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Health informatics — Internet healthcare service pattern

Informatique de santé — Modèle de services de soins de santé sur internet

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by Technical Committee ISO/TC 215, *Health informatics*.

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Introduction

The rapid development of information technologies such as the internet, cloud computing, and big data, as well as their in-depth application in the healthcare field, has given birth to internet healthcare services. With the help of information technologies, internet healthcare services have redistributed medical resources, thereby reconstructing relevant processes, improving service efficiency and promoting fairness across the industry. Healthcare organizations, such as hospitals, outpatient clinics and even some internet companies, provide the public with various online healthcare services. These healthcare service providers, as well as a growing variety of healthcare service types, are intertwined in cyber and physical space, and, together, they have formed a complex internet healthcare service system. The global pandemic has significantly impacted the capacity of the traditional healthcare system to deliver essential healthcare services. Therefore, accelerating the development of internet healthcare services and improving the maturity of non-contact service delivery is inevitably becoming the primary trend of future growth in this field.

The service pattern is the organization and coordination mode of the internet healthcare service system. It includes but it is not limited to the boundary of relevant participants, the collaboration of diverse processes from both business and medical perspectives, the exchange of related information and the realization of healthcare service goals. The ISO 12967 series has developed a concept model to describe healthcare information systems, focusing on enabling openness, integration and interoperability of healthcare information systems. An internet healthcare service pattern aims to organize the entire system and coordinate related participating elements. An understandable description of the pattern throughout the early, mid and late stages of service implementation is critical to effectively designing, rapidly constructing and continuously operating a sustainable healthcare service system. However, communication among relevant participants is long yet costly due to the need for more unified terminology describing and classifying internet healthcare services. Besides, a consolidated descriptive method is necessary. The lack of a descriptive model would impede the identification of the service pattern types, thus bringing difficulty in reusing and systematically analysing internet healthcare services.

This document aims to identify the standardized description and classification of internet healthcare service patterns through terminology and modelling suitable to facilitate pattern reuse, optimize the current healthcare expenditure level, accelerate industrial development, and lay the foundation for systematic analysis of the entire industry.

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Health informatics — Internet healthcare service pattern

1 Scope

This document specifies the core elements, the description model and typical categories of internet healthcare service patterns.

This document applies to the development and application of internet healthcare service patterns.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/TS 21089:2018, *Health informatics — Trusted end-to-end information flows*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
internet healthcare
internet-based telehealth

Note 1 to entry: Internet-based technologies deliver healthcare and transmit health information over both long and short distances.

Note 2 to entry: Telehealth utilizes all kinds of information and communications technologies, rather than internet technology only.

[SOURCE: ISO/TS 5777:2024, 3.1]

3.2
internet healthcare service
healthcare *service* (3.5) activities undertaken via internet

[SOURCE: ISO/TS 5777:2024, 3.2]

3.3
internet healthcare service system
combination of interacting elements organized to achieve one or more *internet healthcare services* (3.2)

[SOURCE: ISO/IEC/IEEE 15288:2015[1)], 4.1.46, modified — The preferred term "system" was changed to "internet healthcare service system"; in the definition, "stated purposes" was changed to "internet healthcare services"; Notes to entry were deleted.]

1) Withdrawn.

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3.4
internet healthcare service pattern
organization and coordination mode of *internet healthcare service system* (3.3), including role allocation of all elements, demarcation of relevant *participants* (3.8), collaboration of diverse processes, exchange of related information and realization of healthcare service *goals* (3.6)

3.5
service
output of an organization with at least one activity necessarily performed between the organization and the customer

Note 1 to entry: In the case of healthcare the customer may be a care recipient, subject of care or patient or other healthcare actor.

[SOURCE: ISO 13131:2021, 3.5.1]

3.6
goal
intended outcome of user interaction with one or more *services* (3.5)

[SOURCE: ISO/IEC 19763-8:2015, 3.1.1, modified — "a process or service" was replaced by "one or more services".]

3.7
platform
infrastructure that supports the operation of the *service* (3.5) pattern

Note 1 to entry: Infrastructure includes software and corresponding supporting hardware.

3.8
participant
person or organization that implements, delivers, or receives *services* (3.5) related to internet healthcare

3.9
service provider
organization, or part of an organization, or individual that manages and delivers a *service* or *services* (3.5) to customers

[SOURCE: ISO/IEC 20000-1:2018, 3.2.24, modified — "or part of an organization or individual" was added to the definition.]

3.10
service recipient
patient
subject of healthcare
healthcare actor with a personal role, who seeks to receive, is receiving, or has received healthcare

[SOURCE: ISO 13940:2015, 5.2.1]

3.11
healthcare organization
healthcare *service provider* (3.9) having an organization role

[SOURCE: ISO 12967-1:2020, 3.3.5, modified — "service" was added to the definition.]

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4 Symbols and abbreviations

IHSS internet healthcare service system

IHSP internet healthcare service pattern

G2S healthcare group to service recipient

P2S platform to service recipient

H2S hospital to service recipient

5 Overview of internet healthcare service system

Internet healthcare service is one of the mainstream development directions the healthcare industry is moving in now. By utilizing information technologies such as the internet, cloud computing and big data, internet healthcare service improves service capabilities and service experience from both service providers' and recipients' points of view. A typical internet healthcare service system (IHSS) shall include various participants, including healthcare service providers, platform providers, payment service providers, logistics service providers and service recipients. These participants shall coordinate with each other in cyber and physical space to achieve the efficient provision and convenient interaction of healthcare services. Different types of healthcare services (such as online appointments and consultations, electronic prescriptions, post-care coordination) should be published through internet healthcare platforms by those participants. Although the purpose and content of IHSS may be similar worldwide, differentiated system structures shall be formed from country to country in industrial development due to different administrative systems and industry status quo.

6 Specification of internet healthcare service pattern

6.1 Core elements of IHSPs

6.1.1 Participant

The design, implementation and interaction of internet healthcare service patterns (IHSPs) depend on participants who can decide the resource allocation and are responsible for the operation, delivery and management of services. An integrated IHSP shall consist of at least the following five sub-categories (see Figure 1).

a) Internet healthcare platform provider: legally registered organizations that provide online carriers for internet healthcare services.

b) Internet healthcare service provider: legally registered organizations or certified individuals who provide online healthcare services via internet healthcare service platforms.

c) Internet healthcare service recipient: organizations or individuals who receive healthcare services via internet healthcare service platforms.

d) Internet payment service provider: legally registered organizations that provide payment and account settlement services.

e) Internet logistics service provider: legally registered organizations that provide delivery services, such as drug and medical apparatus delivery.

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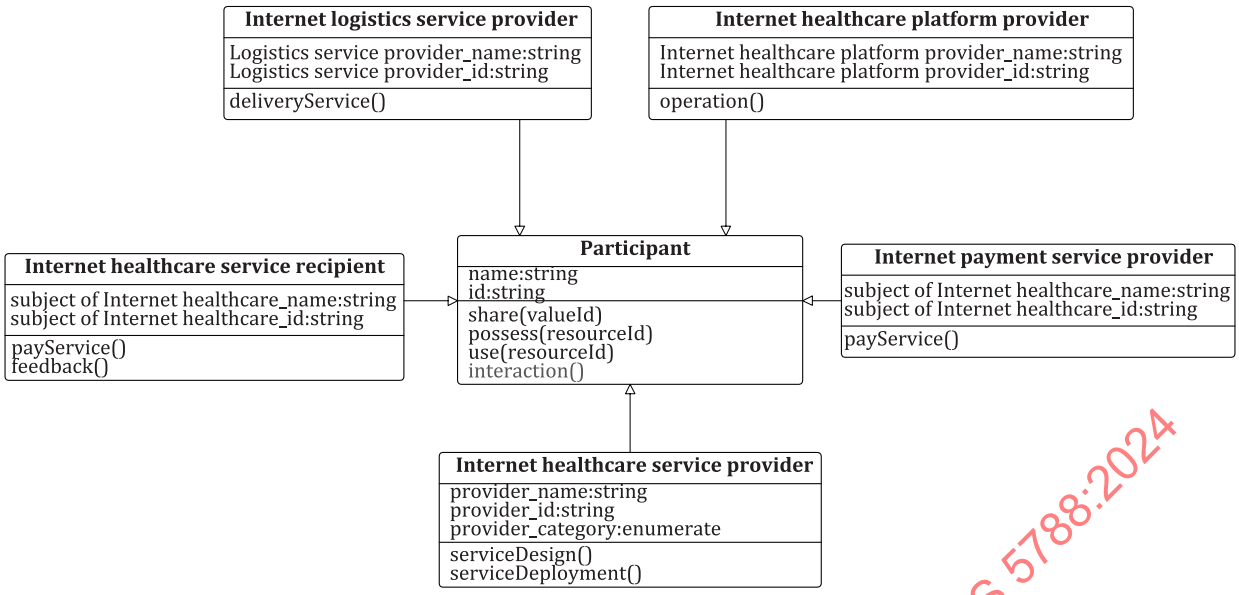

Figure 1 — IHSP participants

6.1.2 Platform

The delivery of internet healthcare services depends on platforms which are carriers to support the interaction between service providers and service recipients. As illustrated in Figure 2, an internet healthcare service platform shall include at least five submodules, namely the service registration platform, service trading platform, payment and settlement platform, logistics distribution platform and system management platform. The essential functions of each submodule shall include:

a) service registration platform: management of service registration, service access, etc.;

b) service trading platform: information and services integration, online interaction support between internet healthcare service providers and recipients;

c) payment and settlement platform: online transaction, including account management and medical insurance settlement;

d) logistics distribution platform: dispatch and distribution of medical supplies;

e) system management platform: user and data management, system maintenance, and upgrading.

Trusted management of health information and health data/records of the platform shall conform to ISO/TS 21089:2018.

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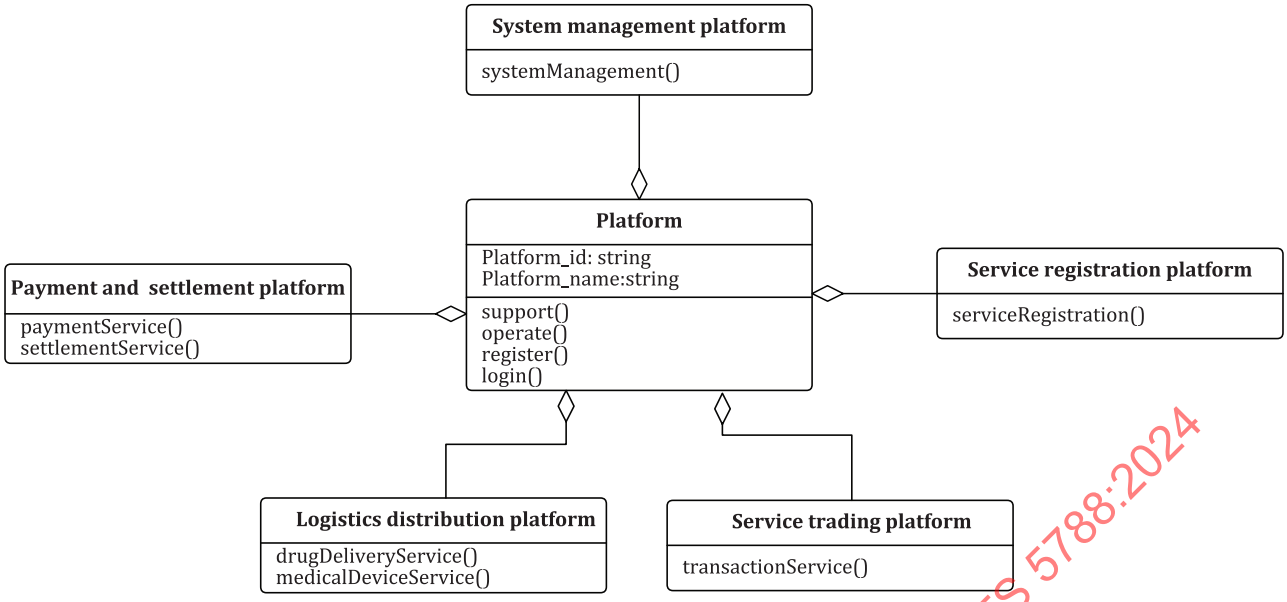

Figure 2 — IHSP platforms

6.1.3 Service

Although different IHSPs may include differentiated services, some services, which are the most common and mature applications in the internet healthcare industry, shall be included in all types of IHSPs. These services can be divided into the following five categories (see Figure 3).

a) Consultation service: commonly occurs between physicians and patients but may also occur among physicians (often between primary care and specialist physicians). It includes healthcare consultation, medical consultation, and professional consultation.

b) Diagnosis service: typically takes place remotely by a radiologist, pathologist, cardiologist, or other specialist relying on transferred images, records, and laboratory results. It includes personal health records, electronic diagnostic reports, and electronic prescriptions.

c) Mentoring service: includes remote guidance, typically by surgeons and other specialists, to other surgeons performing new or complex procedures.

d) Monitoring service: includes healthcare for homebound, chronically ill, recently discharged persons requiring continued skilled care, wound-care patients, and those who are not homebound but have chronic conditions.

e) Ancillary service: other support services. It includes financial services, logistics services, appointment services, E-referral services, and IT services (such as trading services, person identification services, and network management services).

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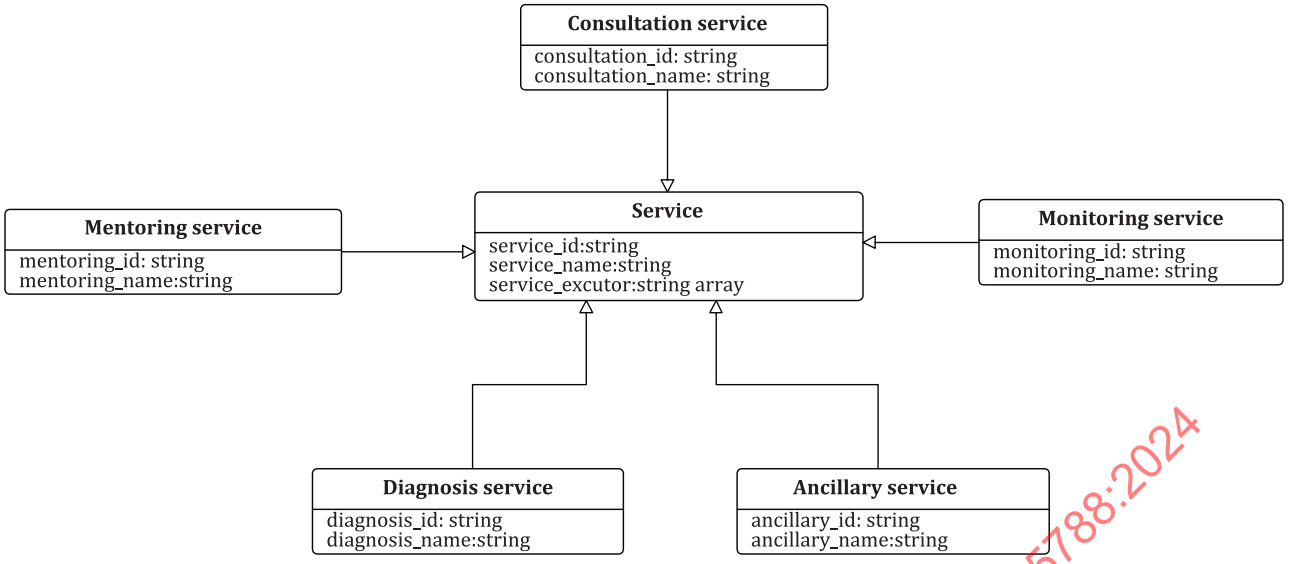

Figure 3 — IHSP services

6.1.4 Goal

Thanks to internet technologies, internet healthcare services can break through the limitations of traditional models by solving problems related to geographical restrictions and low service delivery efficiency. A healthy and sustainable IHSP should achieve the following goals (Figure 4):

a) optimize the allocation of healthcare resources;

b) improve the fairness and public access to healthcare services;

c) improve the efficiency of healthcare services;

d) improve the satisfaction of both healthcare service providers and recipients;

e) optimize the overall scale of expenditure for healthcare.

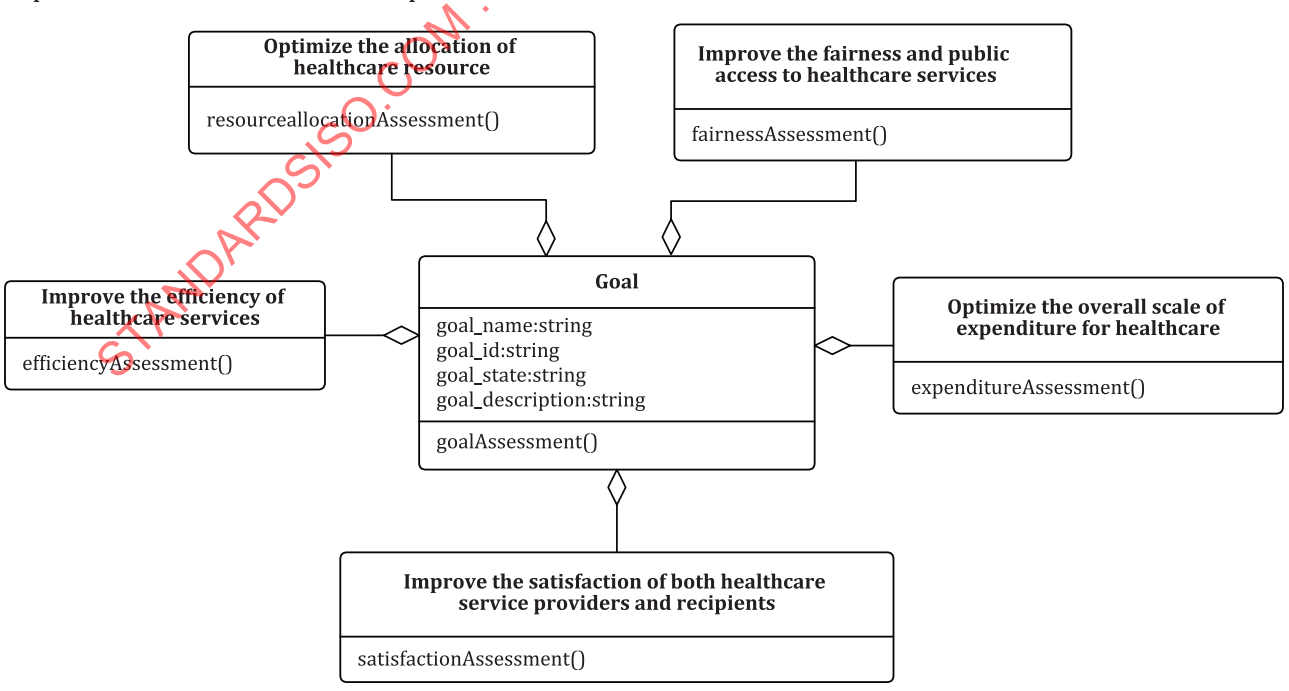

Figure 4 — IHSP goals

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6.1.5 Attributes of core elements

Table 1 defines the required attributes of service pattern elements to describe IHSPs in a unified approach.

Table 1 — Required attributes of core elements

Core element	Required attributes	Postscripts
Participants	participant_name	/
	participant_ID	/
	participant_description	The participant description includes introduction, contact and other information.
	participant_type	/
	participant_domain	/
Service	service_name	/
	service_ID	/
	service_participants	Service participants are the participants involved in this service.
	service_protocol	/
	service_priority	/
	service_state	The service states should contain at least: waiting, processing, finished.
Platform	platform_name	/
	platform_ID	/
	platform_type	/
	platform_owner	/
	platform_state	The platform states should contain at least: closed, under maintenance, open.
Goal	goal_name	/
	goal_ID	/
	goal_type	/

6.2 IHSP specification model

To understand the collaborative relationships among multiple elements within an IHSP, the IHSP specification model should be used. The IHSP specification model (see Figure 5) provides a widely applicable way to describe the pattern using the four core elements detailed in Table 1, and it also explains in detail the relationship among various core components. The relationships are the following.

a) Possess: platforms that provide internet healthcare services are possessed by platform providers, one of the IHSP participants.

b) Use: participants use platforms to conduct activities related to internet healthcare services.

c) Set: goals of IHSP are set by participants.

d) Support: platforms play a supporting role in the execution of applications and the realization of goals.

e) Achieve: participants achieve service goals by performing corresponding services.

f) Control: participants can control the execution state of the application through their own activities.

g) Perform: services shall be carried out by participants.

h) Cooperate: participants perform services collaboratively based on the platform.

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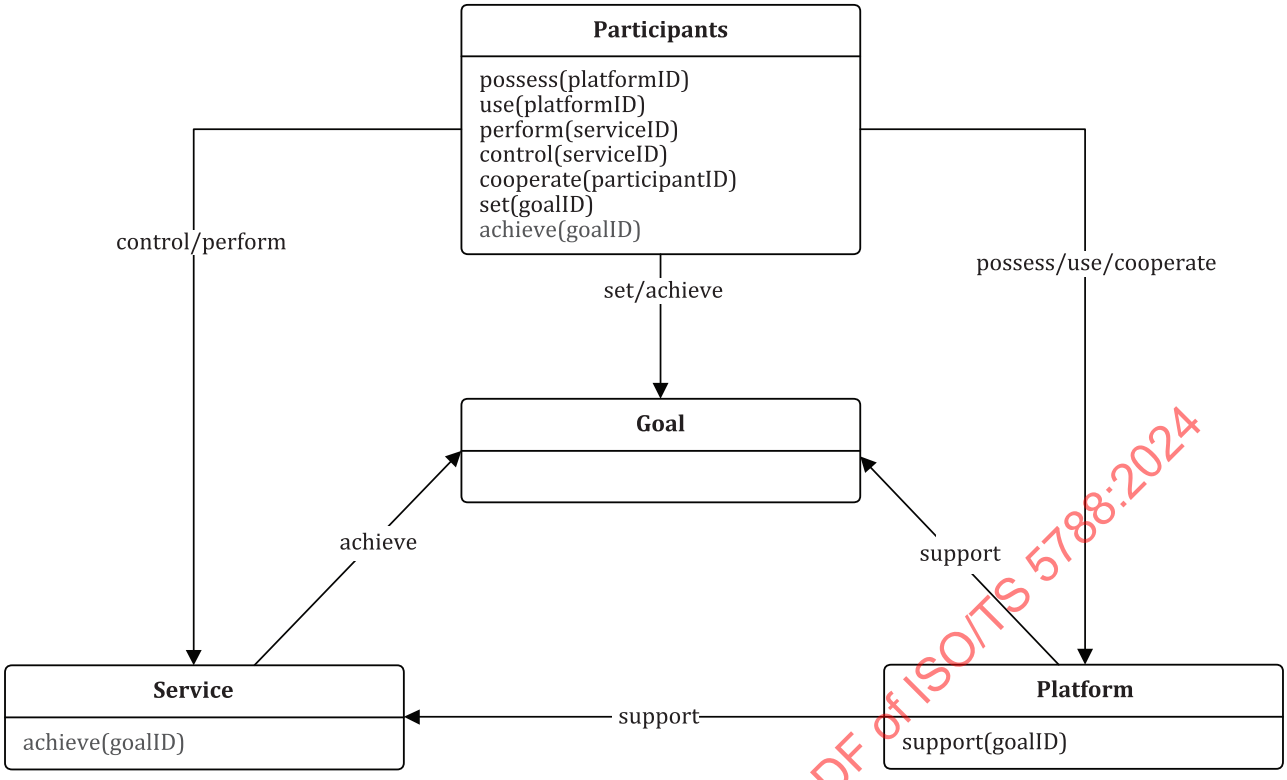

Figure 5 — IHSP specification model

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7 Categories of internet healthcare service pattern

7.1 H2S pattern

H2S pattern is an IHSP dominated by healthcare organizations, mainly hospitals. In this pattern, certain hospitals shall provide and operate internet healthcare platforms. The hospital publishes its healthcare services on its platform and then uses the internet to reach out to service recipients quickly. In the H2S pattern, internet healthcare platform providers and internet healthcare service providers shall be served by the same hospital. Since it is very limited in its private resources, this pattern requires the healthcare organization to have a high level of professional ability.

The framework of the H2S pattern is shown in Figure 6.

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