



Digital Public Goods

Eight Guiding Principles for the Digital Transformation of the Health Sector
Digital transformation toolbox

ORGANIZATION, COORDINATION, AND DEVELOPMENT

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Abstract

Digital public goods (DPGs) constitute one of the eight guiding principles for the digital transformation of the health sector promoted by the Pan American Health Organization (PAHO). This policy brief presents key concepts, recommended lines of action, and monitoring indicators, with the objective of advancing DPGs.

According to PAHO's definition, this principle is intended to **co-create digital public health goods for a more equitable world**:

To strengthen the health and well-being of the world's population, DPGs must include open-source software, standards, algorithms, data, applications, and content designed with the appropriate architecture and licensing. These attributes should allow them to be scaled to diverse populations and contexts, and to be implemented with the appropriate local adaptations. Responsibility and sustainability should always prevail, with a user-centered design, especially in vulnerable populations with special needs in terms of technology and digital literacy (1).

On the road to achieving universal access to health care, digital transformation plays a key role. DPGs, which include open software and applications, open interoperability standards, and open and shared high-quality data, represent an opportunity for low- and middle-income countries with fewer resources to access adaptive and innovative technologies.

The Region of the Americas faces many challenges in this area, including its great heterogeneity in terms of the development of digital transformation strategies, low scalability of its DPGs, limited access to and deployment of DPGs developed in other regions, vulnerable populations with little access to technology, connectivity problems, and lack of computer education, resulting in gaps within and between countries.

Different lines of action have been recommended to address these issues, focused on identifying at the government level a key area to lead the inclusion of DPGs on national agendas, make an accurate diagnosis of DPG needs and their context, create national committees or dialogue forums that guarantee the representation of all viewpoints, and establish public-private partnerships with the incorporation of key stakeholders. In addition, it is recommended that national roadmaps be established as operational plans to coordinate regional efforts, with an eye on the DPGs available on a worldwide scale and replicable at the national and regional levels, all within the framework of synergies with the global community.

In terms of their public policies, the countries of the Region are encouraged to carry out joint interventions to co-create DPGs according to their priority needs, coordinating their governance, financing, and maintenance, and to take advantage of DPGs developed by the international community.

Keywords: *digital public goods, digital transformation in health, co-creation of public goods, open software, open artificial intelligence, open content, digital public goods roadmaps, cooperation of key stakeholders, public-private partnerships, interoperability standards.*

Introduction

Digital public goods (DPGs) constitute one of the eight guiding principles for the digital transformation of the health sector promoted by the Pan American Health Organization (PAHO). This policy brief presents key concepts, recommended lines of action, and monitoring indicators, with the objective of advancing the creation of DPGs.

According to the PAHO definition, this principle is intended to **co-create digital public health goods for a more equitable world**:

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The main goal of digital transformation in the health sector is to facilitate universal access to health care, providing, among other things, software and standards that enable the best capture and communication of clinical information, with high-quality shared data and content that guarantee the best care delivery, health management, and decision-making. This digital transformation in health must be anchored in a framework comprising agreements of the international community, comprehensive strategies, accompanying legislation, and national public policies (2).

The coronavirus disease (COVID-19) pandemic offered an opportunity to boost the momentum of digital transformation and accelerated its implementation in the Region of the Americas, incorporating digital solutions into health systems, including vaccine distribution systems, certification for vaccinated individuals, telehealth platforms, and telemedicine services. However, in many cases, this acceleration has taken place without a comprehensive vision regarding the definition of a digital health strategy as public policy.¹

There are still major gaps and challenges to be addressed in the Region, linked to access to technology, computer programs, interoperable systems, and quality health data

that avoid duplication of information.² Likewise, there are often disjointed computer solutions without any standards to enable communication between them, resulting in technological fragmentation. Such fragmentation can result in misuse of data and therefore in poor planning and resource allocation, the maintenance of parallel systems, and a lack of investment and support for other systems that are needed (3).

PAHO estimates that although 52.6% of the countries of the Region have a national electronic medical record system, only 26.3% have legislation that supports the use of such systems (4), and 3.6 billion people worldwide do not have internet access, with access gaps that markedly differentiate between urban and rural populations, even within the same country. Another indicator of the heterogeneity of the Region is basic computer literacy. According to a 2021 report by the United Nations Economic Commission for Latin America and the Caribbean (ECLAC) on digital transformation in Latin America and the Caribbean (5), only 40% of the population has basic computer skills.

Faced with this situation, the question that arises is how the countries of the Region can access innovative technology to address the fragmentation present in some situations. Experts in the field argue that “each country cannot and should not be expected to reinvent the wheel” in terms of developing digital infrastructure, services and content, but that “it should be possible to learn from other countries’ experiences, and reuse and adapt technologies and content which works well in other places”(6). Therefore, different organizations are promoting the development of DPGs, with the understanding that it is possible to establish and expand digital solutions through the advancement of DPGs, which can reduce costs for low- and middle-income countries, enabling them to access adaptable and innovative technologies.

In the current DPG ecosystem, the most important agencies worldwide for the generation and dissemination of DPGs include, within the United Nations, the Office of the Secretary-General’s Envoy for Technology, the United Nations Children’s Fund (UNICEF), PAHO and the World Health Organization (WHO), the United Nations Development Programme

¹ Based on the opinion of experts convened to the asynchronous policy dialogue on the eight guiding principles for the digital transformation of the health sector in the Americas, held in November 2021.

² Jennifer Nelson, Digital Health Solutions Specialist for the Social Protection and Health Division of the Inter-American Development

Bank (IDB), said in an interview, “COVID-19 has accelerated the digital transformation in health in Latin America.”

<https://gestion.pe/economia/covid-19-ha-acelerado-la-transformacion-digital-en-salud-en-america-latina-noticia/>.

(UNDP), the Food and Agriculture Organization (FAO), and the World Bank; others include the Inter-American Development Bank (IDB); the Governments of Estonia, Finland, Germany, Norway, and Sierra Leone; and the Bill & Melinda Gates Foundation, the Rockefeller Foundation, the eGov Foundation, Digital Square at PATH, the Digital Impact Alliance (DIAL), GitHub, iSPIRT, and the Digital Public Goods Alliance. In the Region of the Americas, PAHO and the IDB play a key role in providing sustainability through visibility, facilitating knowledge creation, and sharing, and financing. However, these efforts must also be financed with national and regional human resources to make the DPGs work over time.

In this context, PAHO issued a “call to action in the Americas” and, together with WHO, they agreed on the

Roadmap for the Digital Transformation of the Health Sector in the Region of the Americas. One of its guiding principles is DPG, stating that it is necessary to:

co-create digital public health goods for a more equitable world (...) public policies should include digital public health goods, such as more equitable internet access, use of open-source software, open standards, transparent algorithms for automated decision-making, open data with measures to protect personal data, and applications. These assets should be designed with the appropriate architecture and licenses to be applied globally tailored to different populations and contexts, with the capacity to make local adaptations.

Current status and identification of gaps

Several countries in the Region have shown progress in the DPG field, launching different kinds of interventions, with national plans, legislation, and organizational structures to promote these strategies. For example, Uruguay has created, maintained, and continues to update a Public Software Catalog, aimed at reusing solutions across the country and promoting cooperation between government institutions and civil society (7).

For its part, Argentina has developed and implemented a Training Strategy on Standards for the Digital Health Strategy (involving CT, FHIR, IMP, IPS, and SNOMED, among others) for public and private health facilities, software companies, and service providers, generating an installed capacity at the national level in terms of standards (8).

Bolivia has passed national legislation on the use of open-source software (9) which defines a period of seven years for the implementation of free software at every level of government.

Jamaica has used two DPGs in response to COVID-19: CommCare (10) and DIVOC (11). CommCare is a digital platform that enables secure and scalable solutions to manage vaccine rollout, provide real-time analytics to monitor vaccine delivery, track missed appointment rates, and ensure that critical populations are vaccinated first. DIVOC enables electronic certification of vaccination (12).

Looking across the Region of the Americas using the interactive map drawn up by the Digital Public Goods Alliance (13), several countries show national or local developments of DPGs, such as electronic medical records and epidemiological surveillance (Argentina, Brazil, Chile, Colombia, and Uruguay), although these

DPGs show no scalability regarding their use in other countries or synergies for regional cooperation. This may account for the Region's low participation in the co-creation or maintenance of health DPGs, except for Canada and the United States, and to a lesser extent, Chile.

There are still important **challenges and opportunities** in the Region with regard to advancing in the formulation and implementation of public policies on DPGs, which is where public interventions are necessary; these include governance, regulation and legislation, financing, public-private partnerships, accessibility to replicable experiences, and technical issues.

The experts consulted identified the **main barriers**³ in the Region of the Americas to the development or deployment of DPGs, linked to the following issues :

- Lack of knowledge about the application and use of DPGs
- Language barriers: most DPGs and support communities are developed in English
- Lack of a governance and leadership structure, leading to ignorance of the real needs of the countries of the Region, and lack of a policy that guarantees the necessary resources and investments, because the implementation of DPGs always has costs, even when the development of this good is for public use

³ Based on the opinion of experts convened to the asynchronous policy dialogue on the eight guiding principles for the digital transformation of the health sector in the Americas, held in November 2021.

- Lack of incentives for the development of technical support communities for the implementation and maintenance of DPGs, and the difficulty in creating public data repositories and an environment conducive to digital innovation
- Lack of professionals trained in health informatics, and of human resources training in general
- Regulatory gaps, given that several countries in Latin America and the Caribbean do not have a national digital health strategy

These barriers are not homogeneous across the Region; there are **gaps** that must be identified in each country to address them.

Finally, and given the heterogeneous situation of the countries and the aforementioned barriers, it is important to take into account the maturity of a DPG when considering its deployment in the Region.⁴ A DPG is

mature when it has free open-source software, is supported by a strong community, has a clear governance structure, is funded by multiple sources, has been deployed on a significant scale, is being used in multiple countries, has proven its effectiveness, is designed to be interoperable, and is an emerging standard application.

It is important to take these aspects into account, since there are risks in the implementation of DPGs, linked to **support** for questions and technical assistance, given that these are not companies that provide services and support—rather, there is a support community (group of computer experts who tweak different versions and answer queries)—and there is an absence of guarantees and service-level agreements (meaning that administrators must closely monitor activities in the community). In addition, all these processes require a great deal of effort and expert knowledge, which are not always available in some countries.

⁴ The criteria established by Digital Square are considered here, which are the following: (a) security, scalability, software productization, technical documentation, interoperability and data accessibility; (b) community governance, software roadmap, user documentation, and multilingual support; (c) country utilization,

country strategy, digital health interventions, source code accessibility, and (d) financing and revenue (https://wiki.digitalsquare.io/index.php/Global_Goods_Maturity_funding_and_income).

Lines of action

To address the current state of development or deployment of DPGs for digital transformation in health in the Region of the Americas, it is necessary to begin by defining the main strategic lines to be advanced.

PAHO (1) calls for coordination, motivation, involvement, strengthening, and the provision of guarantees in order to:

- Establish a vision, strategic objectives, and framework for action to promote appropriate and sustainable mainstreaming of digital public health goods for health strategies at the different political-administrative levels of each country
- Promote legal and ethical frameworks for open source, open data, open models of artificial intelligence, and open standards and content. In particular, to update and strengthen intellectual property frameworks on the use of and access to DPGs, to facilitate their acquisition and application in low-resource areas
- Design and adopt new cooperation mechanisms between the private sector, the public sector, civil society, and academia
- Assess inequities or unintended consequences that DPGs can generate in unfavorable social contexts
- Align the different technological solutions with specific health needs. These solutions must be technologically appropriate to the social, cultural, environmental, and economic conditions of the setting where they will be applied
- Include DPG skills in public health-related education and training programs, emphasizing the importance of monitoring access and use, and of constant adaptation
- Consider such common human values as inclusiveness, respect, the centrality of the human person, human

rights, international law, transparency, and sustainability

Taking as a guide the lines of action prioritized by PAHO and the recommendations provided by the experts consulted, a series of actions is proposed below.⁵ However, considering the heterogeneity of the countries of the Region, they must adapt to the reality of each country, its current degree of capability maturity, and the resources available.

1. ESTABLISH A BASELINE DIAGNOSIS THAT CONSIDERS THE STATE OF PLAY OF KEY POINTS

- Identification of digital transformation policies that are being carried out at national and subnational levels.
- Identification of the legislation and regulations related to the existing issues, especially focusing on legal gaps linked to digital transformation and the development or deployment of DPGs, such as the adoption of free software as a standard, and the adoption by law of communication and semantic standards that promote the interoperability of systems and guarantee national governance.
- Identification of key public, private, civil society, and academic communities in the country that are involved in these issues, which can be brought into public-private partnerships, dialogue forums, and joint efforts for the design of public policies promoting DPGs.
- Identification and systematization of experiences developed or in use in the country involving open-source software, open data, open models of artificial intelligence, standards, and open content that could become DPGs (including the developer, the support communities, the source of financing, the available documentation, and the number of users).

⁵ Based on the opinion of experts convened for the asynchronous policy dialogue on the eight guiding principles for the digital transformation of the health sector in the Americas, held in November 2021.

- Identification of training opportunities related to DPGs available in the country and related to open standards, open-source development languages, and change management to incorporate the use of technologies in health care, among other areas.
- Identification of the needs of the sector in the country, considering the social, cultural, environmental, and economic conditions at the national and subnational levels.

2. CREATE NATIONAL DIALOGUE COMMITTEES OR FORUMS

- Involve the academic community, the national and subnational public sector, and the private sector, to facilitate the involvement of all voices and interests and to promote the discovery, development, and use of DPGs, and investment in them. If forums for dialogue are already being developed in the country, encourage the introduction of DPGs as an area of interest and development.

3. DEFINE NATIONAL ROADMAPS

Involve all the key stakeholders in the country, with clear medium- and long-term objectives, including:

- Develop and approve rules and regulations that favor DPGs, contemplating legal gaps.
- Identify and prioritize the country's needs for DPG deployment or development.
- Set up national technical training plans with multiple stakeholders, including academia, the private sector, and direct users, to strengthen the sustainability over time of the implementation of DPGs and the participation of subnational governments.
- Identify the sources of financing available, considering the coordination of different sources. The development or

deployment of DPGs involves significant investments; therefore, it is necessary to create synergies with funding agencies in the Region and with governments.

- Create, maintain, and update national databases of free software and other DPGs to ensure access to them for the entire national and subnational community.
- Communicate and disseminate information, at the national level, on open computer programs and applications, open information, open artificial intelligence models, and open standards and content that favor the health system.
- Provide technical assistance for training local work teams that are familiar with the available DPGs and can make use of them and be part of their support communities.

4. PROMOTE LEGAL AND ETHICAL FRAMEWORKS THAT FAVOR THE DEVELOPMENT OF DPGS

- This includes open source, open data, open intelligence models, and open standards and content. In particular, intellectual property frameworks on the use of and access to DPGs should be updated and strengthened to facilitate their acquisition and application in those areas with fewer resources.

5. IDENTIFY THE COUNTRY'S PRIORITIES AND SHARE THEM WITH THE REGION

- The objective is to develop or deploy DPGs to create a regional community and establish synergies with the global community.
- Lastly, countries must ensure such common human values as inclusion, respect, the centrality of the human person, human rights, international law, transparency, and sustainability.

Monitoring indicators

To advance the development and use of DPGs in the health sector in the countries of the Region, the following indicators are proposed. It is important to clarify that this is not an exhaustive list, but that each country or region can incorporate other indicators, defining the necessary level of disaggregation and frequency of measurement.

CROSS-CUTTING INDICATORS OF THE EIGHT GUIDING PRINCIPLES FOR DIGITAL TRANSFORMATION IN HEALTH

- A national digital health strategy established through a regulatory framework
- A governmental organization structure to lead the digital transformation in health strategy
- A budget for a digital agenda that includes the necessary human resources and technology

SPECIFIC DIGITAL PUBLIC GOODS INDICATORS FOR EACH LINE OF ACTION

1. Establish a baseline diagnosis of the state of play regarding DPGs in the country

- Number of government actions underway for digital transformation
- Number of types of open-source software developed by the country
- Number of types of open-source software used in the country
- Number or type of interoperability standards used in the country
- Number of DPGs deployed in the country
- Number of DPGs developed or co-created in the country
- Number of annual DPG-oriented training programs

- Existence and appropriability of legislation or regulations related to DPGs

2. Identify, within the national digital transformation strategy, the incorporation of DPGs and the participation of different stakeholders and representative sectors in the country

- Development of a regulatory framework covering ownership, licensing, certification, and maintenance.
- Number of dialogue forums or committees addressing DPGs
- Number of key sectors or stakeholders participating in these dialogue forums or committees

3. Define national roadmaps on digital transformation that include DPGs and that consider the points recommended in the diagnosis

- Number of projects under implementation involving DPGs in the country and that have a roadmap

4. Promote legal and ethical frameworks that favor the development of DPGs

- A regulatory and ethical framework that includes such aspects as ownership, licenses, certification, and maintenance

5. Identify spaces for regional integration to define needs and coordinate resources, which interact with the global availability of DPGs

- Number of participations in regional partnerships addressing DPGs
- Number of annual participations of the country in international DPG forums, committees, and alliances

General recommendations

The deployment or development of DPGs in the Region of the Americas requires integration and coordination, both at the country level and at the regional level, to identify the priority needs of health systems. Therefore, these efforts should be channeled through regional communities or networks to support knowledge sharing and needs identification, to create a DPG portfolio for the Region.

Regarding the financing and sustainability of DPGs, there is also a need for coordination through national and international funds and public-private partnerships, with specialized technical support from non-governmental entities and applied academic research. It is especially necessary to create a governance scheme that defines the priorities and technical equipment necessary for the Region in terms of DPGs, which can be used to determine multiple sources of financing.

Regarding the role of national governments and technical capacity-building at the national and subnational levels, it is necessary to incorporate DPGs into the national digital transformation agendas; generate cross-cutting training programs that include the necessary skills, working together with academia, the private sector, and government agencies involving education, health and science, and technology; and promote university research.

The processes of building this agenda, identifying its priorities, and knowing the needs of countries and the Region are all essential to develop the PAHO guiding principle of “co-creating digital public goods”.

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