting out the debate on healthcare digitisation, even if its operational implementation has been much delayed.

Source: PSSD launch workshop

4.2.2. 2023-2028 Health System Digitisation Programme (PDSS)

The 2023-2028 Health System Digitisation Programme (PDSS), as an action plan, complements the PSSD in accordance with the WHO and ITU practical guide for national e-health strategies.

In January 2020, the CSSDOS began organising a series of workshops, with the active participation of the General Direction of Planning and Economic Policies (DGPPE) of the MEPC, to identify the needs of MSAS divisions and departments, as well as healthcare structures in terms of information systems, platforms, interoperability, telemedicine, digital communication.

Six major digital projects

1. Digital **patient document** management system
2. **Telemedicine** development project
3. Digital system for managing **outpatient** and **hospitalization** activities
4. **Geographic health** information system (SIGS), bringing together in particular the concerns of the SAMU, COUS, DP and health services
5. Digital **drug**, **blood** and **oxygen** management system
6. Project to digitise **community health** processes

PDSS governance support project

Figure 1: The PDSS projects

The PDSS was approved in September 2020. It is the first investment file in the digital health strategy and is estimated to cost around 42M€. It is made up of 7 projects grouped under the concept of "Programme", the seventh of which being a governance project.

As of January 2024, achievements under the PSSD include:

- The introduction of the Single Shared Patient File (DPUP). This project aims to centralise and make accessible medical and paramedical data from patients to authorised actors involved in care; and
- Hospital Information System;
- Drug digitisation project;
- Digitalisation of community health (in progress); and
- Scaling of software for the national supply pharmacy.[7]

Indeed, effective leadership and the establishment of clearly defined intersectoral governance are essential for the implementation of the strategy. The PSSD states that the creation of the Digital Health Unit strengthened coordination and cooperation between external structures and the MSAS on regular monitoring of the implementation of these sectoral projects related to health and social action. The intersectoral platform between the ICT and Health entities, which is already partly operational at the MSAS level, has been identified for the governance of digital health, in particular with the Ministry of Posts and Telecommunications, ADIE, the CDP, as well as the ARTP and the Fonds de Développement du Service Universel des Télécommunications (FDSUT). It should be noted that collaboration already exists with these entities as a result of existing projects such as m-diabetes, which required this form of collaboration.

Coordination bodies with public, private and civil society stakeholders, as well as technical and financial partners, are just as important to take into account when defining governance in order to strengthen cooperation, harmonisation and partnerships.

The organisational structure proposed the establishment of a Digital Health Steering Committee (DHSC), chaired alternately by the Minister for Health and the Minister for Telecommunications, and a Digital Health Technical Committee (DHTCC), chaired by the digital health management structure.

Thematic working groups are multi-disciplinary technical structures set up to develop the technical reference frameworks necessary for the deployment of the Digital Health Strategy. At this stage, these working groups include the following themes: Mobile Health, Telemedicine and Health Records, Interoperability and Standards, Health Information System, Human Resources, Funding Strategy, Innovation, Legal Framework.

[7] https://www.sante.gouv.sn/sites/default/files/MSAS-Mag._D%C3%A9c.2023_V.F%20_%20Light--%2Bmsas.pdf

It will also be important to define a regional governance mechanism that will ensure the strong involvement of all the regions.

The Steering Committee, the Technical Committee and the Thematic Working Groups will be supported by the CSSDOS. The composition of the technical and strategic support bodies (Technical Committee and thematic working groups) will be proposed by the CSSDOS.

The PDSS was the subject of a technical, financial and economic feasibility study , that was financed by the Ministry of the Economy, Planning and Cooperation. It enabled the programme to be structured in a coherent way before carrying out its multi-criteria evaluation (relevance, coherence, opportunity, social and territorial equity, strategic benefits, feasibility and risk potential, viability and possibly financial profitability) based on socio-economic cost/benefit analysis. This study was used to calculate the economic net present value of the programme, from which it was deduced that the socio-economic benefits outweighed the socio-economic costs. Based on the conclusive results, the project was proposed for inclusion in the State budget. Details can be found in the appendix, section 10.4.

4.2.3. Study on patient record and telemedicine

In 2020, TC4A society conducted a study on patient records and telemedicine for the MSAS. The consultants met with four categories of stakeholders (operational structures, companies, international organisations, and public administration). The final report was prefaced by the MSAS and shared at national level.
This report shared with the different stakeholders the importance that the MSAS attaches to the digital transformation of healthcare and enabled them to express their fears, constraints, and readiness to commit to digitisation. It also highlighted the significant risks of fragmentation between MSAS and the National Agency for Universal Health Coverage (ANACMU) and between MSAS departments themselves and ended with some recommendations.

4.2.4. 2022-2026 Strategic Plan for the National Health and Social Information System (PSNSISS)

"The mission of the health and social information system is to provide stakeholders with quality information to inform decision-making"[8]. The diagnosis of the information system analysed in the PSNSISS reveals the existence of several information sub-systems, with software not interoperable with the national health statistics database (DHIS2), producing data not always available for the Health and Social Information System Division (DSISS) or in unsuitable formats.

[8] Page 22 of PSNSISS

Given these shortcomings, digitising data at source is one only way to improve the quality of health statistics. The information system digitisation needs identified in the PDSS have been confirmed in the PSNSISS. Indeed, the digitisation of data collection is included in the "digitisation of data collection"[9] challenges and constitutes action line 2.5 "Digitisation of the data collection system"[10] . These projects (electronic health records, telemedicine services, digital diagnostics) are priorities within the framework of the USD 50M funding from the World Bank (WB) for digital health over 5 years.[11]

However, DHIS2 is not a data hosting server, nor can its Tracker module (digitisation of individual data by disease or health programme) play the role of patient record because it is not natively designed to play this role.

Digitisation of patient medical records and the introduction of a national digital information system or hospital information system can improve data quality and reduce data retention in the event of strikes by healthcare staff.

4.3. Digitisation plans, strategies and policies

4.3.1. At MCTEN

The National Strategy for Artificial Intelligence has just been finalised and has been presented to the different stakeholders. A Cyber Security Law is currently being drafted and could be finalised by the end of 2023. This law is in the administrative circuit.

4.3.2. At MSAS

The 2018-2023 Digital Health Strategic Plan is currently being updated. The 2024-2028 version will be available before the end of this year and will incorporate new issues such as artificial intelligence.

The ministerial department is also working on updating the 2018-2023 health map. As a reminder, the health map defines policy in terms of access to healthcare, the standards of healthcare provision and identifies needs (such as medical deserts). The new version, which will cover the 2024-2028 period, will be a basis for digitisation. Indeed, the CSSDOS needs to know the number of clinical services in each type of hospital (levels 1, 2 and 3), the number of care units in each type of health centre (levels 1 and 2) and in the health post, as well as their service packages. These packages will be used to update care protocols, which will be integrated into the Integrated Digital Health System (SDIS) platforms to further improve medical accountability.

[9] Page 21 of PSNSISS
[10] Page 24 of the NSSHSP
[11] World Bank, Senegal Digital Economy Acceleration Project (2023).

4.4. Digitisation in the community health sector

4.4.1. Background and justification

In 2013, the World Health Assembly (WHA) adopted resolution WHA66.24 entitled "e-health standardisation and interoperability", inviting Member States to "consider developing policies and legislative mechanisms relating to a comprehensive national e-health strategy". The aim of this strategy is to promote equitable access to health at an affordable cost.

Senegal's Health and Social Action Sectoral Development Policy Letter (LPSD) defines the sector contribution to achieving the development objectives contained in the PSE. It sets out the sector political and strategic guidelines for achieving the Sustainable Development Goals (SDGs).

The promotion of health data digitisation is linked to the LPSD, as attested by Line of Action 8 (Improving the availability and use of health and social information of the 2019 – 2028 National Health and Social Development Plan (PNDSS)): "Promoting innovative technologies for managing health and social information" and "community health digitisation" have been identified as actions that can improve data availability and strengthen health and social information management capacities. This will improve the collection, processing and use of data and the dissemination of results for management and decision-making purposes.

It testifies to the political will to integrate healthcare digitisation into the sector priorities. In this sense, the "Community Data Digitisation Project" will contribute to achieving the objectives of the 2019-2028 PNDSS, which operationalises the sector LPSD.

4.4.2. Initiatives

Senegal has launched several initiatives to strengthen community health digitisation (an area of health that involves real community participation in improving health). The members of a geographical community, aware that they belong to the same group, reflect together on their health problems.

These projects are in line with MSAS LPSD, which defines the Government's health policy, as evidenced by Line of Action 8. It reflects the political will to make healthcare digitisation a priority.

Between 2019 and 2020, a pilot project on the use of the DHIS2 mobile module by community stakeholders was implemented in the Malem Hodar health district in the Kaffrine region with the NGO Save the Children, in collaboration with ISED.

In addition, a community data digitisation project has been included in the Consolidated Investment Budget (BCI).

In the same way, an initiative led by PATH (Program for Appropriate Technology in Health), Digital Square, funded by USAID, the Bill & Melinda Gates Foundation and a consortium of funders, aims to connect healthcare leaders to the resources needed for digital transformation.

Within this framework, MSAS, with the support of Digital Square, has developed a plan for healthcare sector digitisation by establishing a Country Profile (situational analysis) along three axes (Human Resources, Governance and Systems).

To turn the PSSD into digital projects, PanAfricare Senegal (former Africare Senegal) has developed a range of community health tools based on the CommCare mobile technology platform.
Various initiatives have been proposed and are currently being implemented with PanAfricare Senegal. They are detailed in the appendix section 10.5.

The activities planned for the development of the plan, including a round table on the digitisation funding, will help to better identify the orientations of these stakeholders and to strengthen commitment and coordination to support community health digitisation.

5. Overview of the regulations and laws governing digital health and health data management (security, confidentiality, patient protection)

5.1. Regulation of the use of ICTs and protection of personal data

5.1.1. At international level

The 2004 Budapest Convention and the 2014 AU Convention are generally cited as being binding on all countries. The Budapest Convention, ratified by Senegal in 2016, is the first international treaty on cybercrime. Because of some of its limitations (for instance, states cannot demand information from GAFAM, the five largest American internet companies, to prosecute a cybercriminal or cyber delinquent), a second protocol is currently being drafted.

Aware of the threats generated by cybercrime, the Heads of State and Government of the AU, meeting on 26 and 27 June 2014 in Malabo, Equatorial Guinea, for the 23rd Ordinary Session of the AU Summit, adopted the AU Convention on Cybersecurity and Protection of Personal Data[12].

The Convention aims to "strengthen and harmonise the current ICT legislation of Member States and Regional Economic Communities (RECs)", while respecting fundamental freedoms and human and peoples' rights. It also aims to create "an appropriate normative framework corresponding to the African legal, cultural, economic and social environment" and stresses that the protection of personal data and privacy is a "major challenge of the information society"; any processing of personal data must respect a balance between fundamental freedoms, the promotion and use of ICTs, and the interests of public and private stakeholders.

5.1.2. At national level

Since 2008, Senegal has been adopting legislation setting out the legal framework for ICTs.

- Law 2008-08 of 25 January 2008 on electronic transactions aims to ensure the security of electronic transactions in Senegal.
- Act No. 2008-10 of 25 January 2008, the *Information Society Orientation Act*, lays down the common law for the Senegalese information society.
- Law No. 2008-11 of 25 January 2008 on cybercrime emphasises reforms in the fight against cybercrime. According to the ITU, *"Senegal is the target of major cyber-attacks[13] and must take decisive action to strengthen its regulatory and*

[12] 2014 AU Convention : https://www.afapdp.org/wp-content/uploads/2014/07/CONV-UA-CYBER-PDP-2014.pdf

[13] According to Adjeoura Haikreo, CEO of 4Itsec-Africa, Senegal is the fifth most attacked African country by cybercriminals on the continent, as revealed by Cyber October 2020.

institutional framework, otherwise it will continue to be poorly ranked in cybersecurity indices. The International Telecommunication Union (ITU) ranked Senegal 100th out of 182 countries and 18th out of 43 African countries in its Global Cybersecurity Index 2020".[14]

- Law no. 2008-12 of 25 January 2008 on the protection of personal data, the objectives of which are to fight privacy breaches that may be caused by any processing of personal data that directly or indirectly identifies a person. The Government has decided to revise this law on the protection of personal data. The new bill has already been adopted by the Council of Ministers and the Supreme Court and is awaiting a vote by the National Assembly. Several provisions relating to health data have been added, such as identity numbers, biological test results and medical history, without the appropriate involvement of the MSAS (it took part in only one meeting during the entire process).
- Law No. 2018-28 of 12 December 2018 on the Electronic Communications Code aims to strengthen the central role of telecommunications and the digital economy, to contribute to the Senegal Digital Strategy.
- The Criminal Code has been amended to include offences relating to ICTs.
- A new draft law on digital health (anticipated by end 2024) will supersede these existing legislation once passed (see below).

A draft law[15] on digital health and its implementing decree have been finalised and sent to the Secretary General of the Ministry of Health in 2023. The draft law is currently being studied by the Ministry's various departments[16]. This draft law aims to regulate the use of digital technology in the health sector, in particular health data digitisation and hosting[17]. The text covers telemedicine, patient records, hosting and other issues relating to the digital transformation of the healthcare system[18].

There is no current policy for sharing health data between Senegal and the countries from which medical tourism originates, such as Gambia, Guinea, Mali and Mauritania. These countries have hardly started digitising their health systems; however, some hospitals have software for transmitting health data and monitoring billing. This presents an opportunity to take a regional approach towards harmonising health data governance policies, standards, and data-sharing between Senegal and its regional neighbours.

For more information, see:
https://www.unodc.org/westandcentralafrica/en/2020-10-16-cyber-october-senegal.html.

[14] ITU, 2021. Global Cybersecurity Index 2020. Available at:
https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx.

[15] Please note that this is not a publicly accessible document; based on information from the Ministry of Health.

[16] The Ordre des Médecins is due to contribute to an article (February 2024).

[17] According to Mouhamed Diop, Director of Legal Affairs, Litigation and Compliance at the Senegalese Personal Data Protection Commission. More information here.

[18] According to Dr Dia, Coordinator of the CSSDOS. More information here.

5.2. **Digital Health Regulation**

5.2.1. Existing legal texts

The MSAS is a regulated field, with laws dating back to the years of independence, such as:

- The public health code
- Law no. 66-69 of 04 July 1966 on the practice of medicine and the medical association. The revision is also under way
- Law n°81-70 of 10 December 1981 relating to the practice of dental surgery, which has been replaced by law n°2023-05 relating to the practice of dental surgery and the National Order of Dental Surgeons of Senegal

Neither the new nor the old texts include provisions on digital health including connected medicine or connected dental surgery. [19]

However, article 16 of law no. 98-08 of 02 March 1998 on hospital reform, as amended by law no. 2015-12 of 03 July 2015, stipulates that: "Public hospital health establishments shall implement an information system to provide information on the activity and costs of the care provided". This provision announces the implementation of an information system without giving any further details about whether it will be digitised. Except for this provision of the hospital law, no other provision takes digital health into account in Senegal.

To remedy these shortcomings in the way digital technologies are considered in healthcare, the MSAS has proposed to the government a draft law and a draft decree on digital health. These two projects have been in the decision-making circuit for several months now.[20]

5.2.2. Validation of draft digital health texts in progress

These drafts have been sent to the Secretary General of the Government (SGG) for legal validation since the beginning of 2023.

These draft texts address several issues, including:

- Patient file in terms of updating and access to data by the patient.
- Health data in terms of ownership, access, hosting, and storage time
- Telemedicine in terms of conditions of use
- Interoperability of healthcare information systems in terms of data exchange standards
- Other digital health platforms

[19] The WHO uses the term Digital Health to refer to all uses of ICTs in the healthcare system.

[20] APS press article 22 June 2023.

These projects will need to be supplemented by other regulations to govern the pricing of telemedicine procedures and the conditions for opening and closing telemedicine sites.

6. Analysis of Senegal level of maturity based on documentation.

Senegal is increasingly adopting digital health policy documents, all of which have been listed in the previous chapters.
Maturity is assessed from the following angles: The following 4 areas can be found in detail in the Appendix, section 10.6.

- Data hosting infrastructures:
    - The digital ecosystem is home to three data centres. A fourth one is currently being set up.
    - MSAS IT platforms and applications are co-administered with SENUM SA.
    - Some healthcare solutions are hosted in private resource centres, often outside the country, which can cause problems of interoperability, continuity of operations, and question national sovereignty.
- Broadband infrastructures:
    - Senegal's fibre optic network covers 15,000km, divided between SENUM SA, telephone operators and SENELEC.
    - Internet quality currently available does not necessarily guarantee real-time telemedicine in health centres and hospitals.
- Leadership and e-health governance
    - The CSSDOS is the administrative structure responsible for healthcare driving digitisation, initiating discussions on data hosting and governance, medical records digitisation, and interoperability.
    - Lessons learned from the Covid-19 pandemic recommend that the organisational charts of health ministries be readapted to give greater functional autonomy to digital health, given its potential for achieving health indicators.
- Existing digital platforms and applications
    - The literature contains several diagnostics providing an overview of existing software used by the MSAS.
    - Some hospitals and health centres have billing management software; however, most healthcare structures are a long way from digitisation, with structured and secured systems.

The following sections are explained in detail below as they pertain more strongly to the work of the Transform Health Coalition:

- Human resources in digital health professions
- Investment and funding strategies
- Architectures and interoperability of healthcare information systems
- Use of digital health services

6.1. Human resources skilled in digital health

6.1.1. Increasing scarcity of these resources

Digital skills in the digital health sector refer to staff specialised in digital technology, agents who have received a minimum of training in digital health, medical computing or telemedicine. The need for human resources is huge. A number of practitioners in rural areas have not even acquired the basics of word processing. Digital skills that need to be acquired include searching for information, online message sharing, creating digital content and developing digital applications.

6.1.2. Gap analysis

A poor distribution of these resources between MSAS departments has been noted. Other departments have web and mobile developers, when both the CSSDOS and the IT Unit do not. This is the case for the Human Resources Direction, the Emergency Medical Service (SAMU), the Health Emergency Operations Centre (COUS), and the DSISS, among others.
Centralising these resources would make it possible to optimise interventions and, above all, reduce the risks of worsening interoperability. The management of interfaces and the handling of needs and expectations would be handled in a single place. The different stakeholders in the value chain would have a single point of contact, and the solutions or applications proposed would be easier to integrate into a global system.

6.2. Investment and financing strategies for digital health

To assess investment in digital health, it would be more comprehensive to go back at least to the year 2000, the date of the first changeover in Senegal. During this period, investment was made in computer equipment and health software, even if it was not called e-health or digital health.

6.2.1. From 2000 to 2016

If we consider that the costs relating to the Internet in health facilities and the building at central level are part of digital health expenditure, then the Government has always made provision in its budget for resources of this kind.

In the early 2000s, the Ministry of Health received funding from the WB to build its current headquarters. According to several sources, the funding also included a component for information system digitisation with what was known as a "Health application", which was the first information system but was never deployed.

Back in 2011, with the creation of the Telehealth Unit, the MFB had earmarked funds for telemedicine for the Ministry of Health, Public Hygiene and Prevention. Supervision and diagnostics carried out since then have not enabled these investments to be seen at first hand, which for a time delayed the inclusion of the PDSS in the general budget for 2023, as MFB officials reproached the MSAS for its inefficiency in this area. The health budget

represents 8.96% of the overall budget, whereas Senegal has pledged to increase this to 15%.

6.2.2. From 2016 to 2023

With the creation of the CSSDOS in 2017, a new dynamic was born, inspired by the worldwide enthusiasm generated by the WHO and ITU resolutions in this area. Following the drafting of digital health policy and strategy documents, the Government, to demonstrate its determination to modernise the healthcare system and health governance through digital innovation, has included the PDSS in the general State budget for 2023 for an indicative amount of USD 200M over 5 years.

It then decided to inject USD 50M into the implementation of the PDSS. This funding is part of the 2023-2028 PAENS. The Minister of Finance and Budget signed the funding agreement with the WB's Director of Operations in Senegal on 6 April 2023.

6.3. **Architecture and interoperability of existing platforms**

6.3.1. Interoperability efforts

Efforts are being made to achieve interoperability between DHIS2 and ERPX3 at SEN PNA (former PNA). This is an integration operation using "csv" type files to transfer statistics from one platform to another, whereas interoperability presupposes the existence of a layer.

6.3.2. Gap Analysis

- Heterogeneity of digital platforms

The audit of the MSAS information system reveals that hospitals have their own information systems and therefore use applications and platforms that are as diverse as they are varied. These systems are independent and not integrated, so there is no information system as such within the Ministry[21].

The MSAS digital ecosystem is structured in a heterogeneous way, with no links or interoperability between platforms. The ecosystem is characterised by a multiplicity of solutions with different technologies and publishers, as shown in the figure below:

[21] DPI. MSAS/CI/2022

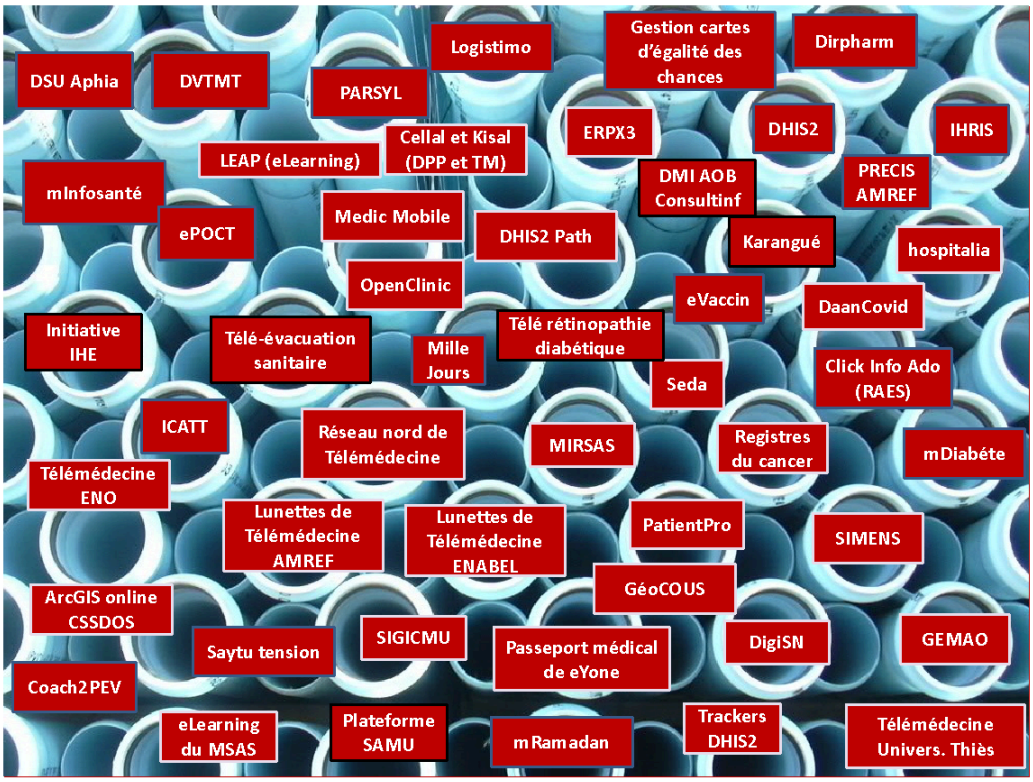


Figure 2: Fragmentation and compartmentalisation of digital healthcare platforms

Note that in this figure we can see:

- Digital health solutions from the private sector
- Applications being deployed by hospitals
- Centrally managed platforms

To fully digitalise healthcare, an instruction requested by the President of the Republic in his speech at the end of 2022, it is essential that the CSSDOS plays its role as administrator of all digital healthcare systems and platforms. This will make it possible to move on to the study of architectures, coding, formats - in short, the implementation of SDIS.

- The SDIS, hope for a national digital information system

The 2023-2028 Senegal Digital Economy Acceleration Project (PAENS), funded by the WB[22], aims to set up the SDIS, which is defined as a digital infrastructure for integrated health management, with:

- Management of health data hosting servers and Internet access
- Management of IT equipment at health service outlets
- System administration of healthcare software
- Human resources digital infrastructure management skills

[22] USD 150M, with USD 100M for the MCTEN and USD 50M for the MSAS

- Data security, exchange and access policies

The aim of the agreement signed with the WB is to implement the digitisation of medical records in an integrated, harmonised environment based on an architecture to be redefined.

The SDIS will be developed by a multidisciplinary team made up of the CSSDOS team, Project Management Assistance, suppliers of healthcare IT solutions and representatives of all the MSAS divisions and departments. The main activities are envisaged:

- Deployment of digital platforms for managing electronic medical records
- Provision of interoperability layers
- Strengthening digital infrastructures (IT equipment, data hosting, internet and electricity networks)
- Strengthening digital skills
- Implementing a communication strategy to get stakeholders on board

6.4. **Use of digital health services**

To measure the maturity of the population in the use of digital health services, we can study the following two use cases. During the Covid-19 vaccination in February 2021, the MSAS, through the CSSDOS, had put a vaccination application form online. Then when the country borders reopened, Electronic Vaccination Certificates (EVCs) were issued to travellers.

6.4.1. Online application for Covid-19 vaccination

Senegal is one of the first African countries that started to vaccinate its population against Covid-19, with its first 200,000 doses of Sinopharm. At the vaccination launch ceremony on 23 February 2021, the question of priority targets was already being raised. While it was easy to identify healthcare workers and the elderly (over 60), identifying those suffering from chronic diseases was a major challenge. A form was set up online to enable people suffering from chronic illnesses to justify their condition. In 28 days, more than 210,000 requests were registered, i.e. 8,500 requests per day.

6.4.2. Issue of QR code electronic vaccination certificates

The first electronic vaccination certificate (ECV) was issued to the President of the Republic when he took his second dose in March 2021.

When the borders began to reopen in June 2021, it was extended to travellers.

Some 117,318 EVCs were issued[23], representing 5.38% of all people vaccinated. Only vaccinated and travelling people request this health document, which explains that low uptake rate for digitised certificates.

A request form to access EVCs was launched online. To date, users have used this form to get it. Issuance is fully decentralised to the health districts, which issue 80% of requests[24].

6.4.3. Maturity of the electronic medical record

Digitising patient records is an excellent way of putting the slogan "patient at the heart" into practice and launching healthcare digital transformation. Assessing the level of maturity of the implementation of this project can give a clear idea of the chances of making a success of this approach to modernising the healthcare system.

One of the conclusions of TC4A's 2020 report on patient records and telemedicine is that the ecosystem is ready to take up this challenge. The report considers that the situation is favourable for the implementation and deployment of the DPP or User Health Record (DSU), noting the existence of the following conditions[25]:

- Widespread awareness of the benefits of using a DSU
- Political will to regulate and organise the ecosystem, even if it means causing some discomfort
- Political will to support and promote this type of initiative
- Political will to legislate in this area (for instance, standardising the content of a DSU and/or establishing a standard to guarantee cross-functionality and interoperability)

6.4.4. Gap Analysis

- Use of Internet services by gender and unbalanced location

Despite "extensive international Internet capacity", with all the cables passing through Senegal, and mobile Internet representing 15.4 million subscriptions[26] provided by Mobile Network Operators via 2G+, 3G and 4G technologies, the "development of Senegal's digital economy and digital inclusion are stifled by insufficient broadband access and use, particularly in rural areas and among women".

Indeed, according to the Human Development Report 2021, "64.6% of unconnected people in Senegal do not use broadband, either because they do not know what the internet is or because they do not know how to use it, compared to 37.5% in Kenya, 11.5% in

[23] Weekly report from 17 to 23 July 2023 taken from the eVaccin platform.
[24] Weekly report from 17 to 23 July 2023 taken from the eVaccin platform.
[25] Page 13 of the final report of the study entitled "Overview of user health records and the practice of telemedicine in Senegal". TC4A.2020
[26] ARTP. 2021

Rwanda and just 9.8% in South Africa[27]. Based on a different survey and data set, GSMA reports that 13% of men and 8% of women (as a percentage of those who know about the internet) do not know how to access it on their mobile devices, while 11% of men and 3% of women do not know how to use it. The gender gap is more pronounced when it comes to reading and writing skills as a barrier to internet adoption, with 36% of women in Senegal citing reading and writing as the main barrier to mobile internet access, compared with just 12% of men[28].

Data from the Human Development Report 2021 estimates that two-thirds of the population covered by a signal do not use Internet services[29].

According to the GSMA, there is a 19% gap between men and women in the use of mobile internet in Senegal, with this gap reaching 32% in rural areas[30] even though internet accessibility has improved considerably, with 1 gigabyte of mobile broadband representing 0.73% of Gross National Income per capita in 2021, compared with 2.77% in 2020[31].

These statistics show how important it is to support women in their use of Internet services, especially given that in the household, women are the primary actors in family health. She helps children to seek care and is responsible for their health until they are eighteen. Digital health services are aimed primarily at women.

- Risks relating to resistance to change

The reign of paper in public entities contributes to worsening climate change and reduces the efficiency of public action and users. It generates costs in terms of printing and destroying administrative or health-related documents. The ambition to move towards a "paperless" strategy does not appeal to all players, because of the public procurement contracts launched each year.

Another concern lies in the DNA of digital technology in terms of redistribution of cards and powers and the removal of monopolies. A director who has the habit of deciding each year on the expenditure linked to the use of paper and other inputs in his department will

[27] Based on the 2018 Household ICT Access and Use Survey.

[28] GSMA, 2020. Connected Women - The Mobile Gender Gap Report 2020.

[29] Based on ITU data for 2020 on Internet users as a percentage of the population amounting to 42%.

[30] GSMA, 2020. Connected Women: The Mobile Gender Gap Report 2020. Available at: https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf.

[31] Average price data from Cable.co.uk 2021 and monthly GNI per capita from WDI 2021. In a different metric, the ITU estimates that the 2GB mobile broadband data-only basket represents 2.87% of GNI per capita in Senegal. Available at https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/IPB.aspx.

automatically lose it because of the digital conversion of paper content into digital content accessible via terminals. Professionals of the e-Sectors (e-Health, e-Education, e-Commerce, etc.) will become key players with hierarchical or functional relationships to establish.

Results-Based Management will become a reality with digital technology thanks to the achievement of accountability and responsibility via traceability. There are regular and irregular flows of money in healthcare facilities. Irregular circuits (payments not cashed by dedicated staff) feed the agents and cause a loss of resources for health facility managers and their staff. Traceability covers both income and expenditure, which could lead to greater resistance than expected.

To deal with the many forms of resistance, a mitigation plan is needed, backed up by consensual communication. This plan should include a new focus on redistributing the revenue generated by digitisation to the healthcare staff who helped to generate it.

- Mitigating job losses

The loss of jobs because of healthcare digitalisation remains a concern raised by those reluctant to change. The history of humanity has been marked by innovations such as the industrial revolution and the mechanisation of agriculture. Studies need to be carried out to quantify the benefits of digitisation and the risks of job losses and retraining.

7. A summary of good practices and the main constraints faced by public and private sector players in promoting digital health to achieve universal health coverage.

7.1. Best practices

The good practices analysed in this section come from the experiences of using digital health services discussed above. The aim is to analyse the success factors of each initiative.

7.1.1. The human factor, the key to success

Despite the leadership expressed by the Council of Ministers, the human factor has been a key factor. Cases of resistance have been noted, due to the impact of the dependence of certain populations on traditional medicine, although this has not prevented the e-Vaccine system from being deployed.

7.1.2. Digitisation clearly defined by users' needs

The vaccination application form and the QR code vaccination certificate were a success because the need was obvious. Users wanted to start travelling again after several months of worldwide border closures, and the elderly and people with chronic illnesses knew that they were at risk from this disease and wanted to be vaccinated to save their lives.

7.1.3. Start with simple projects

The Covid-19 vaccination application form was designed to be ergonomic, simple and easy to use. It took no more than five minutes to complete, and no documents had to be attached or downloaded. All terminals could be used to fill in the form (mobile phone, laptop, PC).

7.1.4. Leadership and commitment

The digitisation of the vaccination process was requested by the Government at the Council of Ministers meeting on 20 January 2021, sending a clear political signale. In fact, those involved in routine vaccination wanted pilot phases, whereas the government wanted a rapid scale-up to improve the safety of vaccination, given that there were several vaccines on the market and users could take their doses in different places.

7.1.5. Decentralisation of digital health interventions

The issuing of the CEV with QR code was first initiated at MSAS level by the CSSDOS. The Unit did not have the resources to set up a decentralised system in Senegal for issuing these documents, which are useful when travelling abroad. The CSSDOS did not have the budget to equip vaccination sites or for training sessions. This led to a lot of difficulties in accessing this digital health service. Users came very early and crowded into the Ministry.

In January 2022, the MSAS provided the resources for the formation of health districts and today, 80% of CEVs are delivered by the decentralised level, with the remaining 20% delivered by central level services (CSSDOS, Prevention Directorate), the Armed Forces Health Directorate and a few private clinics.

7.1.6. Identifying and working with champions

The first QR code issued to the President–an important milestone–was due not simply to the technology but thanks to the commitment of two people who worked late into the night, for several nights, to adapt the system to issue a QR code. At the time, no funding was available for MSAS to recruit developers. These champions are needed, in addition to funding.

7.2. **Constraints**

7.2.1. Public sector

- Digital technology: jobs up or down

The public sector is certainly not a major provider of jobs but is mainly concerned with creating the conditions for creating and maintaining jobs. Opinions are very divided on the contribution of digital technology to employment. "On the question of whether jobs should be upgraded or downgraded, some people think that digital technologies could be used to upgrade jobs through the acquisition of new skills. This means adding value to activities by professionalising workers in the use of these new technologies (this is the case, for example, in the cleaning professions, where the use of complex, modern cleaning machines enables workers to develop new skills). On the other hand, putting workers in competition with new technologies such as robots (hoovers, lawnmowers, companion robots, etc.) can also contribute to downgrading jobs. The use of digital technologies can also have an impact on initiative-taking (reducing the worker to a simple machine operator), which is crucial if a profession is to be valued"[32].

- The urgent need to reinvent effective e-governance that respects ministerial prerogatives.

Digital technology is a cross-functional mission. It is used by all ministries and public institutions. Its institutionalisation varies from country to country. In Senegal, each ministry can use digital technologies without depending on validation by the MEPC or by SENUM SA. The only requirement is that data hosted outside the country must be repatriated. Neither MCTEN nor SENUM is in charge of the digital transformation of the sectoral ministries. This choice on the part of the Senegalese government allows the sectoral ministries to be involved and to see themselves as the main players, which is essential if they are to adhere to the long and difficult process of transformation.

[32]https://assets.ctfassets.net/myqv2p4gx62v/3XZ5ReMOdyDXXjRAW9sij9/336629ded2fee9906530b17e8293ee97/BrochureDigiserv.pdf

Ministries and public institutions generally have an IT department. However, very few ministries create a digital transformation unit in addition to their IT or information system unit, which takes teams out of the "technical support" area and moves them into the "transformation" area, integrating other skills such as business, legal, organisational and communication skills, for example. As an example, the former ADIE (now SENUM SA) has transformed its information systems department into a digitalization and innovation department, which demonstrates this public institution's ability to adapt.

- Lack of advanced digital skills in most ministries and public institutions

Experts in the digital world, whose digital health is a highly valued product in the job market. Departments that have managed to keep skilled engineers for a long time have found internal motivation mechanisms.
The recent increase in the salaries of civil servants will undoubtedly change this mindset that the State does not pay well and will allow there to be more experts to at least lead the right discussion.

- Discontinuity of funding from the general State budget

The State's general budget is subject to what are known as "budget cuts". This involves reducing the amounts allocated during the financial year. Digitisation is a long-term process, with public contracts to be executed over several years. Any budget cut means that contracts may be amended or even terminated.

7.2.2. Private sector

The digital private sector and the private healthcare sector all stand to gain from the digitisation of healthcare if certain constraints are removed.

- Private health sector

According to the director of private health establishments, the private health sector accounts for 45% of healthcare provision, but its statistics are insufficiently capitalised and considered in the national information system. The use of the current DHIS2 digital platform for reporting statistics is not used enough by the private sector because of the financial costs involved in providing this information and does not meet needs. In fact, the private structure needs to have someone to compile DHIS2 data, and in most cases this person has to be recruited, which is a major constraint.

Providers in the private healthcare sector began their digitisation efforts very early on, because of the traceability and control of financial and patient flows that this enabled them to achieve. The overwhelming majority of private clinics use billing and patient management software. However, the lack of a regulatory framework exposes service providers embarking on telemedicine and remote medical expertise to the risk of non-certified platforms and the absence of a legal basis for electronic health data.

The other major concern is the support that the State should provide to the private health sector to keep pace with the digitalisation of public structures. The funding that has been secured and is currently being negotiated is silent on this issue[33].

They are concerned about the conditions of access to data and statistics produced by providers in the private health sector. In terms of the confidentiality of personal medical data, the MSAS is in a position to ensure maximum protection but will probably not be able to oppose the use of statistics by the FISC services for estimating and collecting income tax, as it has become an open secret that the FISC services do not collect taxes in proportion to the activities carried out, in all economic sectors.

- Digital private sector

The private ICT sector is interested in the commercial potential of connected health in terms of sales of healthcare software, IT equipment, technical support and data hosting. Because of the lack of a regulatory framework, the issuing of authorisation or approval for deployment has been suspended, making private sector services precarious. The administrative format of the unit limits the scope for partnerships with the private sector. In fact, apart from public contracts and PPPs, the unit should be able to take market shares in certain companies that have developed specific digital solutions in order to deploy them together in the healthcare system and, if necessary, in the sub-region.

There is no permanent framework for dialogue between MSAS and private digital operators.

[33] PAD in French. BM. 2022

8. Summary of recommendations from the various strategies and studies identified.[34]

8.1. Summary of Recommendations

The existing studies reviewed for this landscape analysis identified the following topline recommendations and actions for digital health in Senegal (Appendix 10.4).

Policy and Regulation:

- Establish the National Agency for Digital Health (ANDS) to lead digital health initiatives.
- Create a legal framework for the operational use of the Healthcare Cloud, leveraging ADIE's infrastructure for cost efficiency.
- Develop and enforce legal standards and legislation to provide a framework for initiatives and ensure data protection.
- Implement a compulsory "Health Card" for all citizens over 18 to streamline health data and services.
- Define standards for interoperability, process standardisation, and unique identification numbers to facilitate data exchange and system integration.
- Train healthcare professionals in new practices and familiarise them with ICTs.

Digital Health Investment:

- Prioritise budget allocation for systems development over IT equipment and vehicles to achieve technical independence and financial control.
- Encourage public-private partnerships (PPPs) to boost investment and accelerate progress, e.g., mobile phone operators.
- Implement investment policies to encourage the use of technologies and telemedicine (e.g., tax breaks, preferential prices for equipment, or even penalties).
- Develop viable business models for each project from the launch phase to ensure financial sustainability.

Advocacy:

- Raise public awareness about the benefits and costs associated with digital health services. Implement strategies to enhance public engagement and support through clear communication about the benefits and processes of healthcare digitization.
- Share national digital health directives with all stakeholders to ensure alignment and commitment.
- Involve local communities and decentralise initiatives to meet regional needs and enhance inclusivity.

[34] Summary of key findings and recommendations drawn from the PSSD feasibility studies, PSNSISS, and TC4A Audit. Detailed recommendations can be found at Appendix 10.4.

8.2. Recommendations drawn from the overall analysis

8.2.1. Expediting the adoption of legislation on digital health

Advocate for the swift enactment of the second protocol of the Budapest Convention, which mandates GAFAMs (Google, Apple, Facebook, Amazon, Microsoft) to share data identifying cyber offenders, is crucial. This measure will help protect users from potential cyber infractions.

Fast-tracking the adoption of the draft texts on digital health at the national level will ensure the protection of private sector investments, guarantee patients' rights, safeguard healthcare providers, and boost the digital economy in the healthcare sector.

8.2.2. Enhancing communication for public engagement

Successful healthcare digitization relies on effective communication. While digitization can yield cost savings for patients, it's important to note that certain digital healthcare services may incur fees, such as acquiring a digital health card or covering data hosting costs. Public support is crucial for this endeavour, both with respect to increased financing and to awareness-raising so that patients understand their rights and costs when it comes to digital data. Transform Health could pursue this through the My Data Our Health campaign.

Clear communication efforts led by institutions like the Ministry of Health are necessary to inform the public about the benefits, costs, and processes involved. Involving civil society in discussions will ensure inclusivity and address community concerns. Simplifying communication will foster understanding and encourage widespread participation in digitization efforts.

8.2.3. Implementing robust health data governance regulations

Drawing inspiration from successful models such as the Kenya Digital Health Act or the EU Health Data Space, the government of Senegal should prioritise establishing comprehensive regulations from the outset. This approach will enable the effective management of health data, the addressing of breaches, and the assurance of data trust and security before potential escalation into criminal activities. These regulations should be based on the health data governance principles.

Additionally, it is essential to clearly define the rights and responsibilities of data subjects, data controllers, and data processors to foster a transparent and accountable data ecosystem.

8.2.4. Strengthening Equipment, Infrastructure, and Funding for Healthcare Digitization

It is imperative to allocate more funding for digitalization, which includes infrastructure (hard and soft, including broadband network), purchasing equipment, training staff. This funding should also facilitate a streamlined procurement process to ensure digital equipment can be purchased in bulk and distributed to all primary healthcare units by a specified date. The 2022 Transform Health report highlights a framework for nine priority investment areas that should be comprehensively funded for digital health transformation.[35]

Attention should be given to enhancing digital health infrastructure and information exchange systems. This includes allocating funds for technical staff across different tiers of the healthcare system to set up and manage these systems effectively.

Finally, enhancing practitioners' skills in digital health and raising awareness of the importance of adapting to change are crucial. Policies ensuring continuity of operations and information within facilities are vital for maintaining public trust.

8.2.5. Recommendation to the Coalition and Transform Health

Taken together, this study delivers a set of recommendations to the Transform Health National Coalition for its long-term strategy. Recommendations to improve and strengthen Senegal's health system were drawn from the overall analysis. They are as follows:

- **Recommendations from Regional Consultation to the Transform Health Coalition**
    - Identify better strategies for community ownership.
    - Identify strategies for mobilising domestic resources.
    - Strengthen sub-regional collaboration among the different stakeholders in health data management.
    - Engage the media to promote the vision and activities of the Network.
    - Involve local elected representatives and build the capacity of local parliamentarians
        - so that they can advocate with their peers(other parliamentarians), and
        - to enable them to take ownership of the law in order to implement it on the ground .
    - Improve communication regarding ENDA Santé's initiatives to amplify the impact of the regional network, expand its reach, and attract new members to join.

[35] https://transformhealthcoalition.org/wp-content/uploads/2023/08/Africa-Regional-Brief-French-v2.pdf

- Encourage collaboration among network members by creating a platform for dialogue to facilitate the exchange of feedback and best practices, especially from countries where healthcare system digitization is advanced.
- Join forces with the Ministry for Women's Affairs as part of strategies to fight against GBV.
- Forge partnerships with healthcare champions to advance the Network's initiatives, connect with communities, foster public trust, and raise awareness among healthcare providers about the importance of data collection and utilisation.
- Building the capacity of local parliamentarians to allow them to take ownership of the law, so that they can then bring the case to their peers with solid arguments.

- **Recommendations from stakeholders during the Restitution Workshop to the Transform Health Coalition**

  - Establishing criteria for selecting and evaluating members.
  - Specialisation of members of the coalition in different stream work and training of the coalition members in advocacy
  - Pooling of core activities and putting together different stakeholders to discuss around digitalisation and HDG
  - Drawing up a strategic development plan for the coalition.
  - Developing an action plan for advocacy on digitalisation and HDG (with community leaders and decision makers)
  - Elaborating the theory of change and supporting the stakeholders during the process

- **Recommendations to the Transform Health Coalition on their Strategic Plan**

A strategic plan could bring together all the concerns and recommendations beyond those formulated in the mapping of stakeholders in the digitisation of healthcare in Senegal. The priority areas addressed through the strategy should align to the gaps identified in this landscape analysis, e.g.,

- Supporting the Government in operationalising the National Agency for Digital Health (ANDS);
- Increasing the allocation of funds to the priority investment areas identified and digital health overall; and
- Establishing comprehensive health data governance regulations, potentially modelled after the Kenya Digital Health Act or the EU Health Data Space.

The Coalition should also define relevant selection and evaluation criteria for its members to avoid enlisting structures that may not be in phase with the needs and expectations of stakeholders that will be implemented in the future. Finally, the Coalition should position

members according to their needs, whether in terms of advocacy, technical input or awareness-raising, with a view to getting participants on board.

- **Recommendations to the Transform Health Coalition on Health Data Governance**

In the absence of a policy for integrating and managing health data interfaces between African countries on the one hand, and with European countries on the other, in the context of health tourism, the Transform Health Senegal Coalition could take on this major challenge and benefit more easily from the confidence of the public authorities but also of the populations.

The Coalition should set up a short- and medium-term strategic development plan to define how they will take forward leadership on adoption of robust health data governance principles or regulation in Senegal, e.g.,:

- An analysis of its internal and external environment governing health data exchange and data sharing in the region;
- Internal and external issues and associated challenges to set up robust health data governance regulation and data-sharing policies; and
- A supporting strategic action plan and a monitoring and evaluation framework for the HDG work.

9. Conclusion

Digital health is a major concern for the Senegalese authorities. Strategic documents (policies, strategies and plans) and initial funding are available to support the robust development in digital health in Senegal

Digital solutions in Senegal are trying to contribute to the health digitisation process to improve both access to care and the well-being of the population, but they are being developed in a fragmented and sometimes competitive way. Healthcare players are well aware of the importance of digitisation, but there are still major legal, institutional and technical challenges to be met in terms of the interoperability of existing and future platforms.

Addressing the key barriers identified in this landscape analysis and supporting the Government of Senegal's digitalization plans for 2024-2028 will significantly enhance public health outcomes. By expediting the adoption of necessary legislation and establishing robust health data governance regulations, Senegal can ensure more secure data sharing and better quality data for public health decision-making. This analysis also outlines areas for increasing funding for digital health infrastructure and applications, building on Senegal’s successful digitalisation efforts during Covid-19.

These efforts should be accompanied by community ownership driven by the Transform Health Coalition as well as clear communication with the public and strong partnerships. These efforts will not only protect user data and healthcare investments but also build public trust and encourage widespread participation in healthcare digitization. Together, these actions will lay a solid foundation for improved health outcomes and a more resilient healthcare system in Senegal.

10. Appendices

10.1. Background to the assignment

Given the importance of digital technology, its use remains relevant and essential to improving the healthcare system and access to and use of quality services. According to the 2020-2021 report on "The use of social media in Senegal: Mariam Traoré Noisy Digital", there are around 3.90 million Senegalese active on social networks, compared with 18,275,743 inhabitants according to the 5th general population and housing census (RGPH-5). The annual growth in the number of active users is 14.7% between January 2020 and January 2021. Around 3.4 million people connect to social networks via a smartphone, representing 98.4% of the total number of active users. The purpose of this assignment is to recruit a consultant to carry out a situational analysis of policies, use of and access to digital technology and the digital transformation of health for the well-being of the population in Senegal, leading to a discussion of the prospects, opportunities and positioning of the Coalition in the digital health strategy defined by Senegal.

The consultant was appointed by Enda Santé, an organisation with a sub-regional reach whose main mission is to support populations, particularly vulnerable groups, in defending their rights and accessing information on appropriate health services. Enda Santé is the host organisation of the Transform Health Senegal Coalition.

10.2. Mission Objective

The overall objective of the mission is to provide an overview of health digitisation policy, and the use and governance of health data to promote the health and well-being of the population in Senegal. More specifically, it aims at:

- Mapping the CSOs/CBOs, government departments and the private sector involved in promoting digital health to achieve Universal Health Coverage (UHC)
- Describing the main strategies, plans and policies underway in Senegal for healthcare digitisation.
- Listing the various laws and regulations on digital health and health data governance in Senegal
- Reviewing and summarising the assessments of Senegal's level of maturity in terms of digital health and the main results, constraints and opportunities identified
- Assessing the presence and leadership of CSOs/CBOs, government departments and the private sector involved in promoting digital health and well-being in Senegal.

10.3. Components of healthcare digitisation in Senegal

The components of healthcare digitisation in Senegal as defined by the project are:

- Shared Patient File (« Dossier Patient Partagé » DPP)
- Hospital Information System (SIH)

- Telehealth
- Geographic Health Information System (SIGS)
- Management and control of medicines and essential products
- Digitisation of community data
- Training and skills management
- Support for the coordination and management of the PDSS (Senegal Health Digitisation Programme)

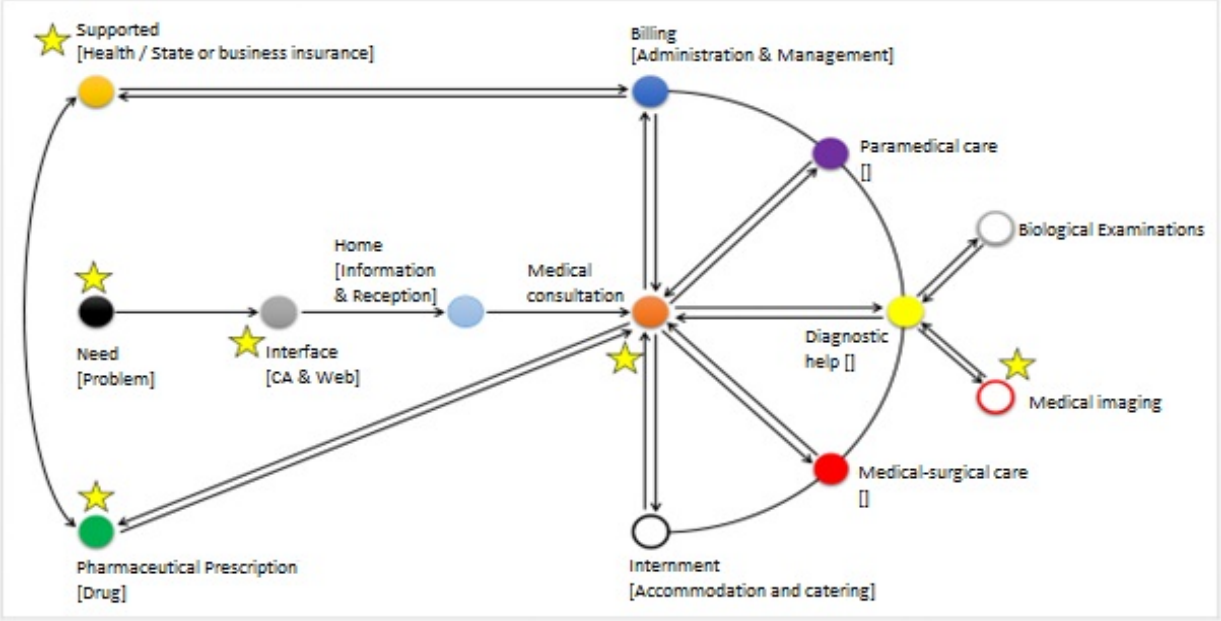


Figure 3: Mapping of patient care interfaces and communication interactions

Caption:

Significant amount of data to be stored

10.4. Detailed Recommendations from Existing Studies

10.4.1. Recommendations from the PSSD feasibility studies

The feasibility study for the SSDP was carried out by SOSEPAC, a firm recruited by the MEPC. The feasibility study led to several improvements, which are detailed in the table below.

Variables	PDSS Developed by the MSAS	PDSS Feasibility Study
Dates	Internal reference document validated on 21 September 2020	Successful maturation PDSS submitted to MFB in 2021
Budget	27,627,218,716 FCFA	34,240,000,000 FCFA
Period	3 years	5 years
Centralization of projects into a program	Into program	In program
Number of projects	10	7
Institutional implementing body	CSSDOS strengthened	Implementing Agency

Table 1: Contribution of the feasibility study

TIn addition, the PDSS has been structured around 3 components:

- Framework: which aims to set up a legal, governance and interoperability frameworks
- Development: which covers all the platforms and technologies to be acquired and deployed in healthcare delivery points
- Equipment: with the creation of an equipment fund for healthcare facilities

The feasibility studies recommended the following:

- Set up the National Agency for Digital Health (ANDS) to ensure the sustainability of strategies and actions through strong, coherent leadership.
- Establish a legal framework for the operational use of the Healthcare Cloud. Make the most of ADIE's offer for Cloud Infrastructure (Server Equipment and Broadband Connections) in order to set up the Health Cloud at a lower cost.
- Implement a strategy to make investments profitable by marketing the "National Digital Health Solution".
- Favour the Systems Development Option over the acquisition of commercial Solutions. This is the path to Technical Independence and financial control of the Programme.
- For the Development Team, select Talents in the "Computer Science Departments of Senegalese Universities" and offer them Capacity Building Sessions in the technologies that will be exploited.
- When allocating budgets, give priority to spending on Systems Development, keeping expenditure on IT equipment and vehicles to a minimum.
- Make the "Health Card" compulsory for all Senegalese citizens over 18,
- Set up a "Health System & Insurance Sector Partnership" to combat health insurance fraud and abuse.

10.4.2. Recommendations from the PSNSISS

- Create an entity bringing together the departments/divisions responsible for statistics, IT, digitisation and the health map to ensure greater consistency.[36].

10.4.3. Recommendations from the TC4A Audit

- Define legal standards and legislation to provide a framework for initiatives and ensure data protection;
- Implement policies to encourage the use of technologies and telemedicine (e.g. tax breaks, preferential prices for equipment, or even penalties);
- Share the major national directives with all stakeholders, in order to align them on a common project and maximise their commitment and involvement (particularly practitioners) by creating a dedicated governance team, for example.
- Coordinate the efforts of the various ministries involved

[36] Page 17 of PSNSISS

- Take seriously the management of change that this implies by creating dedicated facilities, training courses and seminars aimed at developing people's digital culture.
- Encourage PPPs to increase investment and speed up progress, particularly with mobile phone operators
- Find viable business models tailored to each project, right from the project launch phase
- Train healthcare professionals in new practices and familiarising them with ICTs
- Raise public awareness of the benefits of new uses
- Focus on local areas and decentralisation of initiatives (e.g.. regionalise solutions as soon as possible to meet everyone's needs, decentralise to health district level)
- Define a pricing framework adapted to the expansion of telemedicine and regulation
- Think international too: telemedicine opens up international training and consultancy opportunities
- Require the first face-to-face visit before any telemedicine procedure.
- Provide a standard defining interoperability criteria, process standardisation, identification numbers, etc. to facilitate exchanges and standardise structures (i.e. establish a legal framework):
- Try to harmonise the PLR standard with foreign countries as far as possible, to ensure international cross-functionality.
- Think about a "360°" DMP: as seen by the patient, the hospital, the ecosystem and the international community.
- Achieve a unique authentication and identification number
- Design solution architectures that structure data to facilitate interoperability between solutions and/or, at the very least, a national platform for exchanging medical data.
- Implement security at the highest level of the IS that forms its infrastructure, to ensure the confidentiality, integrity, availability and traceability of dematerialised data.

10.5. **Initiatives implemented with PanAfricare Senegal**

1. Mapping community structures and players

The result of this work is multifaceted:

- An electronic register
- A dashboard to support strategic planning

The same application implements different electronic data registers with different functionalities.

This mapping work is in line with the writings of the 2019-2028 PNDSS. The latter defined three strategic orientations, the second of which concerns the provision of health and social services. Action line 19 of the new PNDSS states that improving the availability and accessibility of health and social services involves respecting and implementing the health map.

The implementation plan proposes a mobile application at workstation level, and a dashboard at district level, following an iterative approach.

The dashboard, used at health district level, can be updated to give a real picture of the situation of community players and groups.

2. Community nutrition, by digitising all the data collection tools

The project takes place in Bignona, (South Senegal) and is based on the CommCare mobile technology platform. It offers a set of tools including a mobile application for community relays and a dashboard of personalised indicators used at district health level. A final web tool is used to monitor the activities of the community relays responsible for data collection.

The initiative will provide health district and community supervisors with a decision-making tool that delivers up-to-date, updatable information on the main indicators relating to growth promotion monitoring, screening, moderate and severe acute malnutrition (MAM and MAS) care, and civil registration.

The dashboard, as a decision-making tool, is an Excel-based pivot table.

A mobile application allows community relays to monitor children under the age of five. The monitoring is based on a child-centred approach, making it possible to record all child-related events throughout the project's activities.

Other potential partners

- PMI (Presidential Malaria Initiative) through the Digital Square project, other partners and potential funders have been identified as interested and involved in the use of digital tools to strengthen primary healthcare in general, and for the availability and integration of community data in decision-making.
- USAID, in its approach to strengthening the healthcare system and in the PEPFAR project, has identified the health data digitisation as an area of interest for equitable provision of quality care and optimisation of resources.
- The CDC, which works in health risk prevention and management, has also integrated digitisation through a vertical programme.

- In addition, in its new strategy for resilient health systems, the Global Fund has made community data digitisation a priority.

10.6. Analysis of Senegal level of digital maturity based on documentation.

10.6.1. Data Hosting Infrastructure

10.6.1.1. Datacentres and cloud

The digital ecosystem is home to three Tier-3 certified data centres, from SENUM SA, and from the telecommunications operators Orange and Free.
A fourth data centre is currently being set up. This is the Digital Technology Park (PTN), which will be operational before the end of the year.
In addition to these high-capacity physical servers, the government has decided to equip itself with a sovereign cloud. Discussions are well advanced with the American company Oracle Corporation.
Other data centres exist in the private sector but are not well documented.

10.6.1.2. Health data storage

MSAS IT platforms and applications are hosted at several levels. The IT unit has a resource centre which houses some of the healthcare structure solutions. The servers are co-administered and co-managed with SENUM SA and are physically located on the MSAS premises.
In addition, the SENUM SA resource centre, with a capacity of 1000 Terabytes, set up by the State, also hosts certain healthcare applications and solutions.

Some healthcare solutions are hosted in private resource centres, often even outside the country. Indeed, many players believe that the management and protection of digital health data remains a question of national sovereignty. Continuity of operation and information would be easier if the data were stored in Senegal.

Most data currently hosted concerns health statistics. Electronic medical data is still in its early stages. Hospitals such as the Ouakam Military Hospital (HMO), the Idrissa Pouye Hospital (HIP) in Grand Yoff and the Dakar Main Hospital (HPD) are creating them. Certain types of accommodation in these establishments could be easy prey for hackers, given that hospitals in France are regularly attacked, and recently the French Telecommunications and Postal Regulatory Authority (ARTP) paid the price, even though the management specified that data had not been affected.

Electronic medical data (images, diagrams, audio, video) requires large storage capacities. The country's current infrastructures can handle the current production of electronic data. However, with the introduction of the DPP, Senegal will have "massive data", and if the infrastructures are not brought up to standard by then, it could be difficult to achieve

quality in this area. As a result, "it has to be said that the MSAS suffers from a lack of real-time management and control of health data"[37].

All these infrastructures are necessary for high-quality hosting of electronic medical data. However, there are some limitations relating to the infrastructure of the State technical arm (SENUM SA).

10.6.1.3. Gap Analysis

- Limits:

With the change in status of the former ADIE, which has now become SENUM SA, the State public structures will now have to pay for hosting their public data. This new situation is causing controversy as several stakeholders believe that the legislative text from which this status emanates does not automatically introduce this pricing system for State services. In fact, article 2 on the missions of SENUM SA specifies "commercialisation under objective, transparent and non-discriminatory conditions of the capacities and resources available on these infrastructures, once the needs of the Administration have been met[38]". This situation of excessive commercialisation by the General Direction is already causing difficulties within MSAS. In fact, with the support of Novartis, the CSSDOS and the Disease Control Department (DLM) are seeking to host the Saytu Tension portal and two application versions (web and mobile versions) without success, even though the General Administration and Facilities Department (DAGE) of the MSAS has begun to pay certain hosting costs associated with other initiatives. The aim of this application was to reduce cardiovascular events. It was initiated with the Novartis Foundation and the Baamtu and By Filling consortium.

In addition, SENUM SA data centre has not yet met the conditions for being a Tier-3 facility. In general, physical servers are only a container. The content, i.e. the operating and data management systems, are another major concern. The management of SENUM SA is aware of this situation and is working to ensure that its servers meet the required standards.

The telecommunications operator Orange has an infrastructure used by certain ministries such as the Ministry of Education. The lack of information about where data is stored, transited, and migrated does not inspire much confidence.

- Sustainable data hosting solutions

The use of the cloud ensures a certain degree of redundancy, availability and accessibility of systems and data at all times. The cost of hosting could be a serious consideration. Consulting, modifying, and storing patients' electronic medical data entails individual and per-service costs. If we consider the ambition behind the DPP project, which is to enable patients to access their own data at any time via any terminal, and to enable healthcare

[37] DPI/MSAS/CI 2022

[38] Law n°2021-39 of 13 December 2021 authorising the creation of the national company called "Sénégal Numérique Sa" (SENUM SA).

providers to update the data stored therein, then it is easy to understand the financial burdens to be paid by the patient, the State or both. Therefor the question of who pays arises between the State and the healthcare user.
To compensate for these errors arising from the confusion in the interpretation of article 2 of the law creating SENUM SA, a budget would be envisaged within the Ministry of Finance and Budget (MFB) to cover the costs of hosting State data.
Cloud providers have taken several years to develop these infrastructures and have made a great deal of expertise available. In view of the recurring costs mentioned above, Senegal should in future consider carrying out an opportunity study to create its own CLOUD, as Rwanda has done.

10.6.2. Broadband access infrastructure

10.6.2.1. Internet availability

Senegal is home to five fibre-optic submarine cables[39]. The country's fibre optic network covers 15,000 km, divided between SENUM SA, telephone operators and SENELEC. A sixth will be installed in Senegal in 2023[40].
4G coverage has reached 70%, and the 5G licence has just been awarded to Orange. 5G offers speeds enabling real-time telemedicine and telesurgery.

10.6.2.2. Gap Analysis

- Current broadband availability limits

The availability of this infrastructure is not reflected in healthcare facilities. Only 3% of healthcare facilities are connected to the state fibre optic network. The overwhelming majority of healthcare facilities therefore use the internet provided by telecommunications operators (ADSL, Wifi), with different degrees of success.
Internet quality currently available does not necessarily guarantee real-time telemedicine unless conservative measures are taken by healthcare providers in centres and hospitals, such as restrictions on consulting social networks and other unnecessary platforms.

- Sustainable solutions for sustainable Internet access

We need a sustainable solution for Internet access if we are to fully digitise healthcare. The MSAS must have access to a sustainable, high-quality, redundant broadband to ensure a high-quality service. Without quality internet, healthcare staff risk becoming discouraged by the inadequacy of the internet connection.
Solutions exist to overcome these constraints. A direct supply from undersea cables will enable healthcare to have cheaper Internet access (without the profit margins of current telecoms operators, and the State will be able to abolish index-linked taxes). In other words, we need to provide healthcare with its own Internet network, complete with cabling and dedicated Internet access. This will not involve acquiring new fibre optics, but

[39] ATLANTIS 2, SAT-3/WASC/SAFE, ACE, MAINONE, SHARE
[40] The 2Africa cable, piloted by Facebook, which aims to circle the African continent to interconnect Europe and the countries of Africa and the Middle East, should be operational in 2024.

rather using the surplus linear capacity of SENUM SA and SENELEC to provide access. This decision may not suit telecoms operators who want to use healthcare as a major customer, but a strong decision is needed given SENUM SA ambitions in this area.

10.6.3. Leadership and e-health governance

On 30 November 2016 the Minister of Health and Social Action created the Health and Social Card and e-Health Strategy Management Unit (CSeS), which would later become the CSSDOS.

10.6.3.1. Current ehealth governance

The CSSDOS is responsible for coordinating and managing the health and social map, digital health and the national health observatory. As such, it is responsible for:

- Updating, monitoring and evaluating the health and social map, and digital health
- Organising digital health
- Developing digital health projects and programmes (telemedicine, e-Health, e-Learning, electronic patient records, harmonising the use of services and applications)
- Acting as executive secretariat for the health observatory

From the memo creating the CSeS n°15072 of 30 November 2016, we moved on to the CSSDOS by order n° 8299 of 16 May 2017 attaching it to the General Health Direction (DGS) and then by decree n°2019-910 on the distribution of State services now attaching it to the General Secretariat (SG) of the MSAS.

However, other departments are often assimilated to health digitisation with roles that differ from the CSSDOS missions. The DSISS, which is part of the Planning, Research and Statistics Directorate (DPRS), deals with health statistics, and will be a major beneficiary of digitisation. With digitisation, the data will be massive and of better quality.

The IT Unit deals with administrative IT (internet and networks for the building, health administration, mail, etc.), as do all the ministries' IT units. The CSSDOS is responsible for health IT or business IT (platforms and technologies developed by patients, populations, healthcare providers, data flows, people and statistics).

10.6.3.2. Gap Analysis

- Limitations of current e-health governance

The CSSDOS is the administrative structure that has driven healthcare digitisation in Senegal. The real debates on data hosting and governance, medical records digitisation, and the place of regulatory and interoperability frameworks were initiated and led by the CSSDOS through the policies and strategies it developed.
However, the Unit is not consulted by all MSAS divisions in their initiatives. As a result, its roles as guarantor of consistency, reference and coordination are not implemented. At the same time, the needs of interoperability require centralised management and design, with decentralised implementation and use of indicators and data (by all public services and users).

Furthermore, with its current status as an administrative entity attached to the Senegalese government, the CSSDOS does not have the prerogative to bill for digital healthcare services (opening up of the electronic patient file, data hosting, electronic payments, perpetuation of healthcare APIs), whereas digital healthcare represents an opportunity for self-funding, the only guarantee of long-term sustainability.
In view of the current challenges of technical management of digital health systems (interoperability, definition of architectures) and the service function (billing for digital health services)[41], the governance of digital health must evolve in ministries of health throughout the world.
The WHO[42] recommends "strengthening digital health governance at national level by setting up sustainable and solid governance structures". This attachment to the SG may limit the quality of information transmission between the Unit and the Minister's Office.

- E-governance in demand

The lessons learned from the Covid-19 pandemic recommend that the organisational charts of health ministries be readapted to give greater functional autonomy to digital health, given its potential for achieving health indicators.
In Africa, the examples of Mali and Burkina Faso remain highly illustrative, with the creation in 2013 of the National Agency for Telemedicine and Medical Information Technology (ANTIM) and the IT Services and Telehealth Department. Ivory Coast has set up the Information Technology and Digital Health Department, and the Democratic Republic of Congo (DRC), which has transformed the Clinical Engineering and Digital Health Agency into a public establishment with industrial and commercial nature. Togo is planning to set up a National Centre for Digital Health, with public funding already secured for the construction of the headquarters.

In Senegal, institutional strengthening is one of the key recommendations of the MEPC, in the final report of the Feasibility Study of the PDSS. The report recommends the creation of the National Agency for Digital Health, which will consider the information system, which could become a division within this agency, to increase efforts in terms of the use and exploitation of health statistics. The MSAS has made this institutional transformation a priority, setting it as a recommendation to be followed during the Internal Monitoring Committees (CIS) held twice a year under the aegis of the MSAS.

If there is to be any chance of sustaining the investments and running the digital health platforms, a way of self-funding will have to be found. The State will have to meet recurring costs, such as the regular replacement of equipment, the CSSDOS operating costs and the costs of digital health cards. With the annual budget cuts observed in the implementation of the general State budget, it will be difficult to depend only on the State budget.

[41] Opening a storage space for patient data, telemedicine, APIs for billing, electronic payments for healthcare services, etc.
[42] Draft global strategy for digital health 2020-2025

Digital health is one of the key reforms to accompany the implementation of the 2020-2024 Sectoral Investment Plan. This is the third reform after that of pharmaceutical sovereignty and hospital governance. It involves the adoption of legal texts designed to (1) regulate the practice of digital health and (2) strengthen the institutional structure of the CSSDOS. The legal framework is moving forward, but the institutional strengthening is not yet complete, despite the publication of decree no. 2023-1321 amending decree no. 2020-936 of 3 April 2020 on the organisation of the MSAS. We must therefore continue to lobby the government and the MSAS to ensure that Senegal is not left behind in the irreversible march of progress. At the round table discussion on the joint ITU and WHO initiative for the development of digital health in Africa, held during the 2018 International Conference of Ministers of Health and Ministers of ICT on the safetý of healthcare (CIMSA) in Benin, Mr. DG of WHO had in his speech insisted on the urgency of using the potential of ICT in these terms "The future of Health is digital".

10.6.4. Digital Health platforms and technologies

The use of digital health dates back to the mid-1990s, with a telemedicine initiative spearheaded by the late neurosurgeon Professor Mamadou GUEYE. In 2000, an attempt to deploy telemedicine was made in the Nénéfecha maternity hospital in the Kédougou region at the instigation of the then First Lady, Mrs Viviane WADE.
By analysing the existing digital platforms, we can measure the level of use of digital health at all levels of the health pyramid.
With the lessons learnt from Covid-19 crisis, health facilities are launching themselves, head first, into healthcare digitisation. There is now a real awareness of the issue, and hospital medical committees, management teams and boards of trustees are all actively considering the issue.

10.6.4.1. Overview of existing healthcare platforms and technologies

The literature contains several diagnostics providing an overview of existing software. Indeed, during the first waves of the Covid19 pandemic in 2020, the MSAS benefited from the support of the OPTIC, which brings together private sector stakeholders in the digital sector. White-label software was made available to the healthcare sector, and a review of the submitted projects identified 54 projects in 15 application areas[43], ranging from communications to logistics and hospital management. "An overall sample of 36% was demonstrated over 2 days, with the projects broken down by field:

- 2% Decision support
- 2% Help for healthcare staff
- 20% Communication
- 2% Crowdfunding
- 4% E-Learning
- 11% Health Facilities Management
- 5% Hospital Management
- 2% Patient Management

[43] DAAN COVID Initiative/ Summary of WG 2 work

- 2% Identification
- 4% Logistics
- 2% Matchmaking
- 2% Health Passport
- 2% Telemedicine
- 41% Tracking/Tracing[44]

In addition, in the 2021-2025 Computer Master Plan (PDI) of the MSAS IT Unit, approved in 2022, several applications used by the central level of the MSAS have been identified and documented through an inventory of applications at central level and updated by the CSSDOS.

Hospitals and health centres also have billing management software. Some hospitals have even begun to digitise their healthcare activities. This is the case of the HMO, which has deployed a hospital information system, and the HIP in Grand Yoff, which has deployed a computerised patient file.

In addition, the new hospitals in Kaffrine, Sédhiou and Touba are using care activity management software. The HPD has deployed a system for recording patient data. However, the system is not unified, meaning that data recorded at one workstation cannot be accessed from another workstation.
However, most healthcare structures are a long way from digitisation with structured, secure systems with satisfactory or redundant broadband.

10.6.4.2. Gap analysis

Since 2004, the National Information System Service has deployed three statistical management software packages: the "Application santé" software package, the "MYSNIS" software package, and currently the DHIS2 platform to centralise health statistics. The DHIS2 Open Source platform, developed by the University of Oslo in Norway, offers a Tracker module to enter individual data. "The current state of the DHIS2 does not provide data (qualitatively and quantitatively) to properly assess the six pillars of the health system, which are: healthcare provision, health information, health governance, human resources, financial resources and logistics (equipment, medicines)"[45]. Therefore, to meet current data quality challenges, it is necessary to start the process of digitising registers by setting up the appropriate system and building the capacity of those involved in data quality audit and analysis, and in the dissemination and use of information at all levels.

The CSSDOS does not have expertise in healthcare platforms. It is not often involved in the implementation of solutions by departments or major entities in the healthcare sector, as highlighted in the section on e-governance in healthcare. For instance, the CSSDOS is unaware of:

- Content of contracts between public healthcare organisations and suppliers

[44] DAAN COVID Initiative/ Summary of WG 2 work
[45] Chapter 8 of the WHO country profile

- Technology used (new or old)
- Coding logic

In addition, there may be redundancies with projects piloted by other ministries[46], between central-level departments and health structures themselves.

- The fragmentation of isolated initiatives has many consequences:
- Data and systems interoperability more complex
- Increase in acquisition and maintenance costs.
- Data protection is more difficult to ensure.

However, digital health requires the definition and implementation of an architecture based on the interoperability, security, scalability, and resilience principles, to achieve the goal of sharing health information.

10.7. **Questionnaire for healthcare organisations and operators**

- What is the nature of your business?
- What kind and how much information do you receive?
- What type and how much information do you provide?
- Have you started a digitisation project?
- If so, what level have you reached?
- What is the purpose of the information you provide?
- Do you have sufficient equipment to carry out your digitisation project?
- What might be the strengths, weaknesses, threats and opportunities for the digitisation of healthcare in Senegal on the one hand and within your organisation on the other?
- Can we have the level of investment planned?
- What are your current sources of funding for digitisation?
- Do you plan to explore other sources of funding and partnerships to implement your digitisation projects?
- If so, which ones?
- Can we have your strategic orientations, strategic actions and needs for tangible or intangible investments?
- Please share your observations, fears, challenges and recommendations for the digitisation of healthcare in Senegal

10.8. **Sampling/questionnaire**

The questionnaire have been administered to the following organisations and stakeholders as far as possible:

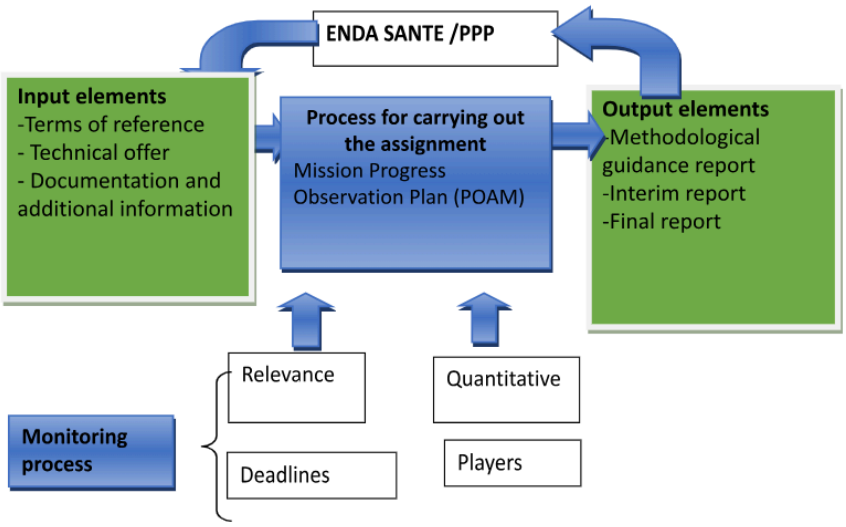
- Ministry of Health and Social Action
- Community-based and civil society organisations

[46] ANACMU with SIGICMU

- The Commission for the Protection of Personal Data (CDP)
- The Army Health Services
- The Faculties of Medicine of the Universities of Dakar, Thiès and Ziguinchor
- The National Order of Dentists of Senegal
- The National Order of Pharmacists of Senegal
- Professional Associations in the Digital Sector
- A selection of public and private healthcare facilities (hospitals or health centres, clinics, medical practices, etc.)
- Functional Investigation Centres (public or private) (Biology Laboratories or Medical Imaging Units)
- NGOs working in the health sector

10.9. Quality management

In order to manage the study as effectively as possible, to carry out the activities efficiently and in a coordinated manner and to ensure the availability of the deliverables on time, the Consultant relied on the Quality Management System that it had already developed for carrying out the studies. This system has been set up in accordance with ISO 9001 and 27001 standards to meet customer requirements for high-quality consulting, technical assistance and study services. It has already been successfully implemented on previous similar assignments.



The consultant drew up a Mission Progress Observation Plan (POAM), indicating the verifiable milestones that enabled ENDA SANTE to assess the progress of the contract. The POAM also provided a basis for assessing the efficiency of the tasks (were the mission activities carried out in accordance with the technical offer and the validated ROM) and their effectiveness in the light of the expected objectives (are the results in line?). Lastly, by its very design, it made a continuous contribution to improving the overall quality of the service.

10.10. Tables

Policy/Plan/Regulations	Aim	Date
2004 Budapest Convention	On the use of ICTs and protection of personal data, at international level.	Ratified by Senegal in 2016
African Union Convention on cybersecurity and the protection of personal data.	Strengthen and harmonise existing ICT legislation in Member States and Regional Economic Communities.	June 2014
Law 2008-08 on electronic transactions.	Ensure the security of electronic transactions.	25 January 2008
Act No. 2008-10, Information Society Orientation Act.	Common law for the Senegalese information society.	25 January 2008
Law No. 2008-11 on cybercrime.	On the importance of take decisive action to strengthen its regulatory and institutional framework and improve is poor rank in the Global Cybersecurity Index 2020.	25 January 2008
Law no. 2008-12 on the protection of personal data.	Fight privacy breaches that may be caused by any processing of personal data that directly or indirectly identifies a person	25 January 2008
Law No. 2018-28 on the Electronic Communications Code.	Strengthen the central role of telecommunications and the digital economy	12 December 2018

Table 2: Summary of international and national policies affecting digital health in Senegal

Region	Socio-professional category						Percentage
	Assistant state nurse	Surgeon	State-qualified nurse	Doctor	State-qualified midwife	Total	
Dakar	404	111	781	767	568	2 631	36%
Diourbel	132	12	141	104	222	611	8%
Fatick	59	3	81	26	118	287	4%
Kaffrine	60	1	44	14	100	219	3%
Kaolack	81	3	79	19	140	322	4%
Kédougou	23	1	29	7	35	95	1%
Kolda	58	4	48	15	59	184	3%
Louga	65	5	96	31	116	313	4%
Matam	79	3	75	24	102	283	4%
Saint Louis	119	8	84	58	136	405	6%
Sédhiou	47	1	24	14	71	157	2%
Tambacounda	117	4	96	35	141	393	5%
Thiès	165	17	255	108	240	785	11%
Ziguinchor	153	9	159	65	148	534	7%
Total	**1 562**	**182**	**1 992**	**1 287**	**2 196**	**7 219**	

Table 3: Breakdown of healthcare staff (doctors, nurses and state-qualified assistants, state-qualified midwives) by region in 2019

Source: MSAS, Human Resources Statistics Yearbook

REGIONS	EPS3	EPS2	EPS1	Non-hospital PHE	Private hospitals	Health centres	Health posts	Health boxes	Community websites	Private medical practices	Private clinics	Paramedical practices	Dental practices	Private laboratories	Military and paramilitary structures
Dakar	10	1	3	4	1	24	126	39	540	218	65	179	141	14	35
Diourbel	1	1	1	0	0	8	85	99	348	8	5	62	3	0	7
Fatick	0	1	0	0	0	10	122	175	401	1	2	8	7	2	8
Kaffrine	0	0	1	0	0	4	94	108	262	1	1	5	1	0	2
Kaolack	0	1	0	0	0	4	115	222	438	11	9	51	6	4	6
Kédougou	0	0	0	0	0	3	42	88	0	0	4	0	2	0	1
Kolda	0	1	0	0	0	4	67	248	555	0	4	1	0	0	4
Louga	0	1	1	0	0	10	120	325	154	6	6	23	7	1	8
Matam	0	2	0	0	0	6	100	63	636	0	0	12	3	0	4
Saint-Louis	0	2	1	1	0	9	117	192	222	12	4	18	9	2	10
Sédhiou	0	0	1	0	0	4	61	103	232	0	0	2	0	0	4
Tambacounda	0	1	0	0	0	7	102	144	263	1	1	7	3	0	7
Thiès	0	1	2	0	2	9	155	252	460	26	22	67	2	3	10
Ziguinchor	0	2	0	0	0	5	125	108	246	4	4	8	5	1	11
SENEGAL	**11**	**14**	**10**	**5**	**3**	**107**	**1431**	**2166**	**4757**	**288**	**127**	**443**	**189**	**27**	**117**

Table 4: Breakdown of health facilities by region

Source: MSAS. Statistical Yearbook 2019.

Platform	Status	Structure	Function
DHIS2	In production	DSISS	Collection of daily activity data
DHIS2 tracker	In production	DSISS	Daily data collection on cases of coronavirus
DVTMT	In production	DSISS	Collection of vaccination data.
ERPX3	In production	DSI/Pharmacies	Medication management
SIM	In production	LIFO	Hospital management
PMB	In production	Archives office	Library management
ICA-AtoM	In production	Archives office	Archive management
SYGMAP	In production	CPM	Public procurement management
SYGEC	Currently being deployed	Mail Office	Electronic mail management
IHRIS Management	In production	HUMAN RESOURCES	Human resources management
MINFOSANTE/RAPIDPRO	In production	Prevention Department	A free SMS platform for users to communicate between healthcare workers and report information in real time.
LOGISTIMO	In production	Prevention Department	Platform designed to enable users at the edge of the network to communicate and process in real time using Android devices.

Platform	Status	Structure	Function
PARSYL	In production	Prevention Department	Monitor the performance of refrigeration equipment and generate performance reports
COACH2PEV	In production	Prevention Department	A software tool for measuring the performance of the Expanded Programme on Immunisation's programme and services, and for providing personalised coaching to staff according to their needs.
DANNCOVID	In production	Prevention Department	Platform used to manage Covid-19 alerts
Tomportail	In production	DAGE	Logging of accounting transactions.
FINPRONET PAYROLL	Currently being deployed	DAGE	Agent payroll management software
MSAS eLearning platform	In production	IT Unit	Self-learning platform
Coach2PEV	In production	DP	Vaccination performance management software
mDiabete	In production	DLM	Diabetes prevention platform
Cancer registry	Currently being deployed	DLM	Cancer registry
Dirpharm	In production	Pharmacy and Medicines Department	Online database of medicines

Platform	Status	Structure	Function
ePOCT	In production	DSME	Electronic tool for managing children's illnesses
ICATT	In production	DSME	Tool for managing integrated childhood illnesses
eVaccine	In production	CSSDOS	Platform for managing individual vaccination data and issuing QR code vaccination certificates
ArcGIS one line	In production	CSSDOS	Online mapping platform for disseminating the health map and its geolocated health structures.

Table 5: List of central level applications completed by the CSSDOS

Sources: DPI 2021-2025 modified by CSSDOS

Profiles	CSSDOS	IT Unit
Certification in Medical Informatics	1	
University Diploma in Digital Health	1	1
Masters in digital health	2 (in progress)	
Computer engineer	1	1
Computer Networks Engineer		1
Telecommunications engineer	2	1
Telecommunications and IT engineer	1	
Geomatics Engineer (GIS)	1	
Senior IT technicians	2	5
Senior network technicians		1
Senior telephony technicians		1
Senior Geomatics Technician (GIS)	1	
Degree in computer networks		2

Table 6: Technical profiles in the MSAS digital and IT units

Source: CSSDOS

10.11. **Mapping of civil society and community-based organisations**

ACTORS AND STAKEHOLDERS	OBJECTS MISSIONS ROLES	RESPONSIBILITIES	SITUATIONAL ANALYSES AND CHALLENGES	OUTLOOK, RISKS AND RECOMMENDATIONS
Transform Health Coalition	-Supporting the digitisation of healthcare; -Promoting equitable access to digital healthcare technologies; -Encourage communities to contribute and participate in a sustained way in government initiatives; -Bringing together and coordinating the grassroots activities of civil society and community organisations; -Contributing to the research and development of applications to improve policies and processes.	-Ensuring the confidentiality of health data; -Inform and raise awareness among the public about policies and strategies and the benefits of digitising healthcare; -Helping people bridge the digital divide ; -To act as a channel of communication between the State and the population.	-Outstanding creations with highly relevant ambitions; -Hosted by ENDA SANTE, which has excellent experience in the field in general; -Can face a multitude of challenges linked to mobilising the various players, financing activities, coordinating and steering activities, and sharing the same visions with stakeholders.	-Having the resources to match your ambitions; -Establish selection and evaluation criteria for civil society and grassroots community organisations; -Specialisation of players to avoid dispersion ; Pooling of key activities such as technology and awareness-raising; -Development of relevant materials and advocacy; -Drawing up a 2024-2026 Strategic Development Plan -Change management support.

MEDSEN	-The design and development of IT applications and systems, as well as technological and engineering services based on health; Care provision, patient traceability, health promotion, disease management and prevention, health governance through real-time data collection, dematerialisation of the patient pathway and increased patient access to health information.	- Providing information systems to manage : - The patient file - The hospital information system - The national identification and authentication platform ...and other integrated systems	-The company needs to meet its financing requirements in terms of tangible and intangible resources; -Consider partnerships with SENUM SA to increase data storage capacity; -Has a PPP to ensure its development; -The needs are technical, human, organisational and managerial; -The company finances its operating cycle from its own funds.	-MedSen V1 (online appointment scheduling platform) - operational since 2021 ; -MedSen V2 (in progress since October 2022) ; -The IME project - Digitalising school health in Senegal -Integration of IHE standards (Integrating the Healthcare Enterprise) with the IHE Senegal coalition funded by GIZ and AGHA The national e-health platform ; -Research and Development in AI and blockchain technology; -In the absence of financial and human resources, it will be very difficult to ensure the confidentiality, integrity and availability of data.s

PatientPro	-PatientPro offers integrated medical management systems (medical ERP) for hospitals, clinics, dental practices, medical practices and centres, research centres and corporate medical programmes; -Combine medical data with financial data to better control their activity; -PatientPro has developed the PatientMax suite, which is an integrated medical management information system built around the computerised patient file; -Storage of medical data.	-Ensuring the confidentiality, integrity and availability of medical data across two systems, either in the cloud or on a server; -Maintain the systems in place.	-The aim of the system is to improve the quality of care provided to patients, empower patients and improve control of data on the activities of healthcare establishments, which in turn leads to better management of the healthcare establishment; -As with all companies in the sector, PatientPro needs to strengthen its capacity and finance its projects internally, through banks, PPPs or networks; -This limits its rapid expansion.	-E-health care project in pilot phase with a network of doctors, academics, social workers and a chronic illness association; -Offering cloud services with SENUM SA ; -Investment in telemedicine ; -Investment and development in occupational medicine; -Strengthen its presence in the HIS market through a consortium project with other local suppliers of e-health systems in Senegal; -System set up in army training hospitals (Hôpital Principal in Dakar, Hôpital Militaire in Ouakam).

Association of Girl Scouts and Boy Scouts of Senegal (EEDS) A movement to educate young people with the help of adults	-To train citizens to be autonomous, supportive, committed and responsible, aware of the problems of their time and keen to contribute to solving them. It strives to free men and women from all forms of enslavement; Activities include education in Scouting values, capacity-building, awareness-raising and advocacy.	-To preserve its members' data using appropriate methods; -The health data collected includes the blood group, allergies and illnesses of its members.	-No digitisation of the health data collected; -Data transmission risks ; -Has a commissioner for digital transition; -Lack of financial resources (internal resources, subsidies, etc.) ; -Highly committed human resources.	-Member of the Transform Health coalition; Good representation and coverage of the country for awareness-raising and advocacy activities with certain stakeholders; -Cyber security risk ; -Support for managers ; -Provides for the digitisation of the data collected; -Partnership with other players.
NGO EDEN	-Raising awareness of the right to information (production of video clips), advocacy for inclusive and transparent governance of health data; - Involving community players in the process of digitalising healthcare.	-Contribute to public debate on the governance of health data; -Deliver the right message for community enrolment.	Equipped to run awareness-raising sessions at community level; -Available skills and proven experience to carry out its missions; - Expects to receive funding from Transform Health and AMREF;	-Strategic development in the following areas -Capacity building for professionals ; Reinforcement of equipment, Promotion of data governance (awareness-raising), Knowledge production (studies, research, dissertations), -Mobilising funds to support the development of digital health ; - Strengthen advocacy with decision-makers to highlight

			-Limited resources ; - Seeking to identify other technical and financial partners, Involvement of the private sector through the Corporate Social Responsibility (CSR) to mobilise financial resources; -Tangible and intangible investment requirements.	the challenges and positive impacts of digitisation; - Introduce the community to digital issues, show its importance and the benefits it can bring; Do the same for healthcare staff and support them in their initiative and ambition to dematerialise their structure.
Senegalese Women's Network for the Promotion of Family Planning (REFESPF)	-Advocacy in favour of maternal and child health, the empowerment of women, the strengthening of female leadership through the promotion of family planning, based on the digitalisation of health systems and data governance.	- Helping women to better monitor their pregnancies and birth spacing, by providing them with quality messages and information on the subject; -Feed back the health data collected for proper monitoring and better planning of RH/FP programmes;	- The "Aar Njaboot" Integrated Project has initiated an interconnected, interactive digital platform with a local company specialising in IT, to enrol women of childbearing age in family planning and monitor their pre- and post-natal	- Calling for domestic resources to be mobilised -Taking advantage of new information and communication technologies to achieve its objectives. The signing of Memoranda of Understanding and partnership agreements with national institutions and the private sector is a strategic move that enables the Network to combine efforts, pool resources and federate

		-Ensuring better care for children. -Preserving the IDC of the data collected and complying with regulations	consultations. -Design of the platform. -Difficulties in mobilising resources to finance its activities - The cost of setting up the platform and running it is estimated at 20 million CFA francs, involving 39 Senegalese communes for the pilot phase.	actions. Material investment needs. -Cyber security risks like all civil society organisations
National Association of Handicapped Motorists of Senegal (ANHMS)	-works for the defence of the material and moral interests of disabled people; for inclusive participation in the socio-economic life of the country	- Provides information on disabled people's problems and their rights, and therefore lobbies on their behalf -Capacity for advocacy -Raising awareness and recruiting members -Protection of data collected and	- physical movement is quite difficult for disabled people. Digitalisation is desirable -Insufficient technical and financial resources and skills in digitalization	-Strategic Development Plan under preparation -Partnership with other structures to develop digitalization

		compliance with regulations		
Employers' organisations and stars up	-Maintain a relationship of ongoing exchange; -Express the need for support with digitisation; -To support its members' innovative initiatives; -Technology companies and start-ups are contributing to innovation by developing digital solutions for the healthcare sector, such as the platforms created during the COVID 19 pandemic to support MSAS ; OPTIC is one of the few ICT-focused employers' organisations.	-Respect the standards of security and protection of personal data in accordance with the laws and regulations in force in Senegal; -To offer reliable and effective solutions and meet the needs of the healthcare digitalization market; Ensure that all measures are and will be taken to ensure the confidentiality, integrity and availability of health-related data for all stakeholders.	-Lack of a framework for expression and competence ; -Difficulties in mobilising innovative financing to support the policies implemented; -Difficulties in establishing PPPs ; -Lack of organisational, technical and human resources -Proliferation and competition in the sector.	-Have a strong desire to support the sector; -Lack of feedback Promoting technical partnerships with northern countries; -Mobilise Senegalese skills based in northern countries such as Canada and France; -Raising awareness of all the issues involved in digitisation.

10.12. **Mapping State Structures**

ACTORS		PURPOSE MISSIONS ROLES	RESPONSIBILITIES	SITUATIONAL ANALYSES AND CHALLENGES	OUTLOOK, RISKS AND RECOMMENDATIONS
MSAS		-Develop policies and strategic guidelines to promote digital health in Senegal; -Coordinating digital health policy ; -Coordinate and steer the digital health platforms developed by the MSAS through the following components: -Shared Patient File (DPP) ; -Hospital Information System (HIS) ; -Telehealth ; -Geographic Health Information System (SIGS) ; -Management and control of medicines and essential products ;	-The Ministry of Health is responsible for public health policy and for regulating the health sector in Senegal, as set out in a number of programmes and strategies, including the PNDS. -Improving the practice of traditional medicine -Combating misleading advertising -Qualify traditional practitioners and study how they can be integrated into programmes to digitalise healthcare, given that some of them have platforms for making appointments and storing their	-The MSAS faces many challenges related to funding and mobilising technical, human and organisational resources at both decentralised and central levels, and raising awareness among healthcare professionals at all levels of the health pyramid; -The absence and availability of computers in rural healthcare facilities, as well as the absence of Internet and sufficient bandwidth to allow data to be processed and transported with confidentiality, integrity and availability;	-MSAS has received funding to invest in digital health in Senegal; -Evaluate all needs holistically and identify all the players who could contribute directly or indirectly to the success of the healthcare digitisation project; -Define the roles and missions of all stakeholders in the digitisation of healthcare; -To study the possibilities of partnership in the management of the interfaces with the countries which offer medical tourism to the Senegalese like France, Morocco, Tunisia but also of the countries which come to make medical tourism in

		-Digitalising community data ; -Training and skills management ; -Support for the coordination and management of the SSDP -Ensuring that the standards and interoperability of digital health platforms are defined and respected; -Ensuring that digital health projects are consistent with health policy priorities and standards.	patients' personal data. -Capacity building for traditional practitioners, many of whom are illiterate	-Hostility to change on the part of practitioners and certain stakeholders in Senegal's healthcare systems.	Senegal like Gambia, Mauritania, Mali, Guinea etc ; -Provide resources at all levels to guarantee the digitisation of healthcare in Senegal; -Encourage and develop collaboration between the various players in the sector at state, private, CSO and CSO level; -Drawing up programmes and advocacy campaigns tailored to all the stakeholders involved in digitisation and the achievement of objectives and expected results Identify and assess the socio-economic impact of digitising healthcare in terms of patient transport, accommodation for patients and their carers, time savings, savings on redundant medical investigations, analyses and

					prescriptions, and patient survival; Identify and evaluate the financial benefits for the State in terms of savings linked to the reduction of waste and over-consumption of healthcare products and the cost advantages from all points of view; -Equip yourself with the organisational, technical and human resources to ensure the security and confidentiality of information, as well as to take charge of the environmental, sustainability and relevance aspects of all the components of the digitisation project; -Digitising healthcare is a means of combating corruption and efficiently managing the resources of the State and its stakeholders; -Use all relevant means of communication to

					raise awareness, reassure, encourage and get citizens to sign up in all the country's languages; -Senegal is ranked 72nd out of 180 countries on the Transparency International corruption index in 2022, so digitalisation is a very interesting lever for improving the country's position. Taking account of the threat to self-medication
	SEN-PNA Ex National Supply Pharmacy NAP	-Ensuring the availability of medicines and consumables.	-Medication and consumables management software; -Availability of an online catalogue of medicines and consumables; -Availability of online purchases ; -Availability of an organisation with proven skills in the management of medicines and consumables.	-Recent migration to a national company for greater efficiency -Recent change of status with a lot of reluctance.	-Has a strategic development plan for 2021-2025 -Digitalisation into an integrated system will allow better management of medicines and avoid shortages of sensitive products such as anaesthetics at the moment. -Drastic reduction in waste and rational use ; -Hostility to change, hence the need to manage and lead

					change at stakeholder level.
	Department of Pharmacy and Regulation	-Application and monitoring of regulations ; -Authorisation to sell medicines and issue certificates ;	-Due diligence in issuing authorisations ;	-State budget ; -Availability of skills in the field ;	-Relatively short digitisation process; -Limited players ; -Fraud management
	Health establishments and university hospitals	-Offer diagnostic services and generalized and specialized medical care in line with Senegal's health pyramid; -Contribute to the continuing and practical training of healthcare staff; -Contributes to research and innovation in the sector; Prescribers, collectors, users and distributors of end-to-end healthcare data.	-Preserving the DIC of patient health data; -Raising awareness among all stakeholders; -Make the most of digitalization to ensure the quality, availability and continuity of care; -Use of data in compliance with laws and regulations.	-The lack of human and material resources and the availability of Internet in rural areas; -Upgrading resources, skills and methods ; -Deficit and ability to mobilise resources and partnerships with stakeholders; Lack of cooperation between facilities and in-house practitioners ; -Has applications for managing the billing of medical procedures and hospitalisation; -Data is often stored without	-Hostility to change management ; -The hybrid status and dependence of two ministries with very strong unions; -Conflict of interest ; -Human capital ; -Skills linked to digitalization ; -Confidentiality of highly sensitive data; -Optimising resources and combating waste ; -Development of telemedicine and capacity building for practitioners at all levels of the health pyramid; -Limit the risk with the use of WhatsApp and others for exchanges between practitioners and data from

				being traceable to internal diagnostic support structures.	healthcare establishments.
Armed Forces Training Hospitals (Hôpital Principal de Dakar and Hôpital Militaire de Ouakam)		-Actions dedicated to war medicine and open to the general public; -Preserving the manpower of the Defence and Security Forces by studying and applying hygiene and prophylaxis measures; -Treating wounded and sick soldiers and their families; -Supporting forces on operations (at home and abroad); -Study and implement therapies adapted to combat ; -Acquiring, centralising and distributing	-Ensuring the availability, integrity and availability of medical data; -Ensures that patient records and hospital information are stored and backed up or creates redundancy in their availability; -Compliance with contractual commitments with suppliers of e-health solutions; -Provides the technical requirements and architectures for the correct use of PatientPro applications; -Ensures compliance with regulations	-Complete acceptance of PatientPro products; -Hostility to change ; -Advantage of going faster than EPS because of its status; -Acquiring additional modules without using the procurement code; -It could be a pilot for the digitalisation of healthcare in Senegal; -Hybrid character due to its status and the fact that it manages the health of military families, civil	-Possibility of moving on to several modules linked to the digitisation of healthcare; Cross-referencing health data with data on military status ; -Increased risk of confidentiality of health data ; -development of telemedicine.

	medical supplies and maintaining this equipment; -Assist in all medical missions requested by the government (participation in the public health service); -To plan and carry out training for its staff (with support from: the Military Health School, the Army Health Service Training School, the Health Battalion, the Army Training Hospital, Dakar Main Hospital, Ouakam Military Hospital).	governing the processing of personal data; -Ensures that the flow of information, processing and consumption of medical products is correctly linked, so as to ensure proper operation and reduce costs and potential malfunctions.	servants and the general public; -Has additional resources compared to EPS; -Military discipline and respect for command.	
Senegal Numérique SA SENUM SA	-National company authorised by law 2021-39 of 13 December 2021 ex ADIE ; -Provides technical assistance, support and maintenance, manages government portals, installs	-Stores data to guarantee confidentiality, integrity and availability; -Ensures redundancy for certain players; -Managing the risks associated with data confidentiality,	-Proven skills in the field; -Potential for substantial government funding and PPPs -Has the resources to assume its roles and responsibilities in the digitisation of healthcare;	-The "Digital Senegal 2016-2025" strategy aims to position Senegal as an innovative leader in Africa in the digital field, with 3 prerequisites: the legal and institutional framework, human capital and digital confidence, based on 4

	multimedia rooms at school level, implements and develops skills and information systems, diagnoses telecoms networks and information systems, improves control of geographical information.	integrity and availability.	-Can be a technical and support arm for MSAS; -Availability of standardised data centres ; -Collaboration with MASAS on covid-19.	priorities: open and affordable access to digital networks and services, a connected administration at the service of citizens and businesses, the promotion of an innovative digital industry that creates value and the dissemination of digital technology in priority economic sectors; -Must face up to all the risks associated with IDA. Play a full role in digitisation and provide the necessary support; -As the driving force behind this strategy, SENUM SA will focus on the following areas: human capital, organisation and processes, and technology.
Ministry of the Economy and Planning	-Facilitating and mobilising financial resources for tangible and intangible investments;	-Mobilising resources and technical and financial partnerships.	-The scarcity of available resources ; -Assessing return on investment.	-To ensure that PPPs can be driven by the domestic private sector in order to preserve the country's added value.

	Facilitate PPPs and support star-ups through employers' organisations such as OPTIC.			
CDP	-Ensures that the processing of personal data is carried out in accordance with the law; -Inform data subjects and data controllers of their rights and obligations; -Ensures that Information and Communication Technologies (ICTs) do not pose a threat to the public freedoms and privacy of Senegalese citizens; -Homologates the user charters presented by information or data processors;	-As part of the digitisation of healthcare, and in accordance with its remit, the CDP must ensure the security and confidentiality of healthcare data, promote innovation in the field of digital health and raise awareness among healthcare professionals, citizens and other stakeholders of the challenges of digitisation and, above all, compliance with the regulations in force; -Identify all the stakeholders involved in digitisation and ensure that they can fully play their role in	-A term of office renewable once can be a hindrance or an opportunity in terms of continuity and improving performance; -Lack of resources to cover all its missions; -A lack of skills to fully carry out its mission; The lack of human resources to carry out its monitoring role, as well as its prevention and awareness-raising activities.	-Health data is personal and highly sensitive. This is why the CDP, together with the MSAS, must very quickly develop the regulations and draw up guidelines or certifications adapted to the management and processing of data, including that used in medical research; -The immensity of the work expected must lead to a formal framework for consultation between the CDP and the MSAS on the one hand, but also with the other stakeholders; -The Transorm Health Coalition initiatives hosted by ENDA SANTE are to be welcomed and encouraged.

	-Keeps a register of personal data processing operations available to the public; -Advises persons and bodies who use personal data processing or who carry out tests or experiments likely to result in such processing; -Submits to the government any suggestions for simplifying and improving the legislative and regulatory framework for data processing; -Publishes authorisations granted and opinions issued in the personal data processing directory; -Produces an annual report on its activities, which is submitted to the	protecting personal data.		

	President of the Republic and the President of the National Assembly; -Make any recommendations necessary to ensure that personal data processing is carried out in accordance with the provisions in force; -Cooperates with personal data protection authorities in third countries and participates in international negotiations on personal data protection.			
Health professionals (doctors, nurses, physiotherapists, etc.)	-Doctors, nurses, biologists, radiologists and other healthcare professionals play a major role in the digitisation of healthcare, as they form the front	-They must act as a relay to ensure that patients are aware of the issues and have confidence in them; They must integrate digital technologies into their day-to-day	Non-ICT-oriented healthcare professionals can be counterproductive in implementing digitalization and hostile to change;	-They generally enjoy the trust of patients; He should be careful about competition from traditional practitioners in patient care; -Support healthcare professionals in raising

	office between patients and the other structures involved in treating them; -Ensuring the confidentiality, integrity and availability of medical data; -Guaranteeing the quality of digital care and complying with the rules of medical practice to gain the trust of patients; -Develop their educational and persuasive skills to enrol patients at every consultation.	practice in order to improve care performance, patient record management and communication between professionals to ensure the availability and continuity of care.	-They can face challenges related to the acceptance of new technologies, training and the management of sensitive data, and therefore constitute a real obstacle; -Some practitioners use whatssap and other groups to share patient files and examinations without any restrictions or assurance that this data is protected, and sometimes without the patient's consent.	awareness and building capacity so that they can fully play their roles and assume their responsibilities; Helping non-executive professionals finance their technical needs; -Supporting all those involved in managing and leading change; -Using cost benefits to raise awareness among managers at professional level Prohibit the sharing of patient data via WhatsApp and other means.
Private clinics, medical analysis laboratories and functional exploration centres	-Information relating to the conditions necessary for taking samples and carrying out examinations and for identifying patients, generally by collecting surname and	-Collection of highly sensitive personal data from patients through platforms for booking appointments and making results available physically or electronically; -Stores sensitive patient data;	-Have completely independent systems; -Many players in the systems ; -Transfer data to patients and practitioners without ensuring that measures are taken to ensure	-Many stakeholders and software providers for implementation and maintenance, which increases the risk of sensitive data escaping, especially for the authorities and celebrities; -Establish authorisations and

	forenames, age or date of birth, telephone number, address, etc., all associated with : -Direct debits; -Performing analyses reliably and accurately; -Technical and biological validation of examinations ; -Transmission of results to the patient and the prescriber ; -Advice for patients and prescribers ; -Functional investigations and diagnostic assistance ; -Preventive and curative treatment of patients.	-Protect patients' personal data.	data security and confidentiality.	certifications for all those involved in data collection and processing.
Citizens and potential patients	They are essential stakeholders and are at the heart of the digitalisation of healthcare as end-users of digital health	-Citizens or patients will be the users of applications and digital devices to monitor their preventive and curative health,	-The major challenge in digitising healthcare is that the vast majority of Senegalese may have difficulty	-Patients and citizens should be the main source of concern for public authorities and other stakeholders, as they are at the heart of

	technologies. They are the main customers; -They should also actively contribute to their own digital health, protect their medical information, and provide feedback to developers and healthcare professionals to improve digital solutions; -Ensure traceability of use of the various platforms and avoid disseminating false news that could hold up the image of policies implemented by public authorities and relevant stakeholders.	facilitate communication and dialogue with health professionals and make informed decisions about their well-being; -They will have to ensure that platforms are used efficiently in order to avoid saturation problems in areas that are not well covered in terms of bandwidth and Internet availability; -They will have to be permeable to the various instructions and awareness in order to contribute to the confidentiality, integrity and availability of the data; -Comply with instructions to prevent cybercrime.	using the technologies due to a very high rate of illiteracy (54.6 percent for men and 62.3 percent for women), bearing in mind that women are responsible for children's health (ANDS), concerns about data confidentiality or a lack of knowledge to fully exploit the benefits of digitising healthcare; -People's trust in traditional practitioners could be a risk factor for their enrolment in the system.	digitalisation and its main customers; -To make these customers active players and partners in their own digital health, to be educated about the benefits and risks, and to participate in discussions about the evolution of digital health to meet their present and future needs; -Gaining their trust from the outset and winning trophies so that we can drive the changes needed to effectively implement the digitisation of healthcare; -Conduct ongoing satisfaction surveys and provide appropriate responses to quickly resolve problems and complaints; -The public authorities should fight against those who sell illusions to traditional practitioners, who risk undermining the

				performance of the digitisation of healthcare; -Tracking down miscommunication in the media and social networks

10.13. **Mapping of Development Partners**

- The World Bank and UN organisations

In Senegal, the WB and and different UN agencies collaborate to support the country achieve its development objectives[47]:

- On development finance with the Un Capital development Fund (UNCDF)
- On women's entrepreneurship with UN Women through the “We Finance” program
- On improving livelihoods and empowering women with the Food and Agriculture Organisation (FAO)
- On nutrition and vaccination with UN Children’s Fund (UNICEF)
- On promoting investment in regional and national value chains with UN Industrial Development Organisation (UNIDO)
- On youth and human development with the UN Office for Project Services (UNOPS)
- On co-funding the Agriculture and Livestock Competitiveness Program with the International Fund for Agricultural Development (IFAD)

In addition to these ongoing initiatives, others are being drafted, in collaboration with:

- UNCDF, UNDP (UN Development Program) and IOM (International Organization for Migration) through the Initiative for the Emergence of the Diaspora and Investments in Territories
- UNODC (UN Office on Drugs and Crime) on crime prevention
- UNFPA (UN Fund for Population Activities) on capturing the demographic dividend and strengthening the autonomy and leadership of young girls
- FAO on improving agricultural productivity, youth employment in rural areas and building the capacities of SMEs and LDCs
- the UNDP, through the Support Project for the Resilience of Informal Sector Actors in the Regions of Dakar, Thiès, Fatick and Kaolack, as well as capacity-building for disaster risk reduction
- UNHCR (UN High Commissioner for Refugees) on professional integration and the creation of employment opportunities for young refugee graduates
- UNCDF on the economic empowerment of women
- UNICEF on maternal and neonatal health and infant and child health
- UNIDO on the circular economy

More specifically, on digital health, the World Bank recently approved a USD150M funding to the government of Senegal, to accelerate the digital transformation of the country. The agreement was signed on April 6th, 2023, with Mamadou Moustapha Bâ, minister of

[47] More information here : https://senegal.un.org/fr/158062-renforcer-le-partenariat-entre-le-syst%C3%A8me-des-nations-unies-au-s%C3%A9n%C3%A9gal-et-la-banque-mondiale

Finance and Budget. These initiatives are part of the Digital Economy Acceleration Project (Projet d'Accélération de l'Economie Numérique - PAEN), which is part of Axis 1 of the PSE. They are also in line with the Senegalese government's ambition to accelerate the country's digital transformation and achieve the objectives set out in the "2025 Digital Senegal" strategic plan, with one year to go.

50 million of this has been allocated to the MSAS through the CSSDOS for a 5-year (2023-2027) healthcare digitisation project, the PDSS. This funding will be used to build, equip, connect and interconnect the country's hospitals. According to the CSSDOS coordinator, it will only cover part of the vast project. Senegal has 1,500 health posts, 110 health centres and 40 hospitals that will have to be digitised. In the start-up phase, 20 health centres will be involved, and 1.5 million patients, 50% of them women, will benefit from the shared patient record.

- The Bill & Melinda Gates Foundation

Through the Digital Square initiative, the Bill & Melinda Gates Foundation is committed to strengthen country efforts to develop national digital health infrastructure, with coordinated investments and high-quality digital health tools.
Digital Square uses an innovative co-investment model to align investments from multiple donors to build a stronger digital health marketplace. Direct investors include the BMGF, Child Relief International Foundation, Deutsche Gesellschaft für Internationale Zusammenarbeit, Microsoft, Vito Foundation, The Rockefeller Foundation, UNICEF, USAID, WHO...

Digital Square brings partners together to improve how the global community designs, uses, and pays for digital health tools and approaches. We work with innovators to advance adaptable, replicable tools that are designed to work together seamlessly. By strengthening the coordination among governments, country-based technology experts, donors, and innovators, Digital Square reorients the market to better match tools and approaches to the needs of countries and communities. Its work focuses on three key areas: alignment & coordination, global goods, and regional & country support.

Digital Square works in the West and Central Africa region to enhance the capacity of digital health leaders through training and technical assistance, building on existing digital health approaches and plans in each country. It sponsors and hosts training for digital health leaders, and provides technical assistance to Ministries of Health with creating enterprise architecture, developing cost roadmaps, and integrating and empowering Community Health Workers (CHWs) as a valued part of the health system.

Senegal has made great progress in reducing the prevalence of Malaria in the past several decades. Through the U.S. President's Malaria Initiative (PMI) and Digital Community Health Initiative (DCHI), Digital Square has partnered with Senegal's Ministry of Health and Social Action (MSAS) to continue further progress by creating a digital community health

febrile disease management system, allowing CHWs to seamlessly share data and gather insights to inform their work.

Digital Square convened a TOGAF® Standard Certification Training[48] for Francophone African Ministry of Health (MOH) officials from Senegal, Burkina Faso, DRC, and Mali. The TOGAF® Standard is designed to enable Ministries of Health to advance enterprise architecture planning for their respective country's national digital health systems, enabling more streamlined implementation and governance processes, reduced costs, and ultimately better health outcomes at the country level.

10.14. **Figures**

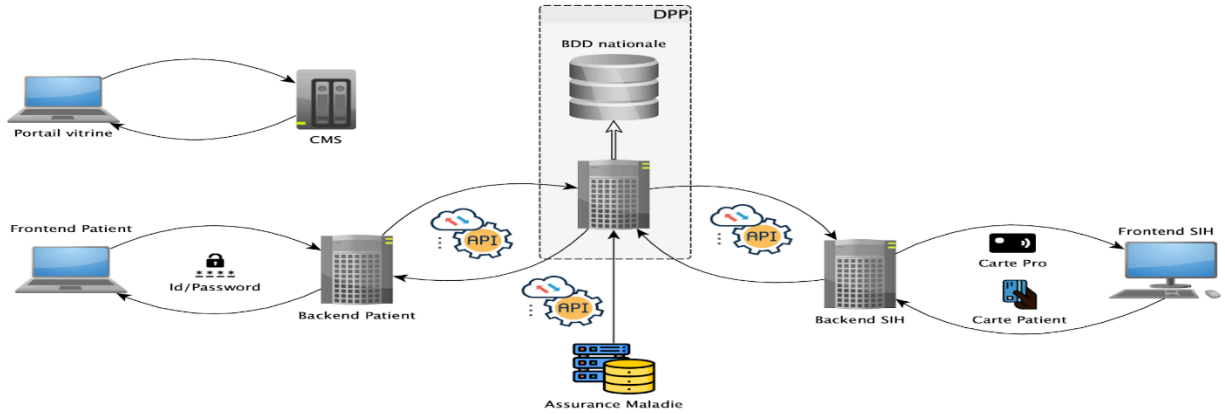
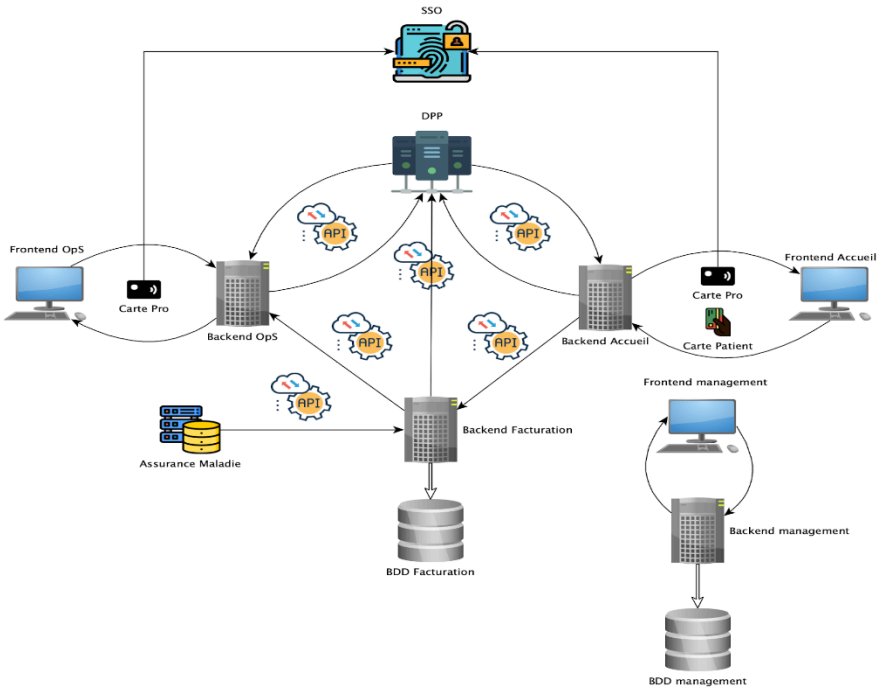


Figure 4: PLR component architecture



[48] More information here.

Figure 5: Architecture of HIS components

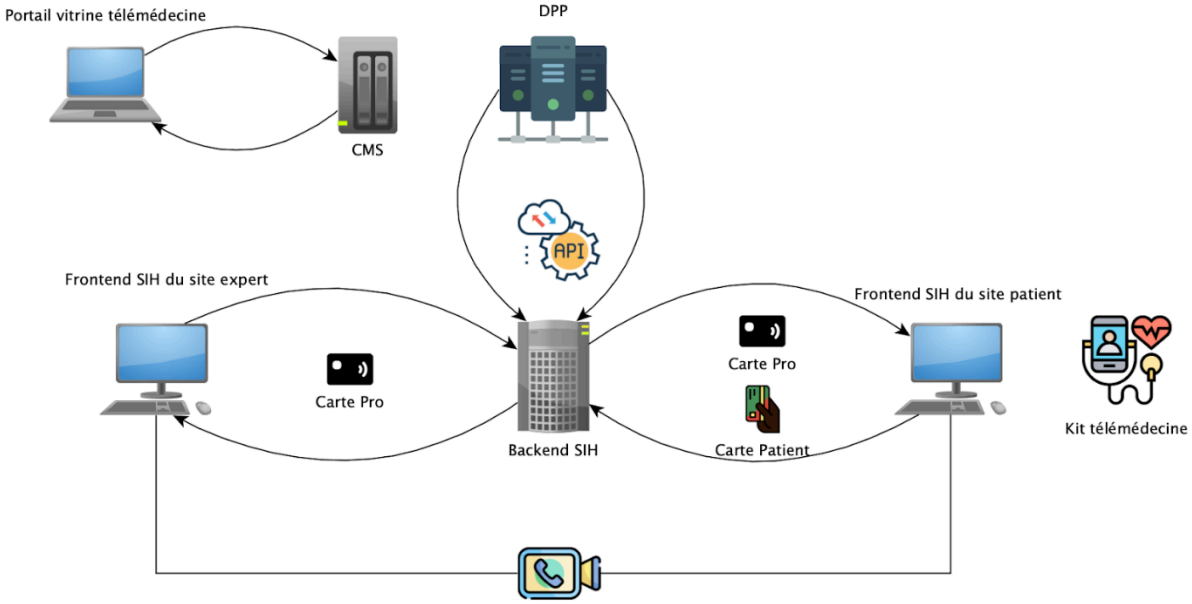


Figure 6: Architecture of telehealth components

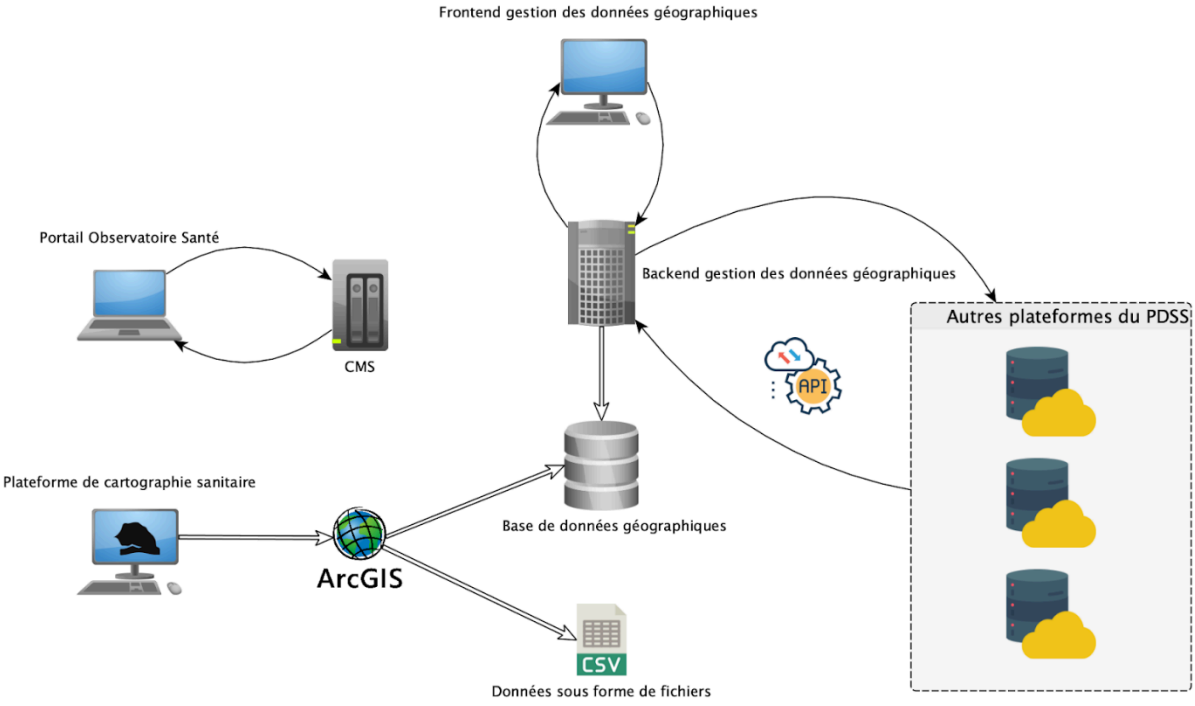


Figure 7: MIS component architecture

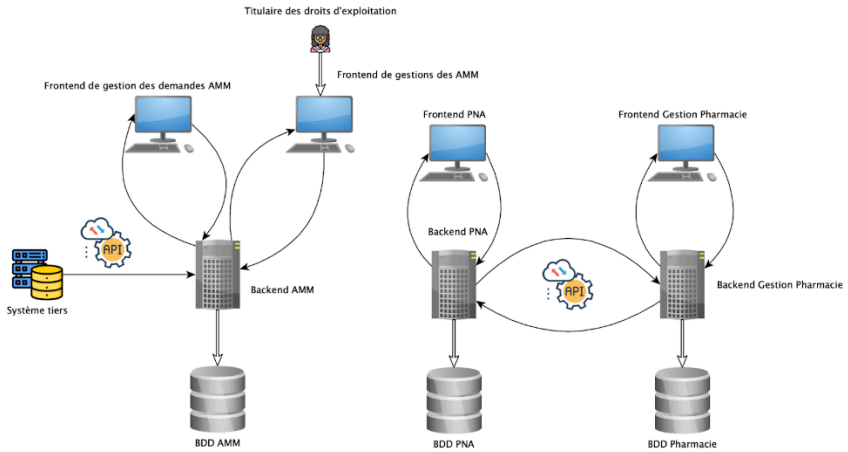


Figure 8: Components of the management and control of medicines and essential products

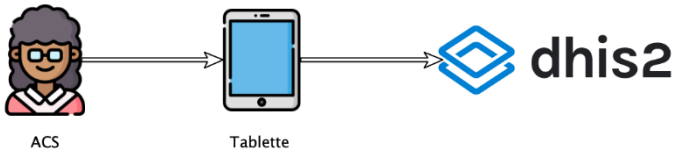


Figure 9: Components of community data digitisation

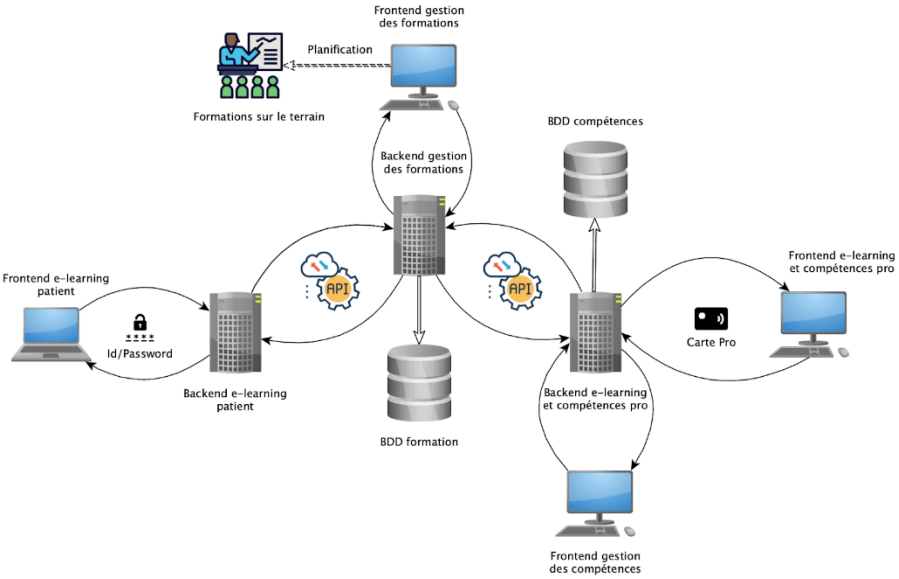


Figure 10: Architecture of training and skills management component

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