enesis 2022

ESTRATÉGIA NACIONAL
PARA O ECOSSISTEMA DE
INFORMAÇÃO DE SAÚDE

NATIONAL STRATEGY FOR THE HEALTH INFORMATION ECOSYSTEM

Preliminary Version for Public Consultation

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TECHNICAL DATA
Shared Services of Ministry of Health
National Strategy for the Health Information Ecosystem 2020-2022
ENESIS $_{20}{}^{22}$ Cordination

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Presentation

There is only one strategy that really interests all Portuguese people in relation to their health information.

The one that, in a participatory manner, in a discussed manner, but in a firm and clear manner, leads to a path that will make information about and from health more useful and more capable of generating health gains and happier lives.

Together with a myriad of institutional and individual partners, internal to the Ministry of Health and the National Health Service, and also with external agents, the SPMS drew up a draft of what will be the new National Strategy for the Health Information Ecosystem, in this case for the years 2020 to 2022, ENESIS $_{20}^{22}$.

These are expected to be years of major changes in technology, in the political and social environment in Europe and the world, and in the attitude of citizens towards their personal information and health. We challenge, ask and exhort you to read, think and share with us ideas, criticisms and suggestions with a view to writing a document that will help us all to navigate those digital ways in search of the new world of digital health where we can all come to benefit. The best benefit, the health and the life.

Henrique Martins

Alcainça, 5th September 2019

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
AMA	Administrative Modernization Agency
PAHA	Portuguese Association of Hospital Administrators
BI	Business Intelligence
CAHS	Central Administration of the Health System
CSIRT	Computer Security Incident Response Team
DPO	Data Protection Officer
DPS	Data Protection Supervisors
ENESIS	National Strategy for the Health Information Ecosystem
EHR	Electronic Health Record
ERDF	Europe Regional Development Fund
ESF+	European Social Fund Plus
EU	European Union
GNI	Gross National Income
eSIS	Health Information Ecosystem
HDTC	Health Digital Transformation Center
HIN	Health Informatics Network
HR	Human Resources
HS	Health System
ICT	Information and Communication Technologies
IS	Information Systems
IT	Information Technology
IoT	Internet of Things
LAN	Local Area Network
LCCI	Local Commissions for Clinical Informatization
LIGHT	Local Interoperability Gateway for Healthcare
MFF	Multi-annual Financial Framework
MH	Ministry of Health
MNO	Mandatory Notification Officer
NCP	National Contact Point
NHS	National Health Service
NNICC	National Network of Integrated Continuous Care
PNB	Portuguese National Broker

PH	Primary Health Care
PHCIC	Primary Health Care Identity Card
RSP	Reform Support Programme
SPMS	Sharing Services of the Ministry of Health
VPN	Virtual Private Network
WAN	Wide Area Network
WHO	World Health Organization

Acknowledgements

Being a preliminary version, the acknowledgments are not yet closed, but they extend to all those who talking to SPMS E.P.E. at some point, took time, and put effort to help us to think.

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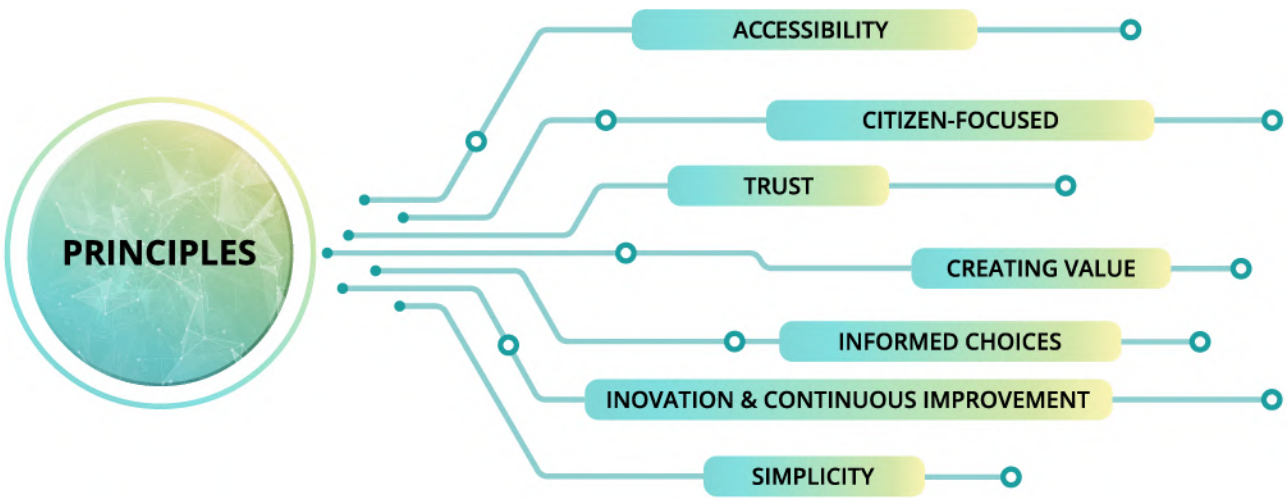
Executive Summary of the Preliminary Version

1. The new National Strategy for the Health Information Ecosystem (ENESIS $_{20}22$), designed for the three-year period from 2020 to 2022, which is proposed throughout this document, was prepared by SPMS, E.P.E., in collaboration with a number of institutional and individual partners, internal and external to the Ministry of Health. This Strategy intends to continue the current ENESIS, which ends in December 2019, taking advantage of and evolving the good things that have been built over the last three years and correcting what should be changed.
2. This strategic document does not include an action plan or details of all the activities to be carried out over the next three years. The ENESIS $_{20}22$ strategic framework will subsequently be operationalized, in eSIS, in accordance with the SPMS and other entities' activity plans.
3. The purpose of ENESIS $_{20}22$ is to promote the digital transformation of the health sector in Portugal, creating the necessary conditions for the evolution of the Health Information Ecosystem (eSIS). This should be considered far beyond the National Health Service, guiding and articulating the different strategies and initiatives of the multiple stakeholders of the Health System in favour of common objectives. ENESIS $_{20}22$ thus represents a common vision for the area of Health Information and Communication Systems, designed considering the Sectoral Plan of the Ministry of Health and should be based on clear and participatory governance and management.
4. ENESIS $_{20}22$ includes a set of principles, strategic aims and dimensions, described throughout this document, organized and structured to facilitate the explanation, implementation and monitoring of the national strategy.
5. This document is organized in 6 chapters:
6. The **first chapter**, the Framework, provided a context for the health and eHealth sector's current affairs, addressing the sector's key needs and challenges. In addition, it frames the previous ENESIS 2020 strategy, referring to the objectives achieved and explaining the premises that justify the preparation of a new strategy, as well as its objectives.



7. In the **second chapter**, the ENESIS $_{20}22$ vision is described, explaining the conditions that provide the evolution of the Health Information Ecosystem (eSIS).
8. The **third chapter**, Principles and Objectives, describes the four central objectives of the new strategy and the seven fundamental principles that guided the definition of the dimensions, strategic aims and measures now proposed.

STRATEGIC STREAMS

- Access to Health Services and Care throught the Citizen's Lifecycle
- Citizien Empowerment
- Efficiency and Sustainability of the Health Systems
- Quality and Safety of Health Care
- Health Prevention, Protection and Promotion
- Organizations and Professionals Empowerment

9. The **fourth chapter**, Strategic Framework of ENESIS $_{20}22$, describes the set of transversal and vertical dimensions that represent the set of key guiding components of the ICT strategy and its facilitators considering health challenges and objectives.
10. The **fifth chapter**, Strategic Aims, presents the six aims that structure the strategy, comprising a set of measures, organized in a coherent way according to the respective axis, and the respective guidelines for its implementation.
11. The **sixth chapter**, ENESIS $_{20}22$ Operational Summary, presents the proposed measures for each of the aims, organized in three different time horizons, according to the time of implementation, based on their expected impact, visibility, and estimated effort.
12. Are described 31 measures in various areas, such as Access to health services in Mobility; Availability of platforms that promote the provision of remote care (telehealth); Development of health literacy through the creation of shared solutions; Evolution of clinical and administrative Information Systems; Optimization of network and server infrastructures; Definition of the Data Governance model; Shared management of health services and resources; Promotion of good cybersecurity practices in Information Systems; Protection of confidentiality, integrity and availability of health information; Implementation of clinical decision support mechanisms and patient safety; Ensuring business continuity; Prevention of public health phenomena through data analysis and Artificial Intelligence; or Improvement of the digital skills of Healthcare Professionals or Top Managers.

This document, in its preliminary version, should be improved based on the collection of ideas, criticisms and suggestions, within the framework of the public consultation period that is now beginning. The document does not include two important components for the success of ENESIS, such as the governance model and the macro financial plan, as they are understood to be elements to be worked on during and after the public consultation period. In this regard, we appeal to everyone to contribute to the maximum through the instructions available at www.spms.min- saude.pt.

1 FRAMEWORK

13. In Portugal, there is an ageing population, justified by the decrease in the birth rate and the increase in average life expectancy [1]. This factor, together with risk factors associated with lifestyles, increases the increased need for health care and, consequently, brings greater economic weight to the health sector [2][3].

14. Portugal therefore faces several challenges to ensure the improvement of health care for its population. At the same time, it must ensure the sustainability of the health system, focusing on the areas of prevention, promotion and protection of health. A citizen-centered approach should prevail to ensure timely and simple access to health care, improving experience in its relationship with the system. At the same time, the Health System must be trained so that it is able to adapt to the rapid changes and constant needs of the sector [4].

15. In this context, and from a technological perspective, the impact caused in various sectors and industries by the industrial revolution 4.0 should also be considered [5]. This brings significant advantages by transforming production processes through new concepts of digitalization. Industry 4.0 focuses on the independent management of intelligent processes and objects.

16. This transformation is associated with a set of technologies, some of which can have a major impact on the health sector, acting as major enablers or accelerators of solutions. Examples include robotics, augmented reality, simulation, vertical and horizontal system integration, the internet of things, the cloud, cybersecurity, big data and analytics.

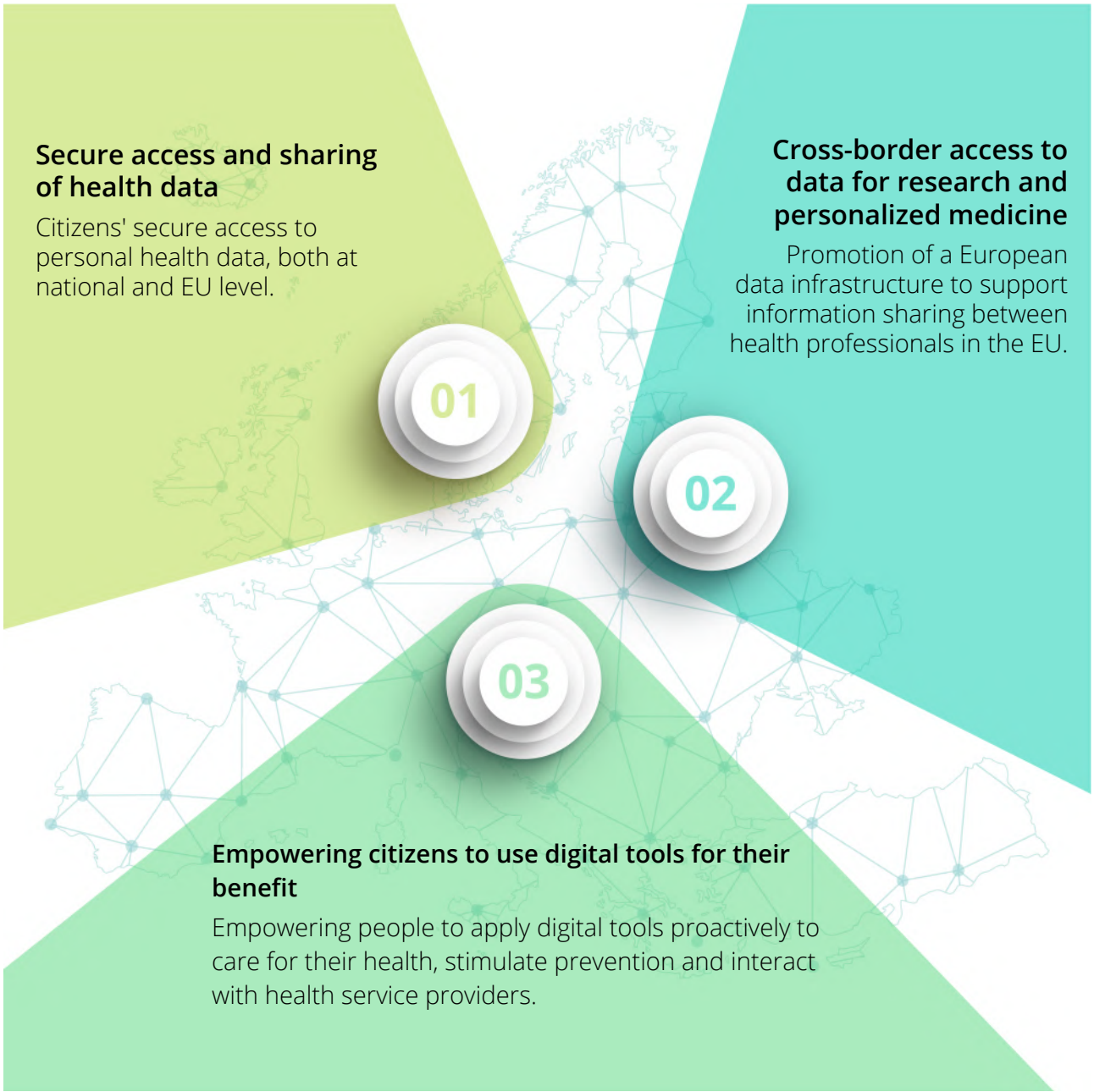
17. It is in this environment that the eHealth 4.0 concept emerges, which derives from the concept of Industry 4.0, having as its scope the digital transformation of Health Care. This transformation, enhanced by these facilitators or technological accelerators, is based on three pillars: People, Technologies and Processes, promoting a profound change in the way health services are provided. One of the most disruptive aspects that this technological revolution has allowed is the involvement of citizens with the health sector, not only as passive actors, but as active actors increasingly involved in their well-being and the promotion and preservation of their health [6].

18. eHealth is increasingly becoming a priority at the global and European level, according to the recent strategy under discussion at the World Health Organization (WHO) "WHO Global Strategy on Digital Health 2020-2024" [7], and the recent statements by the President of the European Commission, Ursula von der Leyen, in the "Mission Letter" addressed to the Commissioner for Health, Stella Kyriakides [8]:

> *"We need to make the most of the potential of e-health to provide high-quality healthcare and reduce inequalities. I want you to work on the creation of a European Health Data Space to promote health-data exchange and support research on new preventive strategies, as well as on treatments, medicines, medical devices and outcomes. As part of this, you should ensure citizens have control over their own personal data"*

19. In addition, the European Commission's strategic direction in completing the European Single Market is also clear.

20. Recognizing that the health sector is essentially provided by the public sector, the European Commission's strategic vision is based on two key priority areas: developing common and uniform data sharing standards (EHRxF) in order to ensure interoperability in the use of ICT and the further development of the EU eGovernment Action Plan 2016-2020 as support for the rapid and sustainable digital transformation of national health systems. With this in mind, and with a view to deepening the two cross-border services already in place - Single Clinical Summary and Paperless Prescriptions - the European Commission's strategic vision for digitalization national health services and care, released on April 25th of 2018, is based on empowering citizens and is founded on three fundamental pillars:



21. The National Strategy for the Health Information Ecosystem 2020, approved by Resolution of the Council of Ministers no. 62/2016, and regulated by Order no. 3156/2017 of the office of the Honorable Mr. Minister of Health, covered the period 2017-2019. This was the first strategy of this nature adopted and published by a Government. During these three years it was possible to initiate a common strategic thinking and action on the Health Information Ecosystem (eSIS). This based on governance and participatory management, allowed guiding the strategies and initiatives of the various stakeholders of eSIS, in alignment with the health policies approved by the XXI Constitutional Government Programme, and benefiting from the ongoing digital revolution in the health sector, based on governance and participatory management, allowed guiding the strategies and initiatives of the various stakeholders of the ecosystem in various areas of eHealth, in alignment with the health policies approved by the XXI Constitutional Government Programme [9], and benefiting from the ongoing digital revolution in the health sector.

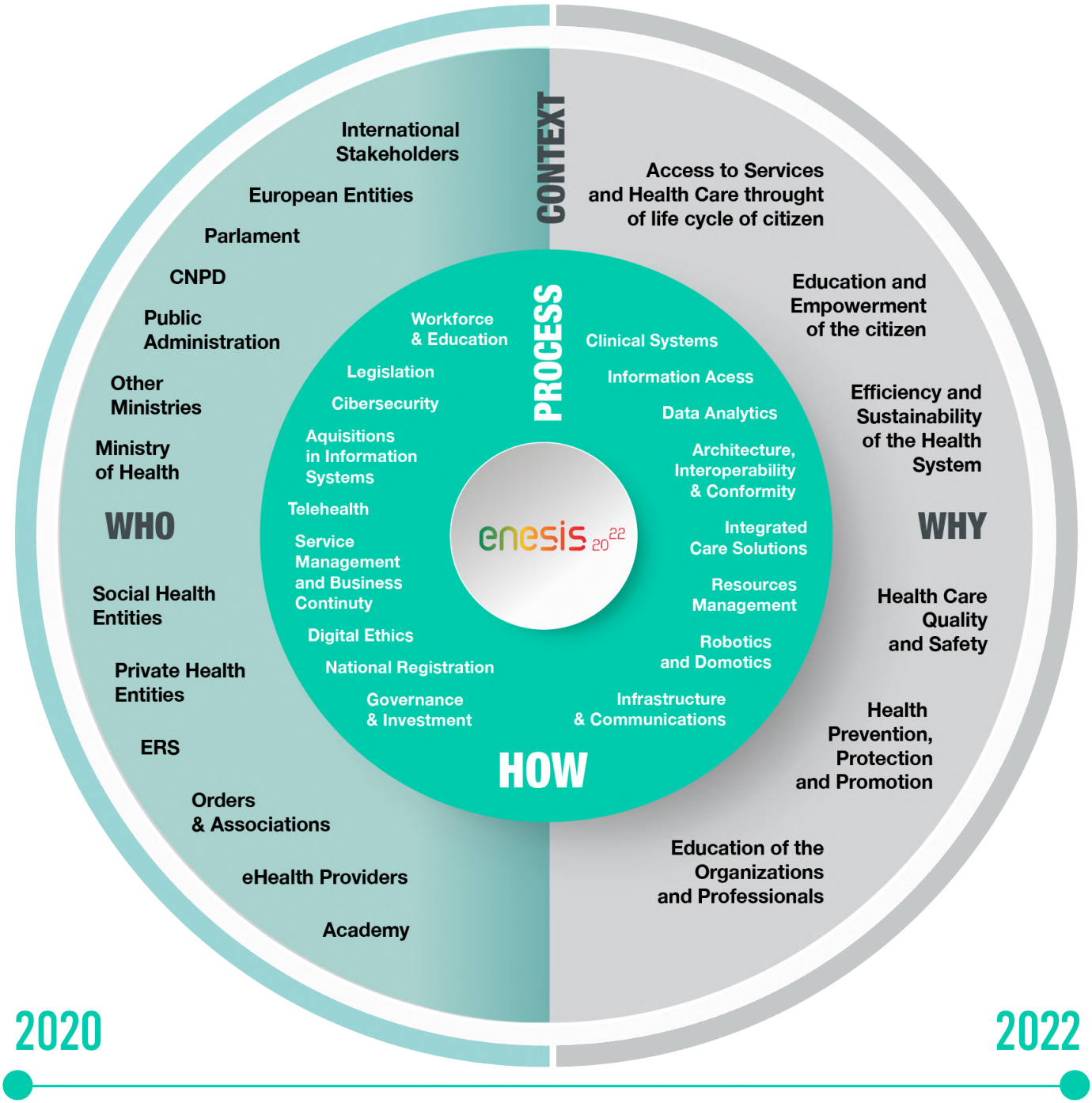
Health Information Ecosystem (eSIS)

A set of technologies, people and processes that intervene in the life cycle of information related to all dimensions of citizens' health and related health, regardless of the place of care and/or organizational barriers.

22. ENESIS 2020 is running until December 2019 and the assessment of the three-year period 2017-2019 is carried out at that time. The conclusions and recommendations that have been made have been integrated into the preparation of the new ENESIS for the next three years. The new ENESIS will also benefit from the understanding of the critical success factors of the current strategy to ensure better execution and operationalization.

23. The National Ecosystem of Health Information Strategy, for the triennium 2020 to 2022, called ENESIS $_{20}^{22}$, aims to guide and articulate the strategies and initiatives of the different stakeholders of eSIS. It is intended to provide a response to the priorities defined in terms of health policies, namely in the framework of the new Basic Health Law, ensuring a common vision for the area of Information Systems and Technology throughout the Health System.

24. A methodology was adopted for the preparation of ENESIS $_{20}^{22}$, the details of which can be found in Annex I. The following diagram systematizes the questions that a national strategy should answer, namely "Why?" and "Who?", which insert the context of the strategy, and "How?", which makes reference to the procedural model. In particular, the "Why" is represented by the strategic aims, which are guidelines of the strategy, and the "Who" is represented by the stakeholders, who are the active participants and responsible for defining, implementing, executing and benefiting from the various measures embodied by this strategy. The dimensions that support the implementation of the strategy are represented by the "How". The following diagram summarizes these concepts:



2

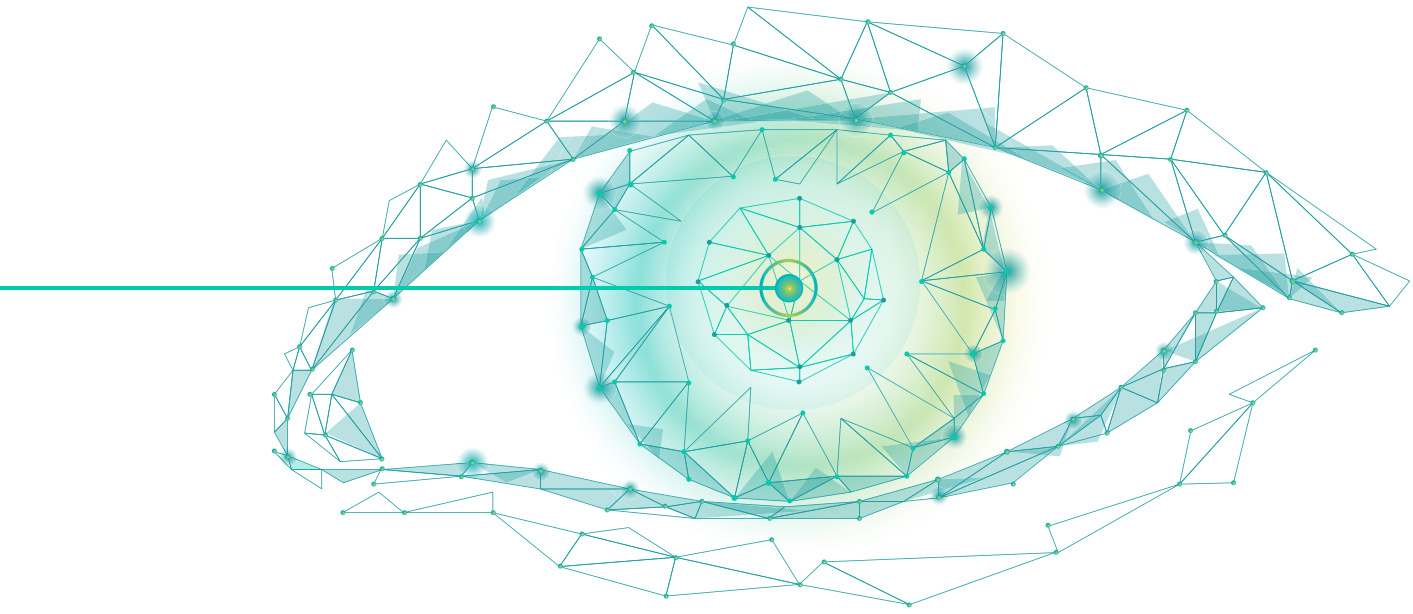
VISION

25. ENESIS 2022 aims to create the framework and conditions through which the various actors of the Health System contribute to the evolution of eSIS, in an articulated and integrated manner, progressing towards common objectives.

26. An eSIS as a reference for good practices, sustainable and centered on the citizen, integrated and digitally qualified, giving the health system more equity, proximity and quality. Providing a better experience for the citizen and the health professional and contributing to effective resource management and better health outcomes.

27. The vision for ENESIS $_{20}^{22}$:

28. "A Health Information Ecosystem as a reference for good practices, for a more digital, integrated, sustainable and citizen-centered Health System, contributing to the delivery of benefits and to the optimization of risks and resources".



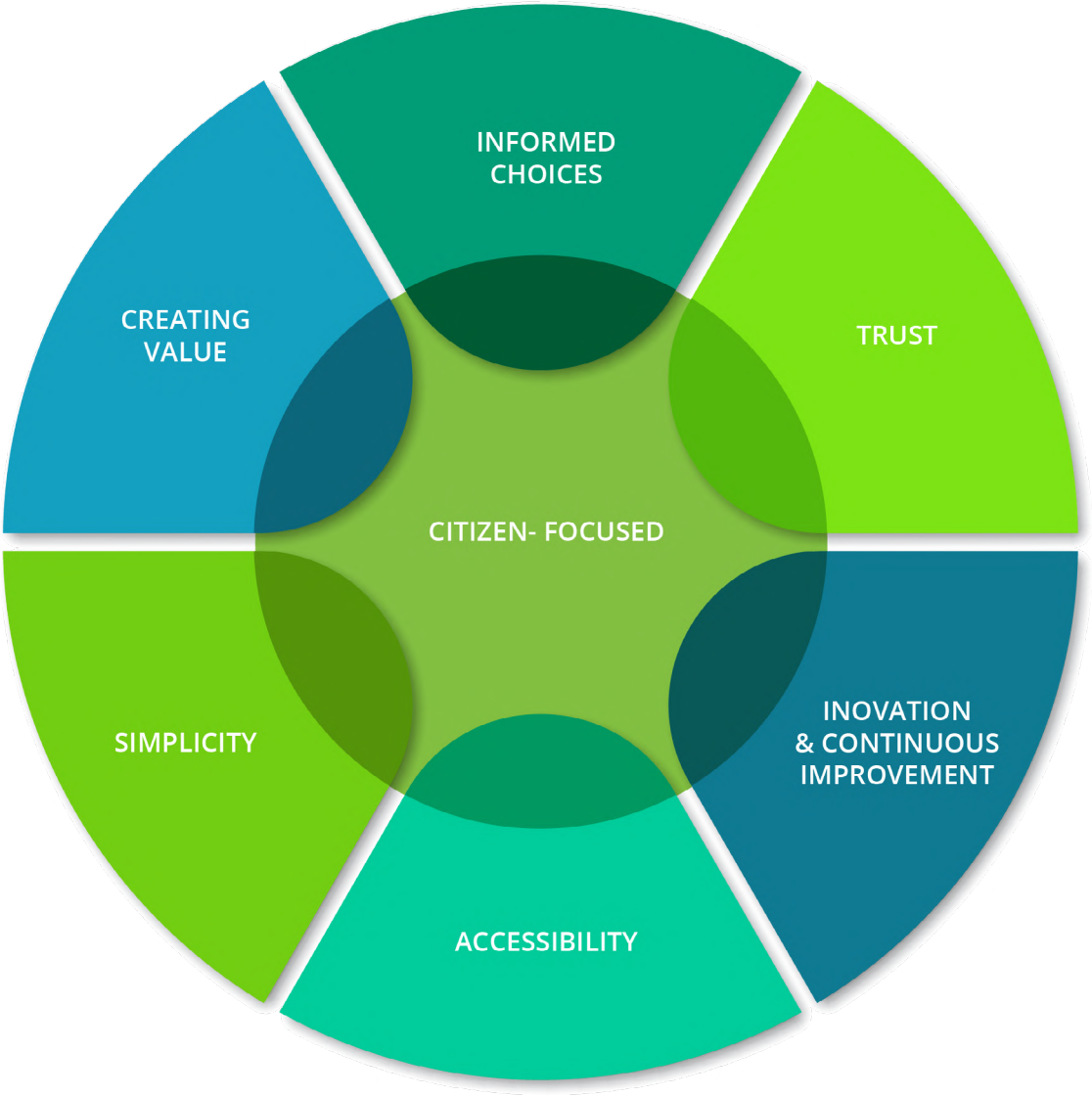
3

PRINCIPLES AND OBJECTIVES

3.1

PRINCIPLES

29. A set of fundamental principles was considered, which guided the creation of the different strategic aims, and the respective measures and guidelines. These represent cross-cutting values that should be known, understood and applied by all eSIS entities in the implementation of the strategy.



ENESIS 20 22 PRINCIPLES

Creating Value

Enhance the creation of long-term benefits for the different actors of eSIS, ensuring an appropriate balance between the associated benefits, opportunities, costs and risks.

Informed Choices

Promote the capacity building of the different stakeholders, and responses to their needs, in order to support professionals and citizens in accessing relevant information to support decision making.

Trust

To promote the reliability, transparency and safety of the Health Information System in the prevention, promotion and provision of Health.

Innovation & Continuous Management

Promote innovation throughout the Health Information System, through the adoption of a culture of change management and continuous improvement with a focus on the optimization of processes and technologies.

Citizen Focused

To promote the experience of citizens throughout their life cycle and satisfaction in meeting their needs.

Accessibility

Promote availability, equity and accessibility to Health Services.

Simplicity

To promote the simplicity, mobility and usability of the Health System for health professionals and citizens.

3.2
OBJECTIVES

30. ENESIS $_{20}22$ has a set of objectives that aim to integrate three different perspectives, the one of them: **Citizens, Professionals and Health Organizations**. The aim is to provide citizens with support in achieving their health goals through easier access to health care and better information available. Professionals need to create better working conditions, and a continuous improvement of their skills and competences, especially digital ones. For Healthcare Organizations, it is important to improve and ensure an adequate capacity to respond to their needs, in an increasingly complex context. So, the main objectives are:

· Supporting the health system and the provision of care to improve the health of the population

- Providing improved management of health services, facilitating access to health information and services and the integration of care, reducing geographical and socio- economic disparities;

· Improve the citizen's experience in his or her life path and in contact with the health system

- To promote the improvement of the quality of care provided, the safety of patients and the simplicity, ease and convenience of contact with the health system;

· Maximize the working conditions of health professionals

- Contribute to improve and innovate the work processes of professionals, improve their satisfaction and, consequently, the quality in the provision of services;

· Increasing the efficiency of health organizations and safeguarding access to quality health services and effective resource management

- Optimize the existing resources, avoiding unnecessary expenses and innovating in the Health System, particularly in the NHS.

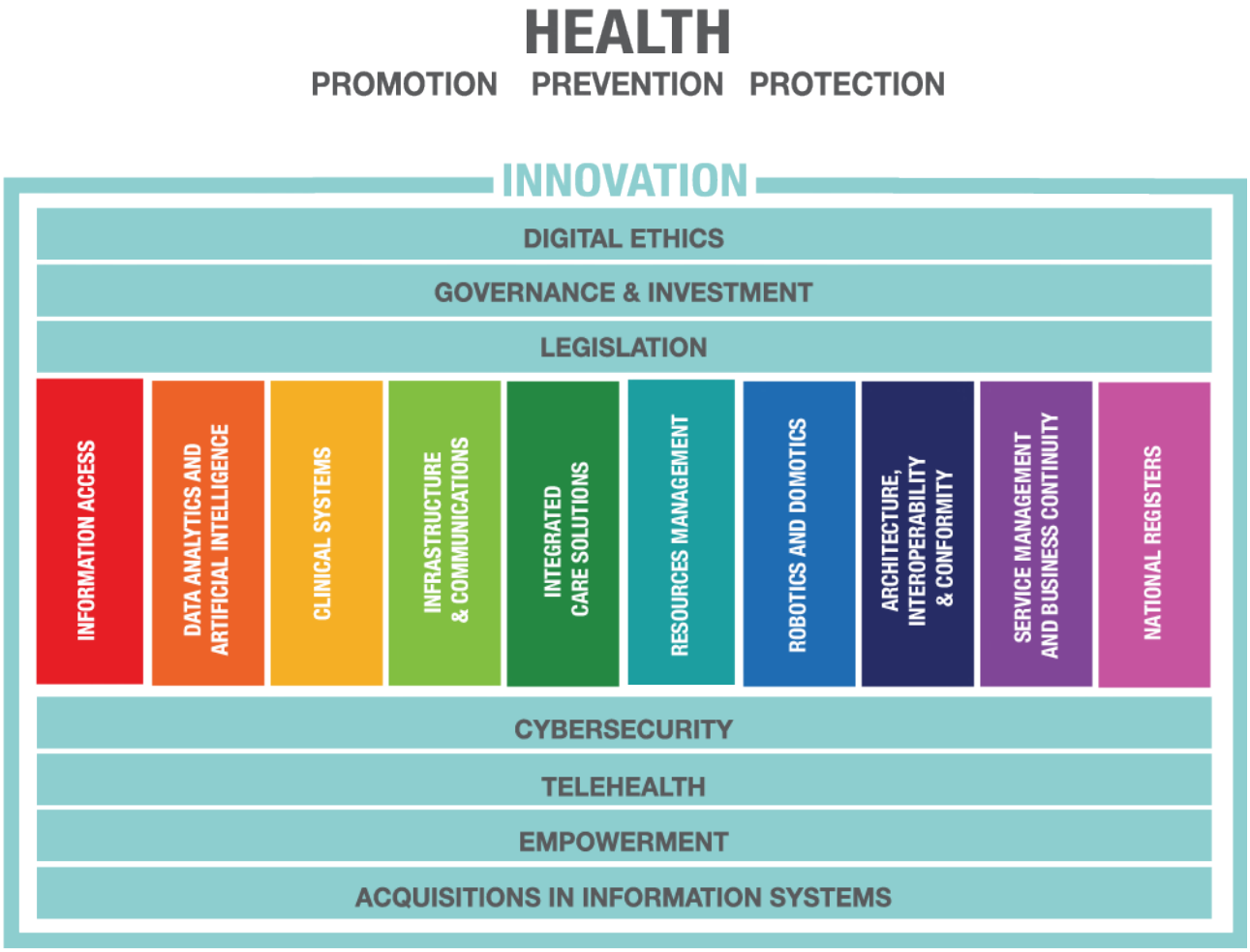
4

STRATEGIC FRAMEWORK ENESIS 20|22

31. In order to organize the set of needs and objectives that Health Information Systems should support, some facilitators were identified in the area of Information and Communication Technologies, aggregated into technological dimensions, which are related to other transversal dimensions. The set of these dimensions is essential for the successful implementation of this Strategy, ensuring respect for the principles defined and supporting a set of strategic streams, measures and guidelines to be implemented by eSIS entities.

32. These dimensions are aggregated in a Strategic Framework that helps to organize and guide the Strategy and its implementation.

33. The **Transversal Dimensions** correspond to national strategic references that transversally support ICT components of a more organizational or procedural nature, called **Vertical Dimensions**.



4.1 TRANSVERSAL DIMENSIONS

4.1.1 DIGITAL ETHICS

34. One of the major challenges of ENESIS $_{20}22$ is to integrate the concept of Digital Ethics into the new strategy.

35. Today, information and communication technologies (ICT) are playing an ever-increasing role and a renewed concept of digital ethics based on the principle of responsibility is needed. It is in this context of responsibility that the main issues of digital ethics arise today, considering that actions are not always guided by awareness of their consequences. Thus, we must be aware that there are no individual solutions to collective contradictions, that is, the new Ethics of the Digital Age cannot be exclusively individual, but must be, above all, a collective, public and professional ethics.

36. Principles for Digital Ethics should be established, considering the ethical and social challenges of new ICT, and the dissemination of technologies. In particular, digital ethics associated with digital privacy is increasingly becoming a strategic technological trend, whether in the development of applications guided by Artificial Intelligence, blockchain or other innovative technologies, or in areas such as robotics or home automation.

37. With the increasing use of smart technology tools, it is crucial to consider digital ethics, ensuring that the interests of society and humanity, in addition to economic interests, are respected.

38. In this context, there is a proposal to create a National Council for Digital Ethics within the scope of eHealth, which will ensure independent evaluation of the usefulness or harmfulness of technological innovation applied to health information systems and the management of citizens' health information, throughout the entire life cycle.

4.1.2 GOVERNANCE AND INVESTMENT

GOVERNANCE

39. To ensure the successful implementation of this National Strategy over the next 3 years, it is essential to adopt sustainable and effective governance, based on concrete organic structures, which ensure a broad and clear participation by the various stakeholders of eSIS.

40. The governance model should cover all organic levels, including a **strategic level**, which ensures the leadership of ENESIS $_{20}^{22}$ and assumes the direction and control of its implementation; **the tactical level**, which includes the management, monitoring and follow-up structures of the different initiatives, and the **operational level**, including the bodies responsible for the implementation of the strategy.

41. The same model should be able to align growing governance structures at the European level (such as the eHealth Network, established under the Cross-Border Care Directive [10], and the different national, regional and sectoral levels and sectors, even going as far as the local level, such as the DPO (Data Protection Officer) or RNOs (Responsible for Mandatory Notification) [11].

42. The organic structures to be created under the ENESIS $_{20}^{22}$ Governance Model should be defined later, in accordance with some fundamental principles, in alignment with one of the eHealth Network Recommendations (under preparation by the end of October) on **Development of National Digital Health Networks in the EU Member States**, such as responsibility, inclusion, involvement and transparency, and it is crucial to define the role and contribution of each actor in the implementation of the national strategy.

43. In order to support the current ENESIS 2020, a Governance Model was created, in force, which includes some structures that have played an important role in its operationalization. In particular, the good functioning of structures such as the ENESIS Forums or the Local Commissions for Clinical Informatization (CLICs) has proved to be possible to motivate the different entities and their professionals and ensure their involvement, framing their action in favour of common objectives. It is therefore important to build on the good examples of the current governance model, but to ensure that it develops in line with the current requirements and principles set out at the beginning of this chapter.

INVESTMENT

44. In order to support the implementation of ENESIS $_{20}^{22}$, it is essential to develop an investment strategy to consolidate and structure the financial needs to implement the measures and respective initiatives included therein. **The approach to the investment strategy should be based on the principle of aligning the entire ecosystem with the integrated vision of priorities in this area**. It should therefore be ensured that the investment integrates a cohesive plan among all eSIS participants, which defines the appropriate and necessary funding to support the different measures and their initiatives, and structures the management and evaluation of the initiatives from a model focused on the 'simple' implementation of ICT projects, **to a model focused on the achievement of ICT induced benefits.**

45. *It is not the purpose of this document to present an investment plan, which is essential to ensure the implementation of the different measures presented here. This work will have to be developed in a second phase, in accordance with the strategy previously defined, starting with the definition of a roadmap that culminates in the presentation of estimated investment values, or investment cycles, at national level, in accordance with the structure of ENESIS itself, by Strategic Aims and respective Measures.*

46. Even so, it is important to present some representative, but not exhaustive, values of the investment foreseen for some critical and transversal areas, at national level.

47. In the area of infrastructure and communications, the new RIS will require an investment effort of around €3 million per year for the next three years. Investment in central infrastructures (including licensing, operations and renovation of equipment and facilities in the NHS central data center) is estimated at around €17 million for 2020.

48. In the area of primary health care, a value of €20 euros was estimated for the next 2 years, for the evolution of the information system and to guarantee the renewal of the local infrastructures of the different health units.

49. In the hospital area, it is planned to update the legacy system of some hospitals, implying an investment of €4 million in the next two years.

50. In the area of National Registries, the evolution of the main systems, namely the National Registry of Users, Professionals and Entities, implies an investment of €3 million, for the next three years.

FINANCING SOURCE

51. The investment required to implement ENESIS is supported by two major sources: National and European (Community Funds). Regarding European funds, it is important to make known some of the instruments that are being prepared to support investment in eHealth between 2021 and 2027.

NATIONAL

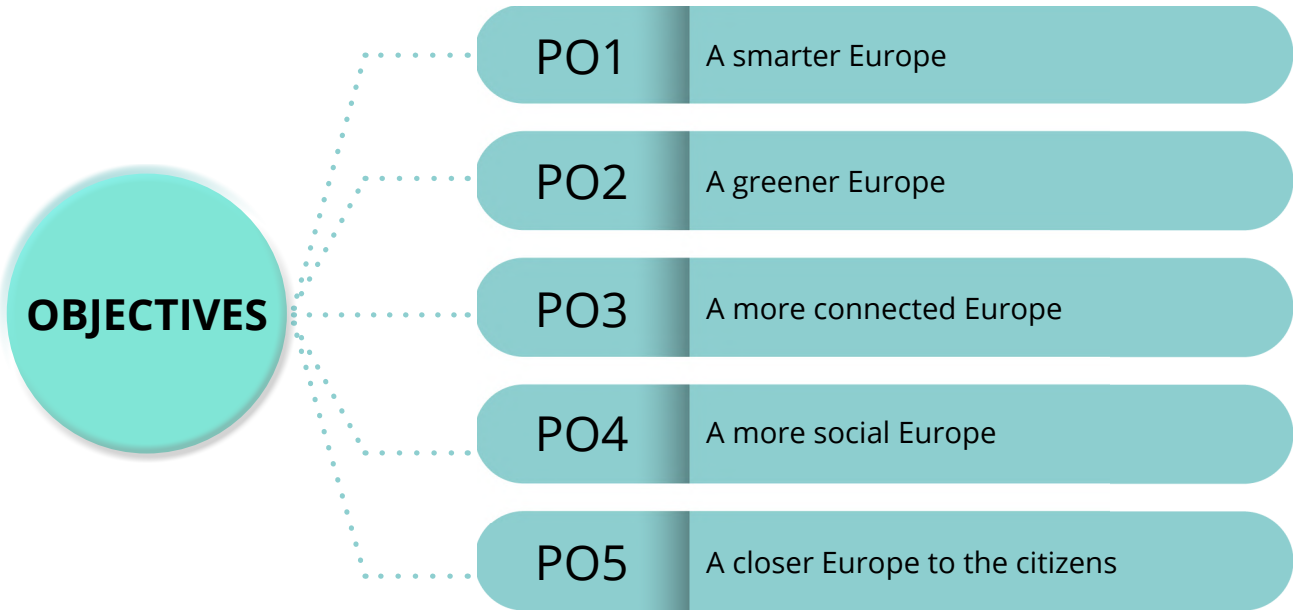
52. The sources of national funding to support ICT investments in health come directly from the State Budget or via the Program Contract, established by the ACSS, as described in the legal framework established by Decree-Law No. 35/2012 [12], of 15 February, and No. 19/2010 [13], of 22 March. It is essential that these two instruments ensure, at the level of the different eSIS entities, that the investment is aligned with ENESIS.

EUROPEAN UNION – COMMUNITY FUNDS

53. Within the scope of the work developed by the Sub-Group on the implementation of the Communication on the Digital Transformation of Health and Care [14], financing instruments were analyzed that may support investment in the area of eHealth, and that will be included in the EU's next multi-annual financial framework (MFF) for the period 2021-2027. Of the financial instruments contemplated, the most relevant for eHealth stand out, being distributed into two categories:

54. Shared Management Funds between the European Union and the Member States:

55. The funds set out below, while having their specific objectives, both fall within the scope of the European Union's 'Regional Development and Cohesion Policy' funds.



Name of the main financial instrument or program	Name of sub-instruments or programmes	Types of investment/activities envisaged under the Financial instrument or programme	Proposed Amount
Shared Management Funds between the European Union and the Member States: The funds set out below, while having their specific objectives, both fall within the scope of the European Union's 'Regional Development and Cohesion Policy' funds. The objectives of this policy are: **PO1** | A smarter Europe **PO 2** | A greener Europe; **PO 3** | A more connected Europe; **PO 4** | A more social Europe; **PO 5** | A Europe closer to the citizens	European Regional Development Fund (ERDF)	**a)** Infrastructure investments (e.g. electronic health records, telemedicine, etc.); **b)** Investments in access to services; **c)** Productive investments in SMEs; **d)** Equipment, software and intangible assets;; **e)** Transformational changes in the health system; **f)** Information, communication, studies, networking, cooperation, exchange of experiences and activities involving clusters; **g)** Technical assistance	**EUR 200,629 billion**
	European Social Fund Plus (ESF+)	Part of the European Social Fund +	**EUR 100 billion**
		eHealth strand: **a)** Analytical activities; **b)** Policy implementation; **c)** Capacity building (including supporting the implementation, operation and maintenance of an IT infrastructure for data exchange) **d)** Communication and dissemination activities.	**EUR 413 millions**
Funds managed centrally and directly or indirectly performed by the European Commission	Digital Europe Programme (DEP)	High performance computing	**EUR 2.7 billion**
		Artificial Intelligence	**EUR 2.5 billion**
		Cybersecurity	**EUR 2.0 billion**
		Advanced Digital Skills	**EUR 0.7 million**
		IImplementation, better use of digital capacity and interoperability	**EUR 1.3 billion**
	Connecting Europe Facility (CEF)	Digital Connectivity Infrastructure	**EUR 3.0 billion**

(Cont.)

Funds managed centrally and directly or indirectly performed by the European Commission	The Invest EU Programme (InvestEU)	Sustainable Infrastructure	**EUR 11.50 billion**
		Small businesses	**EUR 11.25 billion**
		Research, Innovation and Digitization	**EUR 11.25 billion**
		Social Investment and Skills	**EUR 4.0 billion**
	The Reform Support Programme	Support provided through technical expertise	**EUR 25 billion**
	The Horizon Europe Programme (HE)	Open Science	**EUR 25.8 billion**
		Global Challenges and Industrial Competitiveness	**EUR 52.7 billion**
		Open Innovation	**EUR 13.5 billion**

Fonte: *An interoperable eco-system for digital health and investment programes for a new/updated generation of digital infrastructure in Europe* [14]

56. Some recommendations of "Sub-Group on the implementation of the Communication on the Digital Transformation of Health and Care":

• The provision of public funds by EU Member States and the European Commission to upgrade existing digital infrastructure or establish new digital health infrastructure used particularly by health professionals and healthcare providers, but also to enable access to and management of their health status. It should be ensured that those public funds are used to support the establishment of an interoperable European digital health ecosystem, while considering national interoperability strategies.

• To ensure interoperability, applicants and beneficiaries of all types of public and EU funding ensure compliance with functional specifications of IT solutions, with the principles set out in the Refined eHealth European Interoperability Framework. Additionally, as a starting point for the improvement of interoperability, the technical specifications, standards and profiles, which constitute Annex I of the document, should be considered for the health information domains.

57. Regarding the Community Funds, attention should be drawn to the poor implementation of the health sector, according to COMPETE 2020 data, on the basis of applications approved and funded between the years 2016 and 2019.

Measure	Project number	Total Eligible Approved	Approved Fund	Total Executed Expense	Executed Expense (%)	Total Executed Fund
SATDAP TIC (FEDER)	68	46 774 006,26	5 796 794,45	5 796 794,45	12%	4 424 356,98
SATDAP CAPACITAÇÃO (FSE)	73	55 885 912,62	41 996 646,12	19 331 371 31	35%	14 850 991,31
SATDAP TOTAL	**141**	**102 659 917,88**	**77 863 156,42**	**25 128 165,76**	**24%**	**19 275 348,29**

58. The eSIS entities applied for Community funds (ESF and ERDF) to support their ICT initiatives and projects, and a total of 141 projects were approved, representing a total value of approximately 103 million euros, of which 78 million euros corresponded to the Community contribution. The national effort represents EUR 25 million.

59. However, to date, only a total expenditure (Funds and National Contribution) of 24% of the total approved has been executed.

4.1.3 LEGISLATION

60. Developments in information technology have introduced new patterns into the relationship between citizens and public and private institutions, facilitating the existence of a multiplicity of databases, with interconnections between them and new forms of accommodation and availability of information, with associated advantages and risks that need to be considered. On the other hand, the emergence of new paradigms in the approach to health promotion and protection and in the systems that support it, creates the need to create appropriate legal instruments

61. Despite the recent legislative changes, which have in some way strengthened the legal framework applicable in this area, in particular:

- Law n.º 58/2019 [15] of 8 August, which ensures the implementation, in the national legal order, of Regulation (EU) 2016/679 of the Parliament and of the Council of 27 April 2016;

• The Basic Law on Health approved by Law nº. 95/2019 [16], of 4 September, which includes in the Basic Laws 15, 16 and 33, a matter related to information and communication technologies;

• Law nº. 48/2018 [17] of 13 August establishing the legal framework for cyberspace security transposing Directive 2016/1148 of the European Parliament and of the Council of 6 July 2016 on measures to ensure a high common level of network and information security across the Union, and,

• EU Regulation no. 910/2014 [18] on electronic identification and trust services for electronic transactions in the internal market (better known as the "eIDAS" Regulation) as regards the rules applicable to the provision of trust services, which as its main objective is to establish a common European basis for secure electronic interaction, increasing the trust and security of online transactions in the European Union, promoting greater use of online services by citizens, economic operators and public administration.

62. However, a set of complementary legislative needs is identified that are necessary for the proper functioning of the Health sector, in particular regarding information systems, of which we highlight the following:

63. **Implementation of the measures and minimum technical security requirements inherent to the processing of data**, referred to in paragraph 1 of Article 29 of Law 58/2019 [12], of 8 August, through an ordinance of the members of the Government responsible for the areas of health and justice, which should regulate, inter alia, the following matters:

a) Establishment of access permissions to different personal data, due to the need to know and the segregation of functions;

b) Requirements for prior authentication of those who access;

c) Electronic recording of accesses and accessed data.

64. **The creation of a regulatory Law of the electronic platform Electronic Health Record (EHR):**

65. It is important to clarify the terms in which the circulation, access and use of EHR information within the Health System takes place.

66. Likewise, it is important to regulate the interrelationship between this information and the Social Security, Justice, Defense, and/or other systems where the practice of health acts and their monitoring are critical.

67. On the other hand, the current context, the costs associated with the lack of information sharing between public and private entities within the health system, as well as the right to portability of personal data, justifies that the scope of CSR, as a platform for recording and sharing information, be extended to the private and social sector, not only as an option, but also as a mandatory one. This implies the consequent interconnection of clinical registries of the various public, private and social sector information systems, allowing CSR to become a global repository of clinical information. This is therefore also a reality that needs to be regulated.

68. **The approval of a Health Data Law:**

69. The specific nature of the issue of the processing of health data cannot be dissociated from new forms of care and constant technological development.

70. Constantly evolving Information and Communication Technologies, have been introducing newstandards in the relationship between citizens and public and private institutions, facilitating

the existence of a multiplicity of databases, with interconnections between them and new ways of storing and making information available, with associated advantages and risks, which must be regulated, so it is justified to create a specific law for the processing of this category of data.

71. Moreover, in a context of constant technological developments in the Health sector, based on an analysis of a growing set of data, it will also be important to regulate the important issue of secondary use of data.

72. Such strategic dehydration had already been identified as critical by the SPMS, with the launch for public discussion of a strategy for health data, and is aligned with one of the aspects of the European Commission's communication [8], in the Mission Letter of the newly elected chairman of the Ursula von der Leyen commission to the Commissioner for Health - Stella Kyriakides: on the creation of a "European Health Data Space to promote health-data exchange and support research on new preventive strategies, as well as on treatments, medicines, medical devices and outcomes", in which Portugal can play a decisive and central role, due to its technical experience (see the transparency area of the SNS Portal, or BICSP system, as references for data preparation and aggregation). For this, a more conductive and facilitating legal frame is needed.

73. It will also be important to define the terms and model of economic exploitation of health data.

74. **The approval of a Law on Automated Processing and Artificial Intelligence in Healthcare:**

75. Artificial Intelligence (AI) has an important role to play, with positive impacts in the health area, namely in the field of diagnosis and prevention.

76. However, the introduction of AI tools in the health sector raises several legal issues, including those related to the processing of personal data, as well as significant ethical issues. Without prejudice to the benefits resulting from the use of AI, this is an area where regulatory instruments are needed to define the terms of its application in the health sector and limits.

77. **Definition of a legal regime linking health databases, administrative health databases, professional registration:**

78. To clarify the different types of processing of information in the different databases.

79. **Creating a legal regime that regulates the telehealth:**

80. Innovation and the use of new technologies in health, including initiatives in the field of telehealth, still need appropriate regulation.

81. **Creation of a centralized entity of Health Data:**

82. The creation, by legal means, of a centralised structure that represents the reality of the different health bodies, defining their purpose, composition, functioning and powers, as well as the necessary articulation with the national data protection authority, will allow for a more effective coordination, monitoring and homogenization of procedures for the effective compliance with the legal provisions in force, in a coherent and transversal manner, as well as to promote and disseminate good practices in data protection matters This may be fundamental, in order to respond to the concept of "European Health Data Space" which we have been able to follow in European policy forums, will most probably be based on a federation of national aggregation units, and not a single European repository.

83. This type of structure could also be a facilitator for data protection officers (DPOs) to carry out

their duties in the different health bodies, given the current regulatory framework.

84. On the other hand, it is considered essential, like other existing legislative models in Europe, namely in Finland, which approved a Law on the Secondary Use of Social Data, to promote the discussion and adoption of legislative measures to facilitate effective and safe access to data collected in health for purposes of research, development and innovation, while ensuring the expectations of individuals in relation to their rights and freedoms, such as privacy.

85. The creation of a legislative instrument that could legitimize the secondary use of health data, possibly providing for the possibility for data subjects to donate their data, within certain pre-established requirements, would allow:

- Greater responsibility in the management of personal data and health information, protection measures, privacy and security;
- Increased transparency in policy-related decisions on access to and sharing of data at all levels of healthcare;
- Personalized health interactions and integrated care models, using citizens' own data to improve disease prevention.

4.1.4 CYBERSECURITY

86. Cybersecurity in health corresponds to a set of processes, people and technologies that ensures the provision of health care in a resilient and safe manner. This dimension reduces the risks of confidentiality, integrity and availability of information and services and contributes to increasing users' confidence in digital technologies. With the constant development of digital solutions in the health ecosystem, it is essential to ensure the right conditions for network and health information systems security.

87. It is therefore necessary to create a health-conscious ecosystem for the safe and responsible use of digital services and for the processing of users' health information, to ensure user confidence in the storage of their information in the infrastructure, to ensure the correct accessibility and availability of information to health professionals when providing care, and to increase the security

of health services, reducing the risk of threats (internal or external) through the exploitation of vulnerabilities in systems, networks and technologies.

88. In addition, it is essential to reduce the impact of possible security incidents that affect the business continuity of healthcare organizations by establishing mechanisms to detect illegal and malicious activities, and to increase the resilience and levels of preparedness of organizations to put in place measures to reduce the impact and efficiently recover care in the event of an incident.

89. Integrated security information and event management (SIEM) systems provide information on known threat patterns and possible attacks in progress, as well as other tools using advanced analytics and predictive models (threat models and attack scenarios). In this way it is possible to significantly reduce the probability of attempted attack and disruption of services. Therefore, it is important to reinforce the message that it is necessary to add organizational solutions to technological tools, focusing on citizens' awareness of cybersecurity, as well as individual accountability in the use of technologies, constituting one of the first most effective and elementary prevention measures of cyberrisks in a health organization.

4.1.5 TELEHEALTH

90. Telehealth is about supporting health at a distance, with ICT, in the provision of care, the organization of services and the training of health professionals and citizens. This concept is not only restricted to medical activity, it includes all health professionals and actively involves the citizen. Additionally, it contributes to overcome geographical and temporal barriers in access to health, promoting greater coordination, integration and continuity of health care [19].

91. In a transversal way, telehealth has numerous benefits for citizens, professionals, health institutions, the health system and, consequently, for society. In this sense, telehealth allows for: continuous monitoring of the citizen's health, enabling him/her to jointly manage his/her disease with the professionals, from the local level more convenient; increasing the convenience of the citizen, avoiding travel by patients and caregivers; sharing knowledge and experience between

health professionals; and redesigning intra- and inter-institutional processes, thus increasing the safety, quality and efficiency of the service provided.

92. For telehealth to be naturally interconnected to health care and to realize the potential benefits, adequate and accessible infrastructures and technological platforms are needed; an architecture that supports good organization and information management, with special attention to the centrality of the citizen; the availability of systems; interoperability; privacy and security, combined with data quality and the empowerment of professionals and the citizen in a legal framework that strengthens trust.

The emergence of technologies such as robotics, artificial intelligence, machine learning, natural language processing, wearables, the Internet of Things (IoT), among others, will raise the impact of telehealth to qualitative and quantitative levels still difficult to imagine.

Telehealth has its guidelines in the proposal for a National Telehealth Strategy, which reflects ENESIS in this area of digital health.

93. It is in this context that the Council of Ministers through Resolution nº. 67/2016 creates the National Telehealth Centre (NTS) within SPMS E.P.E. This has as its mission to catalyze development and accelerate the adoption of telehealth in Portugal.

4.1.6 EMPOWERMENT

94. The training of health professionals and citizens in digital skills should involve training and qualification activities and promote the dissemination of knowledge through actions that facilitate access to digital health technologies. Empowering citizens and health professionals with the necessary tools to improve their knowledge and skills is a fundamental factor to achieve the objectives defined in the National Strategy for the Health Information Ecosystem.

95. In this context, it is important to diagnose the needs for digital skills and then structure a differentiated training offer tailored to the different profiles of health professionals, IT professionals and citizens. The focus on the citizen's digital skills is aimed at enhancing inclusion mechanisms for all citizens through widespread access to digital technologies.

4.1.7 ACQUISITIONS IN INFORMATION SYSTEMS

96. Over the past few years, public procurement in health has shown great and significant transformations. Based on smart, sustainable and inclusive growth, the european strategy 2020 has made public procurement more efficient in the use of public funds. This growth is unavoidable, but there is still some way to go as regards the effective implementation of new strategies based on modernized measures, greater digital literacy and greater efficiency of resources and public spending.

97. The sector of transversal purchasing and information and communication technologies has become increasingly strategic in the management of each hospital, and given its criticality, the role of the Purchasing Centers has been strengthened with a view to obtaining rationalization of costs and resources, as well as the close connection with the savings generated for the NHS, *máxime*, for the Ministry of Health.

98. The new strategy for public procurement of health also occurs due to the permanent stimulation of the search for opportunities for continuous improvement of processes and their integration into the production chain to achieve financial goals and results, which are increasingly daring.

99. In the wake of a strategy that is intended to be ambitious, given the challenges of the 21st century, the standardization of procedures across public procurement in health requires investment in new information technologies, as well as the use of new instruments that enable the development of faster, more flexible, more comprehensive, more transparent and more competitive procedures.

100. From the existing legal normative, i.e., the Public Procurement Code (PPC), the formation of public procurement, can take different configurations, identifying the types of pre-contractual procedures most used:

DIRECT FIT	• Value criterion for the purchase of services of less than € 20,000, as per article 20 no. 1 al. d) (Articles 17 to 22) • Material criterion, with the need to state clearly and objectively that the specific situation meets all the assumptions provided in any of the lines of articles 24 and 27.
PREVIOUS CONSULTATION	• Direct invitation at least three entities by the choice of the contracting authority, when the value of the contract is less than € 75,000, in accordance with Article 20 (1) al. ç)
PUBLIC TENDER	• Public Tender without publication of a notice in the Official Journal of the European Union, where the value of the contract is below the thresholds referred to in Article 474 (3) al. b), c) or d) • Public Tender with publication of notice in the Official Journal of the European Union, whatever the value of the contact (Article 20 (1) (a))
INVITATION UNDER FRAMEWORK AGREEMENT	• Contracts of any value to be awarded under framework agreements in the following ways: Article 252 line 1 al. a) Article 252 line 1 al. B)

101. In this strategy we intend to walk at the same time as the concept of Procurement, which ends up absorbing the Purchasing function, incorporating a crucial character, insofar as it foresees throughout

the process of acquiring goods and services, the involvement and consequent planning in the areas of management and monitoring with a view to the continuous improvement of a National Health Service.

102. Therefore, as far as the activity of the central purchasing body is concerned, and in order to achieve a higher added value positioning in the areas of risk management, innovation and sustainability, it is necessary to adopt new mechanisms that allow a more effective operation in the pursuit of its activities in the field of public procurement, namely:

a) Obligation for NHS entities to sign up for centralised purchases in some ICT areas, in particular regarding the strategic guidelines for information systems resulting from the ENESIS 2020-2022 strategy.

b) Creation of specific and multidisciplinary working groups to support the purchasing sector in defining technical requirements and service levels for purchases considered strategic by SPMS in the ICT area, also with the aim of standardizing the costs of the various components inherent in the software in the various NHS entities, with these working groups to include members from the IT, purchasing and legal affairs departments, to be appointed by the Boards of Directors of the various health-related bodies and who will be responsible for collaborating with SPMS.

c) Implementation of financial impact assessment tools in the acquisition of medium and long-term software to improve the way in which the life cycle cost of the product is assessed, namely the comparison of the cost with the acquisition of the implementation of a software with its future cost with corrective and evolutionary maintenance services, in order to improve the model for evaluating proposals in accordance with Article 75(7) of the PPC.

d) Definition of contractual services by reference to the results to be achieved, in contracts the subject matter of which covers services particularly linked to innovation, in particular those relating to the purchase of health services, as provided for in Article 301-A of the SPC, which requires the definition of indicators enabling the quantification of the degree of achievement of those results as well as the appropriate ways of doing so.

4.2
VERTICAL DIMENSIONS

4.2.1 INFORMATION ACCESS

103. Access to health information can be characterized by the availability of properly organized, worked and structured data to citizens and health professionals.

104. This dimension allows the citizen to have the necessary elements to exercise a series of faculties and rights, such as, first of all, the right to consent or refuse to the provision of care itself, but also the right to access health services, to request a second opinion or medical observation, to choose another healthcare establishment that he considers more suitable, or even to exercise the most basic right of complaint against decisions taken by establishments or facts that have occurred there.

105. Citizens' access to their health information is fundamental to fully and effectively guaranteeing the right to access their healthcare. At the same time, respect for this right places an obligation on health professionals to provide services aimed at preventing, promoting, restoring or maintaining the health of citizens, as well as diagnosis, treatment/therapeutics and rehabilitation, in order to guarantee a situation of absence of illness or a state of physical and mental well-being.

106. However, more than access to data, it is necessary to ensure the quality and correct integration of data, so that health professionals can access information on their users effectively, avoiding duplicate records and mitigating the risks related to human failures. It is important to note that the place where information is registered should not be a constraint, as those who do register should ensure that the correct information is available to the health professional whenever they need it, and that they have the respective authorisation profile.

107. In this way, professionals' decision making will be supported by easier access to information, which will allow for faster and more efficient care provision. On the other hand, the citizen will be a more active participant in decision making, and the processes will be simplified using digital services, such as the Electronic Health Record - Citizen's Area, MySNS Portfolio, SNS 24 Contact Centre and User / Citizen support desks..

4.2.2 DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE

108. The use of big data, the use of advanced analytical techniques and artificial intelligence will enable health information systems to evolve towards 'intelligent' systems that add value to the health planning process, the monitoring of the health status of the population and the diagnostic and therapeutic process.

109 As such, it is essential to maintain public confidence through rigorous data protection and cybersecurity mechanisms in the secondary use of data for the development of data analysis tools and artificial intelligence in the health sector.

110. In the same context, the usefulness of the information and its value are strictly dependent on the quality of the data, so it is essential to implement validation and data quality management procedures, not only at the time when the data are stored, but also in the source system, through a circular process of continuous data analysis and feedback.

111. The development of an information governance strategy for secondary use, combined with a central data warehouse, is one of the most important steps to give the right direction to the development of advanced analytical and artificial intelligence systems, contributing to efficient data integration and interoperability, which support the priorities identified in terms of planning and health policy.

112. A functional data repository should ensure access to information at the time of decision making, empowering health professionals at the level of processes and technologies. It should also be flexible, in order to evolve to increasingly simplified interaction platforms, with embedded and intelligent software applications that support the interpretation of the growing volume of health-related data and reduce its complexity and granularity, expanding the evidence base for clinical and public health decision making.

113. Artificial intelligence currently allows, for example, the development of communication platforms for home and integrated care, the development of natural language processing algorithms, which allow the extraction of free text information, thus reducing the time used in reviewing information for clinical purposes, the creation of alert systems to detect emergencies and other public health risks, and also the development of image recognition systems, which allow increasing the sensitivity and specificity of diagnostic methods.

114. There is also increased potential to share anonymized information with citizens, universities and civil society associations to develop shared intelligence that emerges from collaboration and collective effort. It is this convergence of opportunity and need that makes this crucial moment to invest in data science in the health system.

115. In this sense, SPMS prepared the strategic document "From big data to smart health: Putting data to work for the public´s health" which aims to establish the guiding principles for a national data governance model, currently under public discussion. This document aims to increase national awareness of the need to align the development of health planning with the digital evolution in the field of big data, and to involve organizations, health professionals and the general population in defining and anticipating the use of artificial intelligence in the health sector.

4.2.3 CLINICAL SYSTEMS

116. The evolution of Clinical Information Systems should consider the technological and functional alignment with the best market practices and the needs of health institutions and their professionals. These information systems should enhance the sharing of information and knowledge among the different actors in the system and support the work processes of health professionals in the most efficient way possible, with a view to improving the effectiveness, quality and safety of health care provision to users. These systems are also essential in providing information and management indicators at the different organizational levels of the health system.

117. Clinical Information Systems should focus on the citizen, ensure the traceability of their clinical information, maximize cybersecurity and the protection of personal data, ensure business continuity and the respective provision of health care in situations of unavailability, and promote equity and simplicity in the access of citizens to health services, promoting the integration of care and the articulation between different professionals.

118. Clinical Information Systems should also ensure the adoption of interoperability mechanisms, technical and semantic, in accordance with the strategy that will be defined at national level, ensure the mobility of access and registration of information, providing mobile platforms for clinical registration to health professionals. They should contribute to the sharing of knowledge and facilitate research and promote the use of and access by professionals to systems and platforms to support clinical decision-making.

PRIMARY HEALTH CARE

119. The Clinical Information System should incorporate a set of specific functionalities according to this level of care but ensuring that its professionals have access to relevant clinical information from its patients, through a global and universal Electronic Health Record. The system should evolve into new areas of information registration and new professional profiles, as well as the integration and sharing of information with other healthcare providers.

120. In order to support this evolution, we intend to provide a single information system - UNO - common to all primary health care providers. The standardization of clinical registration procedures at national level will facilitate the sharing of information between the various health care providers, the guarantee of standardization of information and the registration process, technological and functional developments in the administrative and clinical areas, and the improvement of integration processes with other regional and national applications, in order to increase the quality of the data recorded, facilitate the work of health professionals, and ensure more effective iteration with citizens.

SECONDARY OR HOSPITAL CARE

121. The Clinical Information System (SClínico Hospitalar) is intended to be a national system of hospital clinical records that promotes safe and interoperable communication of the information needed for health teams to dedicate more time to using their skills in decision-making and improving outcomes in Health for the Citizen.

122. Some of the main vectors of the evolution of the Hospital Clinical Information System are, through a technological evolution of the information systems, to guarantee more and more the centrality of the citizen, namely in his path through the health system, the continuous increase of safety criteria and audit of access to clinical information. The evolution of interoperability, based on common international standards, will facilitate the sharing of secure and transparent information for citizens and health professionals. The improvement of the user experience combined with intelligence and alarming can enhance the true role of health teams before the citizen, as well as the availability of indicators that ensure greater efficiency and effectiveness of institutions and professionals in research and improvement of health outcomes for the citizen.

123. On the other hand, with the extension to all NHS health units, the use of standardised models of clinical information is facilitated, which position the NHS and Portugal at the forefront of the use of big data in health.

CONTINUOUS CARE

124. The support system for the National Network for Integrated Long-Term Care (RNCCI) should be transparently articulated with the public and private Clinical Information Systems, both for referral and for the identification of the health gains of the users placed, avoiding duplication of records.

125. The implementation of Telehealth solutions in RNCCI is a very important requirement for this type of users, since most of them are elderly people with mobility difficulties and poor health, so it will be very convenient to avoid their transportation and stay in places with high risk of infections such as hospitals.

126. This is probably the area, together with that of primary health care, in which home health care is the most pressing, enhanced by new technological solutions that will allow the follow-up and monitoring of these users in a more efficient and more convenient way for the users.

4.2.4 INFRASTRUCTURE AND COMMUNICATIONS

127. The Infrastructure and Communications dimension refers to the physical and logical layer that houses, supports and instantiates the operability made available by the various information and communication systems around the Health Information Ecosystem; in essence, it represents the invisible but essential "backbone" that makes possible the existence of the various digital solutions of eSIS.

128. Traditionally, concerns with the area of Infrastructure and Communications could be reduced to only a few essential aspects, namely at the level of ensuring investment for the respective acquisition and maintenance, to the needs in knowledge and technical know-how (i.e. human resources), relatively specialised for the operation of the classic datacentres and to the possibility of shared use of national and international networks to ensure the interconnectivity of data between central and local hubs.

129. However, this classic representation of Infrastructure and Communications solutions has increasingly become a complex and heterogeneous reality, given that today's digital solutions (and what is expected to be in the future) require a highly specialised, distributed, flexible, permanently innovative and highly complex infrastructure and communications architecture. Given the practically unlimited combinations of physical and logical architecture that digital solutions present today, it is not possible to address the challenges of Infrastructure and Communications based solely on the historical practices of building a data centre, filling it with the classic physical components (servers, storage, networks, etc.) and believing that this ensures guaranteed service for many years. Currently, it is necessary to consider resource concentration versus decentralized facilities; lodging in the physical resources belonging to the organization (on premise) versus lodging in external resources (cloud); virtualization and "containerization" strategies (containers); private networks versus internet services; among several other considerations, while concerns with cost rationalization and flexibility in the provision of rapid responses have become acute.

130. In relation to Infrastructure and Communications in the ecosystem of the entities of the Ministry of Health and the National Health Service, and in order to ensure the stability and correct functioning of all the systems developed and made available in these entities, it is necessary to provide adequate support infrastructure and operate them safely and solidly. It is therefore necessary to start by developing the physical infrastructure strategy for the NHS and MS, from the data centres to the computing, network and storage infrastructures, ensuring the capacity to implement various redundant and high-performance digital systems and elaborating the network strategy between all NHS locations, allowing constant connectivity between all entities, providing the best communications and services.

131. Likewise, for all other eSIS entities, the same concerns in ensuring agile, resilient, flexible, efficient Infrastructures and Communications, with high evolutionary capacity and high level of dependence, are present and should be thought of strategically, in order to address the following goals:

1. To ensure a strategic response to the need to provide secure and reliable means of data and voice communications in eSIS entities, compared to the role that the Health Information Network (RIS) plays in this strategic goal for HM entities;

2. Provide all the infrastructure capacity necessary for the correct execution and functionality of all implemented digital systems;

3. Actively monitor the entire physical and logical infrastructure in order to improve the systems and their service availability;

4. To develop business continuity and contingency strategies, both at the physical level, but also in the logical component of the systems;

5. Ensure the operation of all the infrastructures and systems provided, in the preventive, reactive and evolutionary areas;

6. Implement and ensure the execution of service levels, constant and timely support and incident resolution with regard to infrastructure and communications;

4.2.5 INTEGRATED CARE SOLUTIONS

132. Care integration solutions enable access to quality health care from a perspective of continuity, considering the health objectives of each citizen, facilitating the accessibility, mobility and transfer of users in the health care network and allowing the citizen to interact with the health system, at any time and place.

133. These solutions should be integrated into the Information Systems already in use by health care providers, namely Clinical Hospital Systems, Primary Health Care, the National Network for Long-Term and Integrated Care, the SNS 24 Contact Centre and the Systems in use by the private and social sector. In addition, it is essential that the integration of care is simple, mobile and suitable for all professionals involved and citizens.

134. In this way, the implementation of care integration solutions is fundamental for a more efficient and citizen- centred health system, ensuring a better articulation of health professionals.

135. Therefore, it is crucial to focus on the development of a single Electronic Health Record in order to cover all relevant health information of the citizen, including medical and nursing diagnoses, active medication, chronic medication, allergies, vaccines, surgeries performed, test results, measurement of vital signs, eating habits and sports, among others.

136. This development should focus on all areas of health intervention - in addition to the public sector, also the social and private sector, such as pharmacies, clinics, laboratories, etc. The Electronic Health Record should not be seen as the creation of a large Single Information System, but rather as a platform that allows aggregated presentation of valuable information.

4.2.6 RESOURCES MANAGEMENT

137. The management of resources covers several areas with direct regard to financial, human and clinical resources, with the mission of optimizing the various resources available, in order to support the achievement of the goals of the health system and thus ensure a greater set of benefits achieved.

138. There is a need to define a management model to consolidate and contribute to the health information ecosystem, delivering results and benefits through integrated resource management, and to control and automate processes in a secure, reliable and timely manner. To this end, it is essential to establish financing models, define costing methodologies, ensure control and audit of economic and financial management, monitor budget execution, and ensure the registry and management of the different accounting standards of public administration.

139. With regard to resources and planning, effective HR management should be promoted, regular HR publications should be supported, performance analysis and evaluation should be ensured, communication and training should be closer to professionals, planning and forecasting should be increased, decision-making processes should be improved, strategic resources should be provided to meet the objectives of the MH, clinical coding should be provided in the actual translation of care should be provided, and auditing of clinical coding should be promoted.

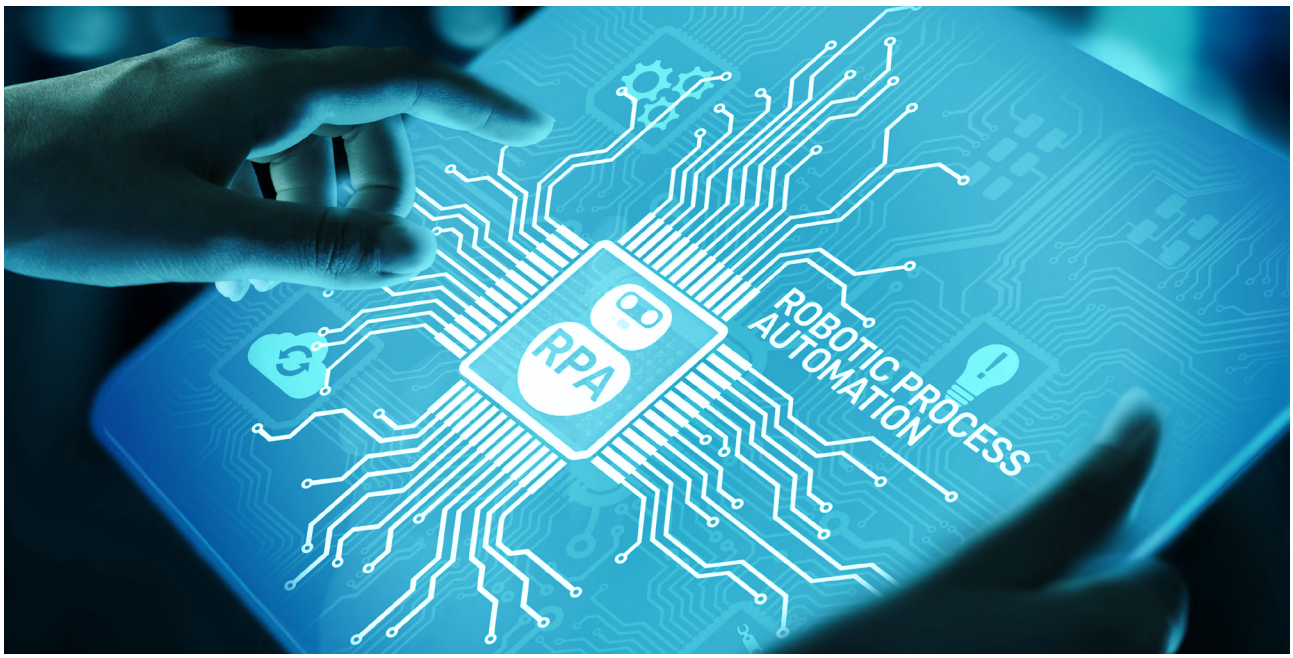
140. With regard to health information systems, it is necessary to ensure consistency and congruence of information, simplify processes through the use of digital services, improve the satisfaction of professionals by providing reliable, robust and usable information systems, technologically and functionally evolve resource management systems and ensure greater interoperability between systems.

141. In addition, medical assistance abroad should be guaranteed, reimbursements of cross-border medical assistance should be promoted, billing for international and cross-border agreements should be promoted, and integrated management of the non-urgent transport of patients should be ensured.

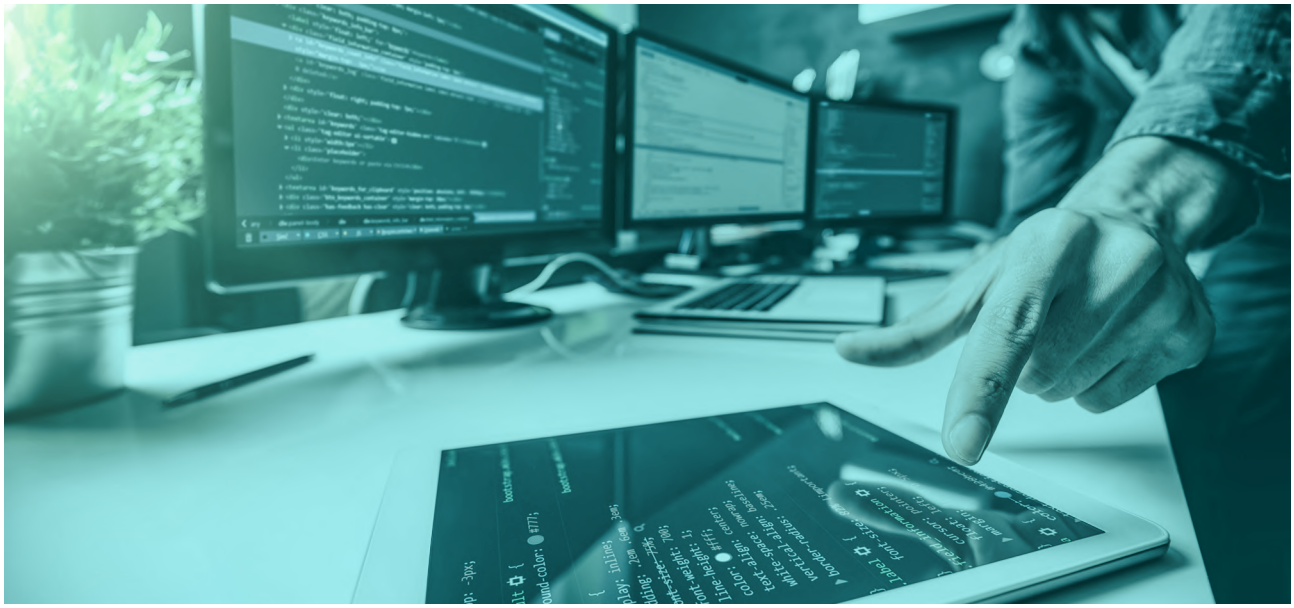
4.2.7 ROBOTICS AND DOMOTICS

142. Robotics and domotics aim to increase the autonomy, support and convenience of health professionals and citizens. This dimension allows the automation of clinical and administrative processes, facilitates the provision of care and frees health professionals for other activities of greater importance, within their specialization. In the context of the citizen, it facilitates communication, satisfaction and the well-being of the citizen.

143. The introduction of robotics and other innovative technologies in health has occurred sporadically, in a geographically dispersed manner without there having been a joint effort and a global national strategy for their implementation. This way of acting may benefit the institutions closer to the scientific community, but the others are not able to follow the innovations so easily. The clear definition of a national strategy to ensure the implementation of robotics and other innovative technologies in health is fundamental to improve the quality of care delivery to the user.



4.2.8 ARCHITECTURE, INTEROPERABILITY AND CONFORMITY



144. In this dimension, several essential components to the Health Information Ecosystem are included, and the Architecture aims to capture the vision of the whole Ecosystem when comprising the Business Architecture, Information Architecture, Application Architecture and Technological Architecture, thus ensuring the alignment between the business strategy, the information entities, the business processes, the application systems and the technological infrastructure. In this context, the aim is to understand the relationship between IT entities and business processes, to facilitate the reengineering of business processes, to provide effective, efficient and timely application support for these processes, to facilitate interoperability between application systems of different suppliers and to help the decision-making process of Information Technology managers.

145. At the same time, it is also necessary to enhance the sharing of information and data mobility throughout the Ecosystem, in order to guarantee access to information for citizens, organisations and professionals, through the interoperability component, which allows the integration of the various systems. This, in turn, is addressed in four layers - legal, organizational, semantic and technical, and includes standard and reusable interfaces, the standardization of the format of information exchanged throughout the NHS and the audit of accesses. This is intended to monitor and reprocess in real time (backoffice), greater capacity for error detection and resolution, improved performance, quality of records and reduction of process and development costs, all supported by different platforms - LIGHt (Local Interoperability Gateway for Healthcare), which is a middleware responsible for communication between systems within an institution, PNB (Portuguese National Broker), a platform responsible for central interoperability and communication with other government entities and NCP (National Contact Point), a platform responsible for communication with other countries.

146. Finally, compliance aims to guide the operational activities that have to be guaranteed in order to establish a minimum basis for compliance in ISs, as well as to reduce inefficiencies and redundancies in systems, ensuring that products comply with standards and technical specifications. In this context, it is necessary to define the basic principles of Evaluation and Conformity of Information Systems, define the Evaluation and Conformity guidelines to the processes, resources and tools,

define the implementation guidelines of Evaluation and Conformity of Information Systems, guarantee the cumulative compliance with the technical and legal requirements applicable to Information Systems, define a Conformity Evaluation Model based on international certification systems/schemes and ensure an accreditation process for certification of products and testing laboratory, at national level.

4.2.9 SERVICE MANAGEMENT AND BUSINESS MANAGEMENT

147. This dimension covers two major areas, Service Management, which consists of the definition and implementation of a methodology for the operation of Information and Communication Technology services, with a view to the adoption of continuous improvement procedures, and Business Continuity, responsible for the creation of prevention and recovery systems, which are responsible for the occurrence of a disaster in organisations, with an impact on the availability of information systems.

148. Within the scope of Service Management, it is essential to guarantee the quality and speed of the response to the customer, through the integration of processes, resources, transfer of knowledge and adoption of the use of appropriate technologies for automation, in order to minimise the daily constraints on the use of Information Systems, thus ensuring the satisfaction of citizens and health professionals. At the same time, the availability of management indicators on the support activity, through the adoption of BI technology tools are important to improve management information on the quality and efficiency of the service provided, thus contributing to a continuous improvement of IT services. This area also aims to rationalise costs and maximise the value of the service to be provided, introducing new mechanisms and self-help solutions that enable simple tasks to be automated and create better user experiences through the adoption of artificial intelligence mechanisms.

149. With regard to Business Continuity, it is necessary to establish policies, norms and processes, in accordance with the best international practices and standards, in order to create prevention and alarm systems that anticipate the occurrence of information systems failure and promote the regulation of the maintenance of continuous operations, before and during the process of disaster recovery, minimising the impacts on the ICT services available to professionals and citizens.

4.2.10 NATIONAL REGISTERS

150. National registries, such as the National Register of Patients, the National Register of Professionals or the National Register of Health Entities, among others, provide the National Health System with basic registers for the proper functioning of the Health Information System, contributing to the standardisation and generalisation of critical data for the rapid and correct identification by the structural entities of the information system and facilitating the sharing of information between systems, in a safe and reliable manner.

151. To this end, it is essential to enhance the centralisation of records in citizens, professionals and organisations, enabling processes to be streamlined, information reliability to be increased, information systems to be interoperable, and procedures to be standardised, security and identification to be promoted in all their aspects. In the same context, there should also be a centralisation of multidimensional registers in order to promote transparency, quality and accuracy of information, thus amplifying the importance of the technological and social dimensions.

152. Thus, this dimension aims to centre the digital identification of the citizen in the National Registry of Patients, so that this registry is assumed as the advocate of the lifecycle of the citizen in Health, implement rules of organization and business of NRP, and promote the interconnection between ministries and other entities in relation to Health and with national registries, for simplification of processes. It is also important to ensure the quality and security of information, namely sensitive information of citizens, entities and professionals, and to implement a National Register of Professionals that guarantees the authenticity, identification and digital authentication of professionals in the ecosystem of health information systems.

153. With regard to planning, it is necessary to constitute planning instruments for the needs of health professionals, in the public, private and social sectors, empower the NHS with the creation of indicators to support the coordination of human resources policies, and implement planning instruments and anticipation of citizens' needs in relation to the NHS.

154. With regard to resource management, it is essential to establish national registries as the single source of truth for each of its dimensions (citizens, organisations and professionals), centralise the management of entities, allowing knowledge of their geographical distribution, installed capacity and respective relationship with the NHS, ensure the existence of a repository of single, integrated and shared health entities, allowing access to simplified information, and finally, optimise and maximise the management of resources available in the NHS.

5

STRATATEGIC STREAMS

155. The implementation of the strategy is structured under a set of six aims, which are guided by a set of health objectives, thus ensuring the alignment of the health sector with the information system that supports it. To this end, these aims integrate various dimensions defined in the strategic framework, ensuring that information technologies meet the needs of organizations and their professionals, in accordance with current health policies, and lead to the creation of improvements and benefits for citizens, professionals and organizations.

156. The Strategic Streams are aggregators of a set of measures with respective guidelines for their implementation, thus integrating the Strategy for the Ecosystem of Health Information and its Vision for 2022.

157. Throughout this chapter, in the description of each strategic axis, a diagram with the dimensions involved is presented. Different dimensions are associated with each strategic axis, making it clear that the objectives to be achieved in each axis will only be feasible if synergies are created between the different areas.

Access to Health Services and Care throughout the Citizen's Lifecycle

Promote and facilitate greater mobility and equity in access to health care, where and when needed, throughout the citizen's life cycle in a simple and integrated way.

Citizen Empowerment

Promote citizen involvement and active participation in the health information system through digital training and the provision of mechanisms and tools that support conscious and informed decision making and promote self-management of health care.

Efficiency and Sustainability of Health System

Promote the rationalization of resources and the sustainability of the health system, through savings of time and money, thus enhancing productivity. Ensure more rational and savings-generating public procurement, ICT services and products for the NHS.

Quality and Safety of Health Care

Promote mechanisms and tools to increase the quality and safety of health care, as well as auxiliary means of diagnostic and therapeutic.

Health Prevention, Protection and Promotion

Preventing public health and disease phenomena, citizen awareness of behaviors that improve his/her well-being and increase his/her quality of life.

Organizations and Professionals Empowerment

To adequately train organizations and their professionals to maximize the optimal use of information systems, as well as their correct development and implementation.

5.1

ACESS TO HEALTH SERVICES AND CARE THROUGHOUT THE CITIZEN'S LIFECYCLE

158. The growing reorganisation of care provision, with a view to a more citizen-centred system, shows in simplicity, innovation and proximity the improvement of access to health care.

159. The development and improvement of Information and Communication Technologies allows supporting the Health System in guaranteeing access in mobility, ensuring universal coverage, where and when necessary.

160. In this context, it is necessary to ensure integrated, interoperable systems supported by robust infrastructures that provide more effective communication between organisations and between them and the citizen, with a view to improving their experience throughout their lifecycle.

161. Within the scope of Access to Services and Health Care, ENESIS $_{20}^{22}$ establishes a set of measures aimed at changing the paradigm of the traditional model of care to access to services anywhere in the national health care network, in a more convenient, easier and inclusive way, through the use of information and communication technologies.

INVOLVED DIMENSIONS

DIGITAL ETHICS

GOVERNANCE & INVESTMENT

LEGISLATION

INFORMATION ACCESS

DATA ANALYTICS AND ARTIFICIAL INTELLIGENCE

CLINICAL SYSTEMS

INFRASTRUCTURE & COMMUNICATIONS

INTEGRATED CARE SOLUTIONS

RESOURCES MANAGEMENT

ROBOTICS AND DOMOTICS

ARCHITECTURE, INTEROPERABILITY & CONFORMITY

SERVICE MANAGEMENT AND BUSINESS CONTINUTY

NATIONAL REGISTRATION

CYBERSECURITY

TELEHEALTH

WORKFORCE & EDUCATION

ACQUISITIONS IN INFORMATION SYSTEMS

1 | ACCESS TO HEALTH SERVICES AND CARE THROUGHOUT THE CITIZEN'S LIFECYCLE

MEASURES		GUIDELINES	
1.1	**Information Systems Accessibility**	1.1.1	Ensure the implementation of standards (international and national) for accessibility of websites and mobile applications by all citizens.
1.2	**Health Access in Mobility**	1.2.1	Consolidate the access and integration of electronic data through mobile platforms and other devices (e.g. wearables, etc.).
		1.2.2	Promote the implementation of standards that allow data collection through wearables and mobile devices.
		1.2.3	Provide services that allow self-service interaction with citizens
		1.2.4	Deliver health information and digital services on multi-channel platforms
1.3	**Communication between Information Systems within and among organizational**	1.3.1	Promote, develop and adopt technical standards in order to ensure interoperability
		1.3.2	Promote, develop and adopt semantics standards to ensure interoperability
		1.3.3	Create and standardize the communication flow of health information among ministries
1.4	**Provision of plataforms that promote the provision of distance care**	1.4.1	Monitor, in real time, the population at risk
		1.4.2	Disseminate Telehealth, home care and population-based health monitoring initiatives
		1.4.3	Enhance the use of virtual assistance services (eg chatbot; etc.), and automate healthcare processes

5.2

CITIZEN EMPOWERMENT

162. The constant digital transformation and evolution of the Information Systems are directed in order to allow the citizen a greater interaction with the Health System. In this sense, the main challenge is to empower citizens, giving them the autonomy to exercise, in an informed and responsible manner, their power of decision and an active participation in their health project and in the health of those who depend on them.

163. In this sense, and in line with the European directives (eHAction, AMO model) [17] the characteristics that should support the empowerment of the citizen are Ability, which relates to the knowledge and digital skills of the citizen to access digital solutions and their personal data, the intrinsic and extrinsic motivation of the citizen to use the available solutions and portals, and the Opportunity that refers to the availability and accessibility to mHealth or Telehealth solutions, as well as the involvement of the citizen in the decision-making process.

164. Improving the population's access to information enables the adoption of preventive strategies and early diagnosis, supported by a monitoring of the citizen's own health status.

165. Thus, since digital health literacy is a measure to empower citizens, the aim is to raise awareness of the potential of digital health with a view to improving lifestyles and mitigating risky behaviour. On the other hand, it is intended to ensure greater participation and involvement of the citizen in improving the usability of information systems, in a logic of continuous improvement.

INVOLVED DIMENSIONS

- DIGITAL ETHICS
- GOVERNANCE & INVESTMENT
- LEGISLATION
- INFORMATION ACCESS
- DATA ANALYTICS ND ARTIFICIAL INTELLIGENCE
- CLINICAL SYSTEMS
- INFRASTRUCTURE & COMMUNICATIONS
- INTEGRATED CARE SOLUTIONS
- RESOURCES MANAGEMENT
- ROBOTICS AND DOMOTICS
- ARCHITECTURE, INTEROPERABILITY & CONFORMITY
- SERVICE MANAGEMENT AND BUSINESS CONTINUTY
- NATIONAL REGISTRATION
- CYBERSECURITY
- TELEHEALTH
- WORKFORCE & EDUCATION
- ACQUISITIONS IN INFORMATION SYSTEMS

2 | CITIZIEN EMPOWERMENT

MEASURES		GUIDELINES	
2.1	**Health literacy development through the creation of shared solutions**	2.1.1	Promote the dissemination of the digital services portfolio by making information available on a multi-channel platform.
		2.1.2	Create means for providing online platforms that promote digital health literacy and inclusion, in conjunction with educational and social support institutions
2.2	**Introduction of citizen experience as a mean of Health Services improvement**	2.2.1	Create evaluation systems of citizen experience in the use of health services
2.3	**Promotion of improved usability of Information Systems trough citizen engagement mechanisms**	2.3.1	Promoting citizen integration in the process of identifying needs and interacting with digital services
		2.3.2	Promotion of workshops and forums open to civil society
		2.3.3	Create mechanisms for evaluating the user experience in the use of information systems
		2.3.4	Launch co-creation initiatives in which citizens are called to create health information systems in whole or in part
2.4	**Promotion of a 360° view of health condition**	2.4.1	Implement tools that promote single, direct and centralized contact with the citizen (eg smart patient; self-monitoring; motivation)
		2.4.2	Promote the dissemination of data that impacts citizens' health on digital services (eg social context, geo-demographic risks, radiation exposure bulletin, etc.)
		2.4.3	Allow access to health information and management in all digital services by citizens or legal representatives

5.3

EFFICIENCY AND SUSTAINABILLITY OF HEALTH SYSTEM

166. With the current challenges in the health sector, there is an urgent need to adapt to a more efficient Health System, ensuring its long-term sustainability. In this context, investment should be directed towards solutions with the best cost-effectiveness ratio. These solutions, which objective is to ensure the optimisation of work processes that add value for the user, should be aligned with good practices and supported by the evolution of new technologies with a view to greater productivity throughout the Health System. In this sense, the use of Information Systems should enable organizations to have a greater capacity to better manage the use of resources and the information that supports it.

167. At the same time, the efficiency of Health Information Systems should be supported by investments that promote the improvement of infrastructures and networks, through economies of scale in their acquisition and/or sharing of existing ones.

168. The intended results should focus on the relationship between the resources used, such as capital, human resources or equipment, and the benefits achieved, such as optimisation of treatments, waiting time or others.

3 | EFFICIENCY AND SUSTAINABILITY OF HEALTH SYSTEM

MEASURES		GUIDELINES	
3.1	**Evolution of Clinical and Administrative Information Systems**	3.1.1	Create a roadmap for Information Systems optimization/ evolution
		3.1.2	Standardization of Clinical Information Systems of the NHS Hospitals
		3.1.3	Standardization of Primary Health Care Clinical Information Systems, and interconnections with Continuous and Palliative Care Network Information Systems
		3.1.4	Consolidate the digital identity of the Entity, Professional and User and implement its transversal application in Clinical and Administrative Information Systems.
3.2	**Optimization of clinical and administrative processes**	3.2.1	Create uniform procedures to systematize and optimize clinical and administrative processes in Information Systems
		3.2.2	Extend the centralized model of computer support professionals of Primary Health Care, promoting the standardization of processes, standards and procedures
3.3	**Optimization of network infrastructure and servers**	3.3.1	Continuously match Healthcare Network to business requirements including capacity, mobility, availability, security, and multiservice
		3.3.2	Provide free and full internet access in all areas of healthcare facilities securely
		3.3.3	Streamline and optimize infrastructure and data centers
3.4	**Centralized Information Systems purchasing process optimization**	3.4.1	Provide monitoring and decision support platform
		3.4.2	Optimize the purchasing process
		3.4.3	Optimize licensing management of information technologies in Health Entities

(Cont.)

MEASURES		GUIDELINES	
3.5	**Optimization and dissemination of Business Intelligence to support management decision making**	3.5.1	Create integrated dashboard in operating systems
		3.5.2	Standardize indicators (production data) for management and monitoring of the activity performed
		3.5.3	Promote the sharing of good practices among entities from the Health sector
3.6	**Definition of Data Governance model**	3.6.1	Create a single point of contact for accessing and promoting secondary use of data (eg research, clinical and administrative management)
		3.6.2	Create information standards for analysis
		3.6.3	Define a transversal Action Plan with data access rules, complying with the RGPD and law 58/2019, of 8 August , 2019
		3.6.4	Consolidate a data warehouse for data access
		3.6.5	Define a model for collecting information on disease tracking data
3.7	**Shared management services and health resources**	3.7.1	Develop telehealth mechanisms that enhance the sharing of Human Resources
		3.7.2	Create or optimize use of Information Systems that support the management of productive capacity of Health Units
3.8	**Use of technological tools to support health professional practice**	3.8.1	Promote the use of emerging technologies (Artificial Intelligence algorithms, voice to text, data & text mining and imaging, machine learning) to enhance the practice of healthcare professionals
		3.8.2	Introduce mobility tools for healthcare professionals in the hospital context, based on Clinical and Administrative information systems.
3.9	**Value management model**	3.9.1	Create a cost-benefit analysis model to evaluate the effectiveness of initiatives

5.4

QUALITY AND SAFETY OF HEALTH CARE

169. Information systems should ensure the quality of service delivery to citizens by supporting safer decision-making, minimising health risks and the specific needs of each citizen.

170. In this context, it is important to ensure access to quality information in real time, allowing, on the one hand, to support the decisions of health professionals and, on the other, to boost research and development.

171. Thus, there should be a collective effort to ensure better service delivery through the implementation of best practices and a uniform approach to the implementation and use of Information Systems. At the same time, the aim is to promote the security and robustness of the systems, data reliability, as well as ensure business continuity, so that organizations can meet the needs of citizens.

4 | QUALITY AND SAFETY OF HEALTH CARE

MEASURES		GUIDELINES	
4.1	**Confidentiality, integrity and availability protection of the health information**	4.1.1	Adopt and / or ensure information security and privacy requirements from conception (security/privacy by design) and default (security/privacy by default) on information systems and medical devices
		4.1.2	Establish processes and controls on access to health information, ensuring confidentiality and integrity of information.
4.2	**Promotion of cybersecurity practices in Information Systems**	4.2.1	Define and adopt a national Cybersecurity strategy for the Health Information Ecosystem
		4.2.2	Adopt a National Cybersecurity Strategy operational/action plan for the Health Information Ecosystem
		4.2.3	Build a transversal culture of safety and risk management in healthcare organizations
4.3	**Guarantee of Business Continuity**	4.3.1	Establish rules and procedures to minimize the impact of unavailability through Business Continuity Plans
		4.3.2	Ensure the implementation of contingency mechanisms (fallback option) in information systems
		4.3.3	Implement mechanisms for the prevention and detection of anomalies and security events, with a view to anticipating impacts on health care continuity and better understanding of threats
4.4	**Assurance of Information Systems Conformity**	4.4.1	Define and adopt a Reference Architecture for the entire Health Information Ecosystem
		4.4.2	Define and adopt a national Interoperability strategy for the entire Health Information Ecosystem
		4.4.3	Ensure requirements are met across multiple domains: legal (GDPR), organizational, semantic, interoperability, technical, vendor security
4.5	**Implementation of clinical decision support mechanisms and patient safety**	4.5.1	Implement in Information Systems the clinical guidance and other relevant source of information (eg adverse drug effects, allergies, etc.)
		4.5.2	Implement mechanisms in Information Systems to support the reduction of safety risks to the patient (eg therapeutic administration, falls, ulcer, infection, etc.)

5.5

HEALTH PREVENTION, PROTECTION AND PROMOTION

172. Ensuring the protection of the health of the population implies the promotion of healthy lifestyles and the prevention of the occurrence of disease. In addition, it involves ensuring the ability to predict population health risks to better meet demand for health care. The development of new digital diagnostic and therapeutic tools should therefore be promoted, involving and supporting the public in improving their health and well-being.

173. In this sense, it is necessary to guide the development of intelligent digital tools to progressively consolidate the paradigm of health care, oriented towards health promotion and disease prevention and active citizen participation in health management.

5 | HEALTH PREVENTION, PROTECTION AND PROMOTION

MEASURES		GUIDELINES	
5.1	**Gamification concept application**	5.1.1	Build gamification component for evidence of good health habits, accessible to healthcare professionals and citizens through integration of wearables data
5.2	**Prevention in public health through data analysis and Artificial Intelligence**	5.2.1	Real-time data analysis for health risk identification
		5.2.2	Implement predictive analytics solutions (eg epidemiological assessment and care management) to identify at-risk groups (eg pathology detection, diabetes, etc.)
		5.2.3	Create conditions for a culture and practice of population-based health data analysis. Use Data Science and Artificial Intelligence techniques

5.6

ORGANIZATIONS AND PROFESSIONALS EMPOWERMENT

174. The correct appropriation of information and communication technologies provides more advanced and efficient health care. In order to maximize their potential, it is essential to invest in the training of organizations and their professionals.

175. Proper access to and use of digital tools will make it easier for healthcare professionals to provide care, increasingly promoting better interaction and experience for citizens. On the other hand, it will also allow a more personalised treatment and a more accessible communication.

176. By ensuring greater capacity of ICT professionals in development, implementation and management of the solutions, the increase in capacity of guaranteed organizations to respond to their needs.

177. In addition, for the training of health professionals in the usability of the information systems, better working conditions are promoted, in the extent to which increased workflow efficiency is achieved and, consequently, the reduction of the administrative burden, providing more quality time devoted to citizens.

178. It is therefore recognised that the training and certification of professionals in health and health ICT professionals is crucial to the good performance of its and should therefore be appropriate to the profile and skills of each individual one.

6 | ORGANIZATIONS AND PROFESSIONALS EMPOWERMENT

MEASURES		GUIDELINES	
6.1	**Stakeholders involvement for continuous improvement of Information Systems**	6.1.1	Ensure consultative and co-creation dynamics with public or private sector associations, professional associations and patient and caregiver associations
6.2	**Improvement of digital skills of non-technological health professionals**	6.2.1	Create a reference model of profiles and skills of Information and Communication Technologies (eSkills), across the health sector in particular the MH / NHS
		6.2.2	Include in health professionals curriculum plans the teaching on the use of Clinical Information Systems, cybersecurity, data analysis and general notions of health informatics
		6.2.3	Develop a training plan appropriate to the reference model, with certification
		6.2.4	Create mechanisms for stakeholders participation in Information Systems innovation
6.3	**Improvement of digital skills of health technology professionals**	6.3.1	Create a reference model of profiles and skills of Information and Communication Technologies, across the Ministry of Health
		6.3.2	Develop a training plan appropriate to the reference model, with certification
6.4	**Improvement of information and communication technology skills for top management**	6.4.1	Ensure awareness of Information and Communication Technologies issues (eg Information Systems Governance, Service Management and Business Continuity, ITIL, COBIT, etc.)
6.5	**Boosting Innovation in Information Systems**	6.5.1	Create a Robotics and Innovation Center in health area (CRIAS) to support exploration, development, evaluation of robotization solutions, data analytics, and others
6.6	**Promoting a culture of knowledge sharing**	6.6.1	Create a digital community for sharing experiences, good practices, lessons learned (eg cyber security incidents, research, information systems value assessment)
		6.6.2	Leverage national and international synergies to collaborate on projects relevant to the health ecosystem.

SUMMARY TABLE | STREAMS AND MEASURES

Access to Health Services and Care throughout the Citizen's Lifecycle	Citizen Empowerment	Efficiency and Sustainability of Health System	Quality and Safety of Health Care	Health Prevention, Protection and Promotion	Organizations and Professionals Empowerment
1.1 Information Systems Accessibility	2.1 Health literacy development through the creation of shared solutions	3.1 Evolution of Clinical and Administrative Information Systems	4.1 Confidentiality, integrity and availability protection of the health information	5.1 Gamification concept application	6.1 Stakeholders involvement for continuous improvement of Information Systems
1.2 Health Access in Mobility	2.2 Introduction of citizen experience as a mean of Health Services improvement	3.2 Optimization of clinical and administrative processes	4.2 Promotion of cybersecurity practices in Information Systems	5.2 Prevention in public health through data analysis and Artificial Intelligence	6.2 Improvement of digital skills of non-technological health professionals
1.3 Communications between Information Systems within and among Organizations	2.3 Promotion of improved usability of Information Systems through citizen engagement mechanisms	3.3 Optimization of network infrastructure and servers	4.3 Guarantee of Business Continuity		6.3 Improvement of digital skills of health technology professionals
1.4 Provision of platforms that promote the provision of distance care	2.4 Promotion of a 360º view of health conditions	3.4 Centralized Information Systems purchasing process optimization	4.4 Assurance of Information Systems Conformity		6.4 Improvement of information and communication technology skills for top management
		3.5 Optimization and dissemination of business intelligence to support management decision making	4.5 Implementation of clinical decision support mechanisms and patient safety		6.5 Boosting Innovation in Information Systems
		3.6 Definition of Data Governance model			6.6 Promoting a culture of knowledge sharing
		3.7 Shared management services and health resources			
		3.8 Use of technological tools to support health professional practice			
		3.9 Value management model			

6

ENESIS 20|22 OPERATIONAL SUMMARY

179. The different measures consolidated in the six strategic streams have a different impact on the various health stakeholders, thus having distinct visibility and value in eSIS. In order to structure the future implementation plan, the proposed measures were distributed over the next three years according to the priority, duration and estimated resources for their implementation. This distribution is presented according to the following execution horizons:

HORIZON 1

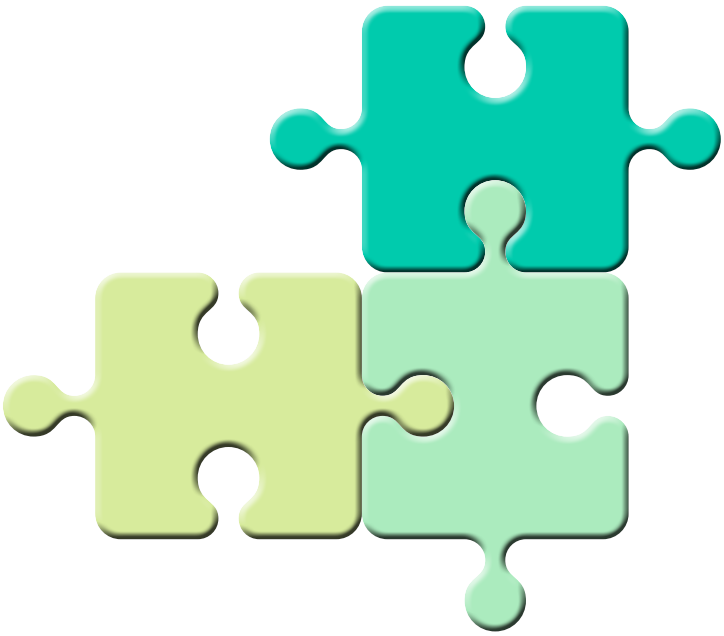
Measures of high visibility, but of less complexity in their execution, which allows them to be implemented faster (Quick Wins).

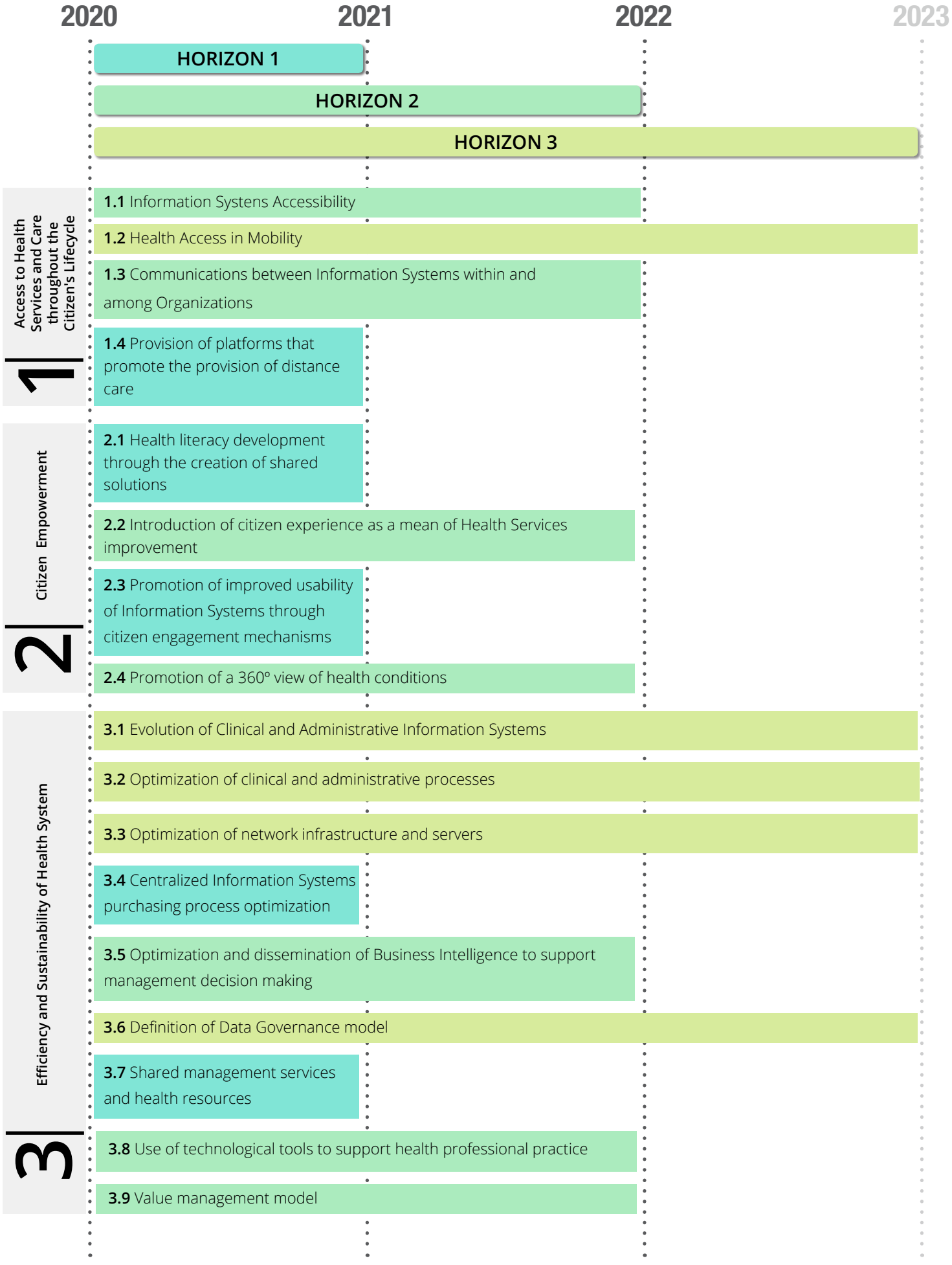
HORIZON 2

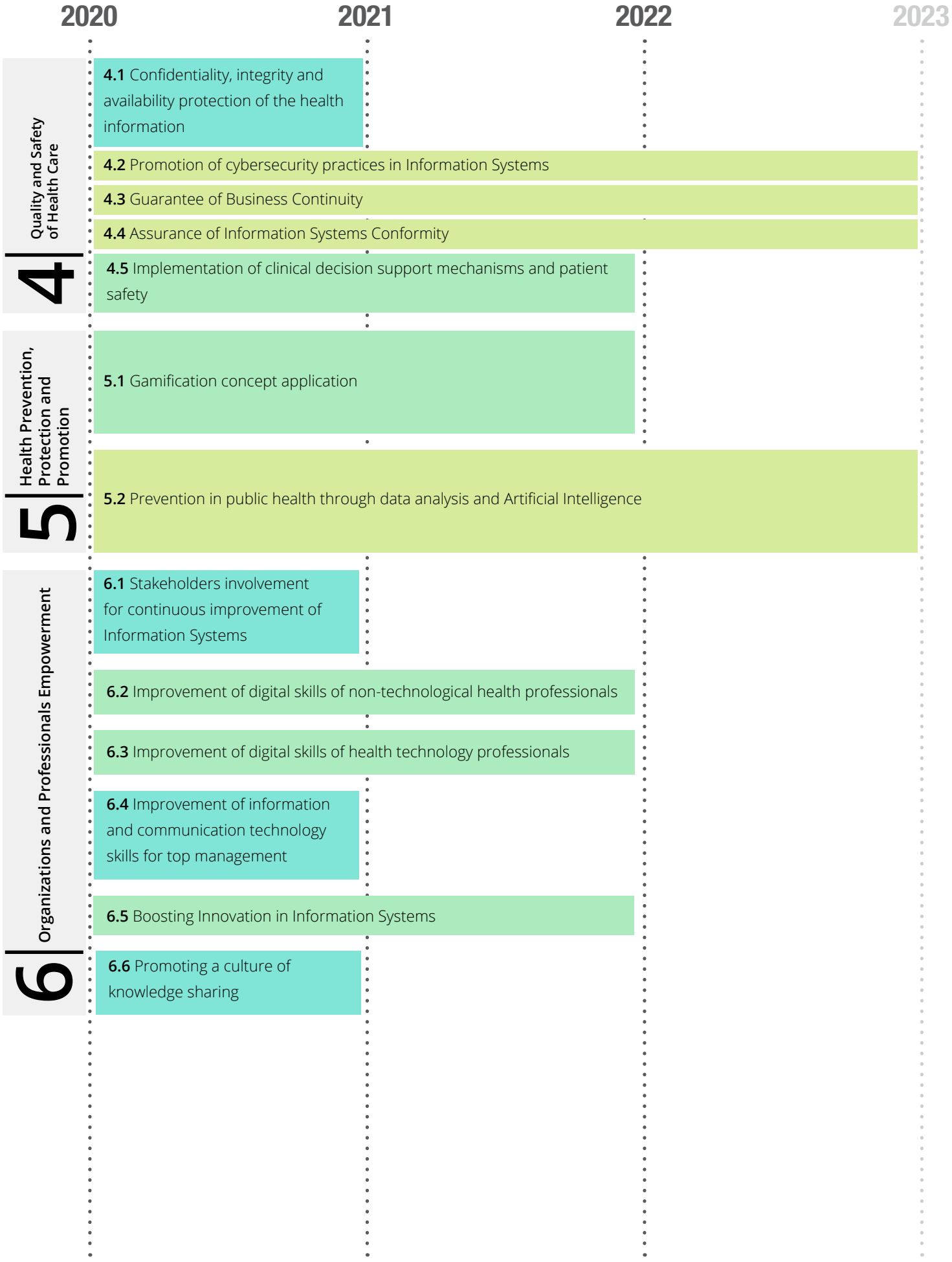
Measures of high visibility, but which represent greater complexity in its execution, which requires more time for its implementation, with greater use of resources.

HORIZON 3

Measures that are structural in the ecosystem and represent great complexity in its implementation, requiring a long period of time for its implementation.




2020
2021
2022
2023
HORIZON 1
HORIZON 2
HORIZON 3
1 Access to Health Services and Care throughout the Citizen's Lifecycle
1.1 Information Systens Accessibility
1.2 Health Access in Mobility
1.3 Communications between Information Systems within and among Organizations
1.4 Provision of platforms that promote the provision of distance care
2 Citizen Empowerment
2.1 Health literacy development through the creation of shared solutions
2.2 Introduction of citizen experience as a mean of Health Services improvement
2.3 Promotion of improved usability of Information Systems through citizen engagement mechanisms
2.4 Promotion of a 360º view of health conditions
3 Efficiency and Sustainability of Health System
3.1 Evolution of Clinical and Administrative Information Systems
3.2 Optimization of clinical and administrative processes
3.3 Optimization of network infrastructure and servers
3.4 Centralized Information Systems purchasing process optimization
3.5 Optimization and dissemination of Business Intelligence to support management decision making
3.6 Definition of Data Governance model
3.7 Shared management services and health resources
3.8 Use of technological tools to support health professional practice
3.9 Value management model


2020
2021
2022
2023
4 Quality and Safety of Health Care
4.1 Confidentiality, integrity and availability protection of the health information
4.2 Promotion of cybersecurity practices in Information Systems
4.3 Guarantee of Business Continuity
4.4 Assurance of Information Systems Conformity
4.5 Implementation of clinical decision support mechanisms and patient safety
5 Health Prevention, Protection and Promotion
5.1 Gamification concept application
5.2 Prevention in public health through data analysis and Artificial Intelligence
6 Organizations and Professionals Empowerment
6.1 Stakeholders involvement for continuous improvement of Information Systems
6.2 Improvement of digital skills of non-technological health professionals
6.3 Improvement of digital skills of health technology professionals
6.4 Improvement of information and communication technology skills for top management
6.5 Boosting Innovation in Information Systems
6.6 Promoting a culture of knowledge sharing

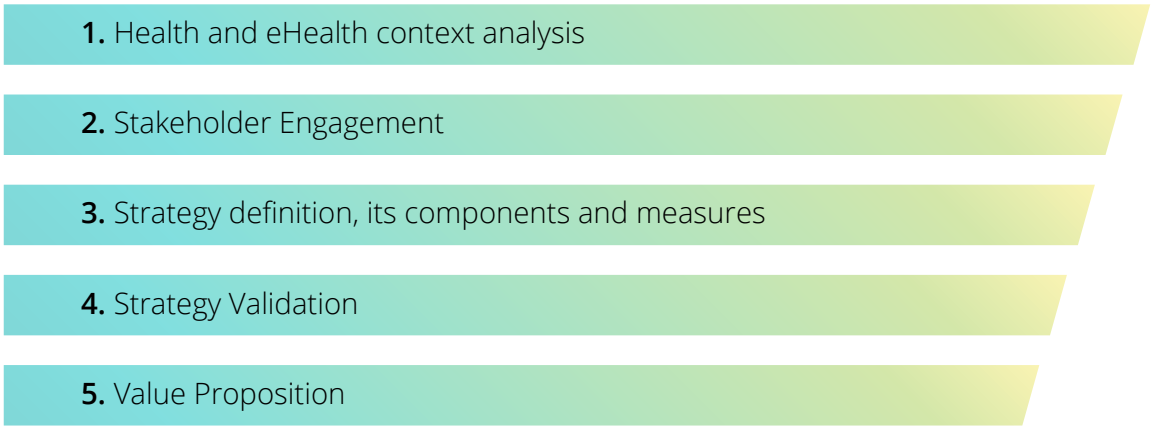
Help us make a difference by participating in this public consultation with ideas, suggestions and critiques through the website www.spms.min-saude.pt

7

ANNEXES

ANNEX I | Methodology

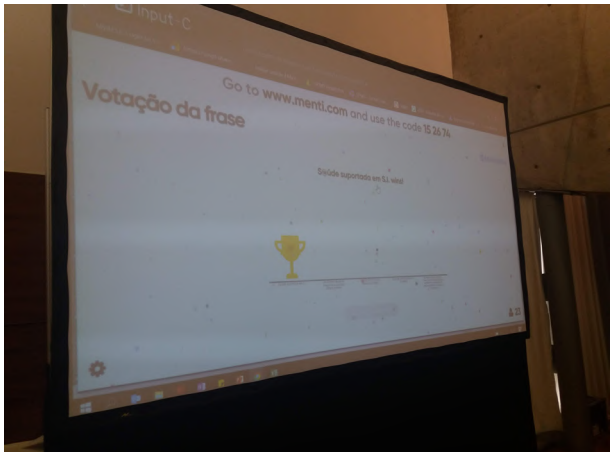
180. In the preparation of this document on the National Strategy for the Health Information Ecosystem - ENESIS $_{20}22$, for the three-year period 2020-2022, a methodology was defined with the aim of ensuring the integration of the entire process, addressing the different challenges of the ecosystem and alignment with stakeholders. In this regard, and based on the WHO [21] and JASeHN [22] benchmarks for defining an eHealth strategy, ENESIS $_{20}22$ planning was structured in five distinct phases:

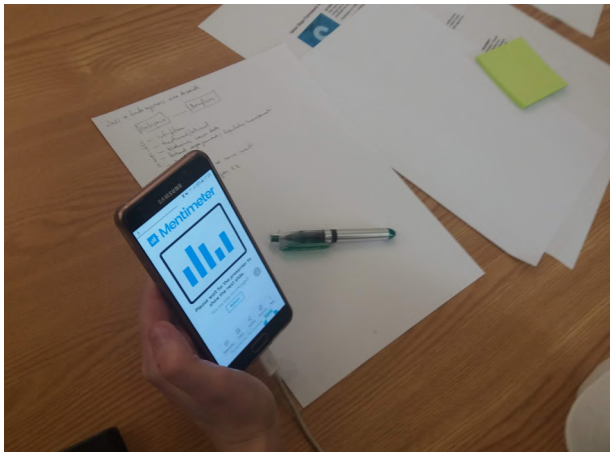


181. Initially, the Health and eHealth context was analysed, with the purpose of understanding current health challenges and health-related information systems trends from a national and international perspective. To this end, different articles and digital health strategies from reference countries were analysed.

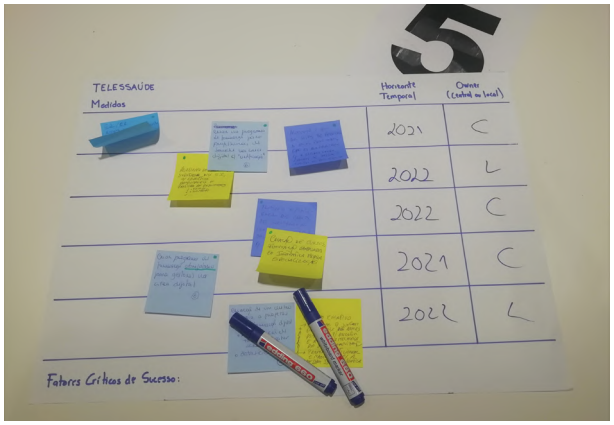
182. In a second phase, several moments of stakeholder consultation were carried out, through which the challenges of the Information Systems were identified, and the key objectives were established. In total, there were about 22 individual meetings with stakeholders, namely the Ministry of Health, bodies of the Ministry of Health, representatives of professional associations, universities and private groups. There were also 3 workshops with stakeholders, the first of which took place at the Portugal eHealth Summit 2019 event, with the participation of 29 professionals from different entities. In this workshop it was possible to obtain information on three aspects under analysis: eHealth benefits, vision and eHealth measures considered by those present as priorities. With regard to the benefits to the Portuguese Health System associated with eHealth, the participants placed greater value on those related to efficiency and effectiveness of resources and optimisation of processes, as well as information and support for decision-making, empowerment of citizens and improved communication. With regard to the measures, intervention in the following components was considered critical: leadership and governance; strategy and value management; provision of health services; health information and knowledge; management and administration of public health care; infrastructure; interoperability and standards; ICT management and processes; legislation,

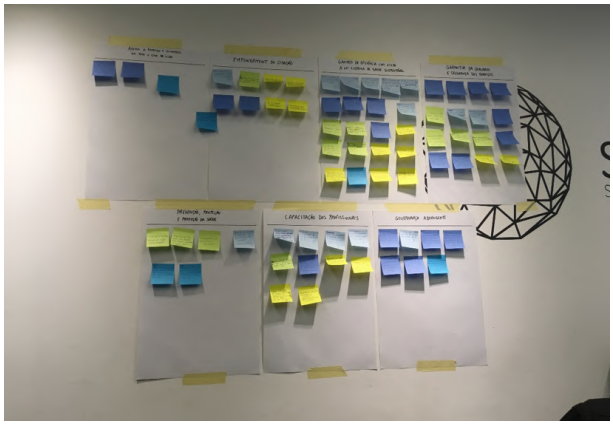
policy and compliance; workforce; adoption mechanisms; and innovation and technology trends; and priority actions were formulated and proposed for each component.





183. The second workshop, in partnership with the Portuguese Association of Hospital Administrators (PAHA), brought together 22 participants, resulting in a set of 30 measures proposed by the various working groups in six strategic areas: a) Empowerment, Citizen Involvement and Access, b) Management Information, c) Clinical Information, d) Data Protection / Cyber Security / Data Access, e) Service Management and Business Continuity + Digital Training (eSkills), f) Governance Model, and Investment + Alignment between Business and IT. Of the 30, the group jointly selected a total of 18 measures (three in each area) that it considered a priority over the others. The measures related to Clinical Information and Management Information were fundamentally valued.





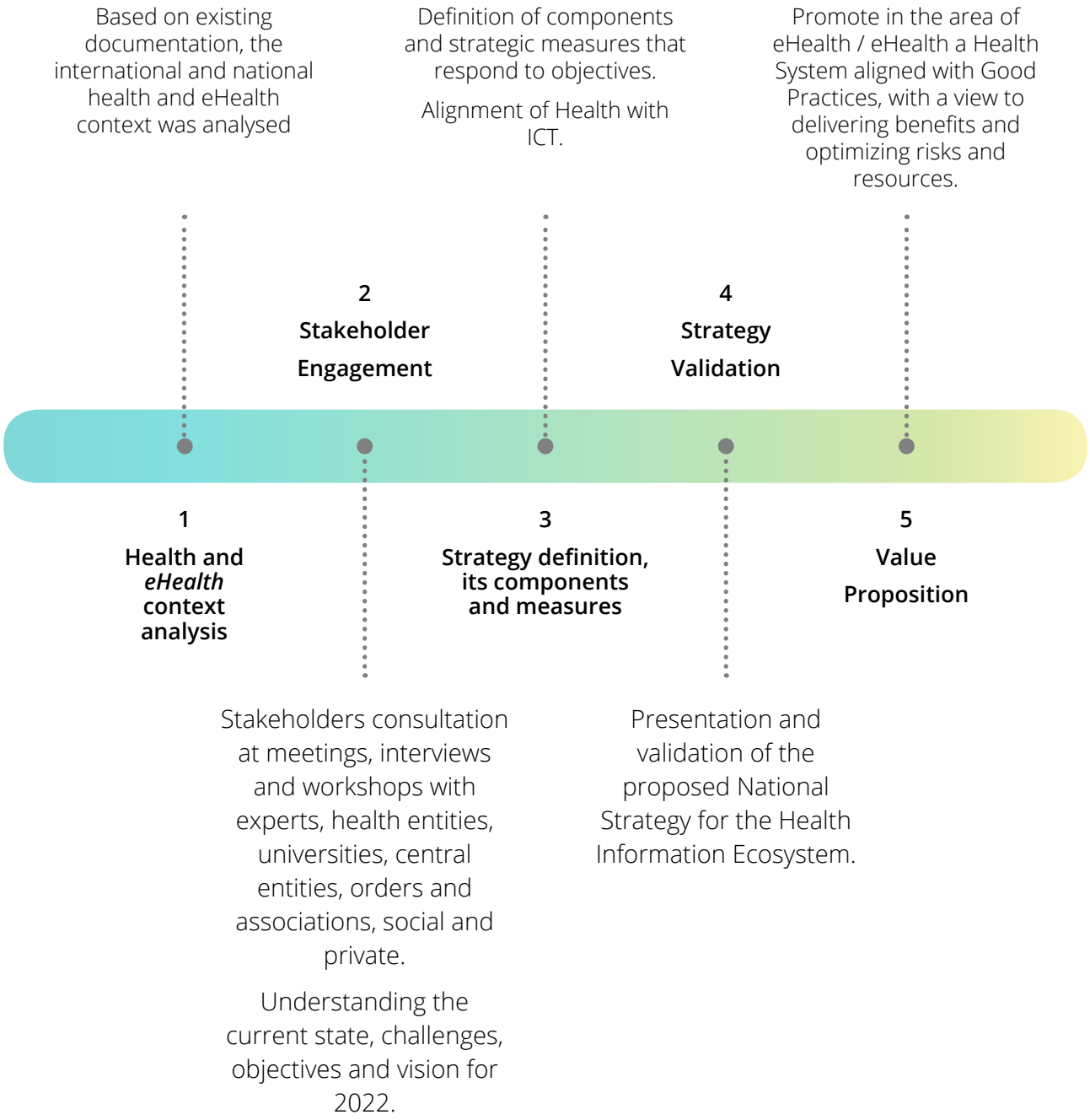
184. Finally, a workshop with experts was held with seven participants, with the aim of defining a set of measures for each of the six strategic aims already consolidated in ENESIS $_{20}$22. For each measure, its visibility and impact on the ecosystem were analysed, as well as the effort to implement the respective measures in order to structure them in different time horizons.

185. These moments of consultation corresponded to around 54 hours of involvement, which were fundamental for the development of this strategy. Some examples of the work carried out in the workshops and meetings are presented.

186. Then, in a second phase, the necessary components and measures were defined, based on stakeholder consultation, which led to the construction of the framework and definition of the strategic streams and measures. This phase was essential to develop all the information obtained, ensuring a clear definition of the strategy and the alignment of the Information Systems with the business objectives.

187. In a fourth phase, the proposal for the National Strategy for eSIS is presented through a public consultation, with the aim of validating the strategy and integrating the new contributions.

Finally, after the strategy was validated, the document was consolidated, establishing the vision and strategy for the Health Information Ecosystem, in order to implement an action plan aligned with good practices and focused on the optimization of risks and resources.



ANNEX II | Table with Measures Implementation Plan, by timeframe

HORIZON 1 — 1 year

HORIZON 2 — 2 years

HORIZON 3 — 3 years

HORIZON 1	HORIZON 2	HORIZON 3
1.4 Provision of platforms that promote the provision of distance care	1.1 Information Systens Accessibility	1.2 Health Access in Mobility
2.1 Health literacy development through the creation of shared solutions	1.3 Communications between Information Systems within and among Organizations	3.1 Evolution of Clinical and Administrative Information Systems
2.3 Promotion of improved usability of Information Systems through citizen engagement mechanisms	2.2 Introduction of citizen experience as a mean of Health Services improvement	3.2 Optimization of clinical and administrative processes
3.4 Centralized Information Systems purchasing process optimization	2.4 Promotion of a 360º view of health conditions	3.3 Optimization of network infrastructure and servers
3.7 Shared management services and health resources	3.2 Optimization of clinical and administrative processes	3.6 DDefinition of Data Governance model
4.1 Confidentiality, integrity and availability protection of the health information	3.5 Optimization and dissemination of business intelligence to support management decision making	4.2 Promotion of cybersecurity practices in Information Systems
6.1 Stakeholders involvement for continuous improvement of Information Systems	3.8 Use of technological tools to support health professional practice	4.3 Guarantee of Business Continuity
6.4 Improvement of information and communication technology skills for top management	3.9 Value management model	4.4 Assurance of Information Systems Conformity
6.6 Promoting a culture of knowledge sharing	4.5 Implementation of clinical decision support mechanisms and patient safety	5.2 Prevention in public health through data analysis and Artificial Intelligence
	5.1 Gamification concept application	
	6.2 Improvement of digital skills of non-technological health professionals	
	6.3 Improvement of digital skills of health technology professionals	
	6.5 Boosting Innovation in Information Systems	

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