



**HL7 Logical Model: Anatomical Inventory and  
Person Characteristics, Edition 1**

May 2025

**HL7 Informative Ballot**

**Sponsored by:  
Orders and Observations**

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**Public Health**

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# Background and Introduction

Inaccurate anatomical representations within digital health systems can lead to clinical assumptions, perpetuating health inequities and reducing healthcare quality. An anatomical inventory is an evidence-based digital health intervention that directly addresses underrepresentation or inaccurate representations of a patient's organ status in digital health information system. An anatomical inventory:

- is a detailed list or catalog of organ structures that a person does or does not have
- is used to document presence, absence, or modification of a person's organs
- provides an accurate overview of a patient's current anatomy
- includes surgical procedures such as organ removal, reconstruction, or transplantation where applicable
- is used to ensure patient care is tailored to their unique anatomical profile, guiding preventive screening and clinical interventions, and
- is used by health care providers to provide context for supporting clinical decision making, accurate diagnosis, care and treatment planning, and research.

Anatomical inventories improve information quality, reduce clinical assumptions and enhance clinical decision making by providing contextually-relevant information to clinical practitioners. When coupled with person characteristics, anatomical inventories and the information model supporting consistent design, will provide a foundation for personalized medicine, enabling precision in treatment decisions and care planning.

The HL7 International Anatomical Inventory and Person Characteristics Logical Model ('the model') serves as an important step toward standardization, offering clarity and structure for the development of evidence-based and standards-based solutions. The model will help to ensure that digital representations are accurate, and that they meaningfully address clinical assumptions, support interoperability and that they help to improve health and healthcare outcomes for all people. The model dovetails with the HL7 International Gender Harmony Model and Cross-Paradigm Implementation Guide and serves as the basis upon which future artefacts such as FHIR profiles and/or Implementation Guides can be developed.

This universal-realm model was developed through the participation of patient advocacy groups, multinational vendor representatives, national and international standards organizations, researchers and people with lived and living experience. While most active contributors are from the United States and Canada, we welcome broad participation in our open community.

## Scope

We have developed this logical model as an initial step to developing a FHIR profile for the exchange of common, clinically relevant and infrequently changing person characteristics including anatomical or organ status, blood type and antigens, eye color and other characteristics.

### *In Scope*

The HL7 International Anatomical Inventory and Person Characteristics Logical Model includes a logical description and diagrammatic representation of necessary data elements, attributes, definitions, relationships and selected illustrative use cases. Primary data elements in the model include:

- Patient
- Body Structure
- Inventory Entry
- Inventory
- Provenance; and
- Clinical Practitioner.

Example code sets are also provided in the following enumeration tables:

- Inventory Reconciliation Status
- Inventory Entry Verification Code; and
- Body Structure Origin Code.

Helper classes or data elements include:

- Information source and its subtypes
- Observation
- Device; and
- Spatial definition.

## *Out of Scope*

Data elements and attributes that are out of scope for the model include privacy related concepts. Guidance related to the implementation of this model in real-world solutions is not provided.

## **Intended Audience**

The intended audience for this model includes government, regulatory, and legal organizations; standards development organizations; health system solution providers; researchers; provider groups; and patients—anyone who has a vested interest in ensuring high-quality healthcare for all people.

## **Use Cases**

### **32-Year-Old Patient with Right Lower Quadrant Abdominal Pain**

A patient's anatomical inventory indicates a past appendectomy, allowing the care team to quickly rule out appendicitis and focus on other causes.

### **Patient with Bilateral Mastectomy**

A patient's total bilateral absence of breasts is documented, preventing unneeded breast cancer screening reminders and ensuring decisions are based on current anatomy.

### **Cervical Cancer Screening Eligibility**

A healthcare organization identifies which patients have a cervix to ensure appropriate cervical cancer screening and avoid unnecessary follow-ups for those without a cervix.

### **Tracking Embedded Shrapnel**

Shrapnel location is documented, aiding clinicians in avoiding procedures (e.g., MRI) that could be harmful if metal fragments have migrated.

### **Blood Type O+ in Emergencies**

Blood type is recorded as a person characteristic, allowing emergency clinicians to select compatible blood products swiftly.

### **Continent Diversion (Neobladder)**

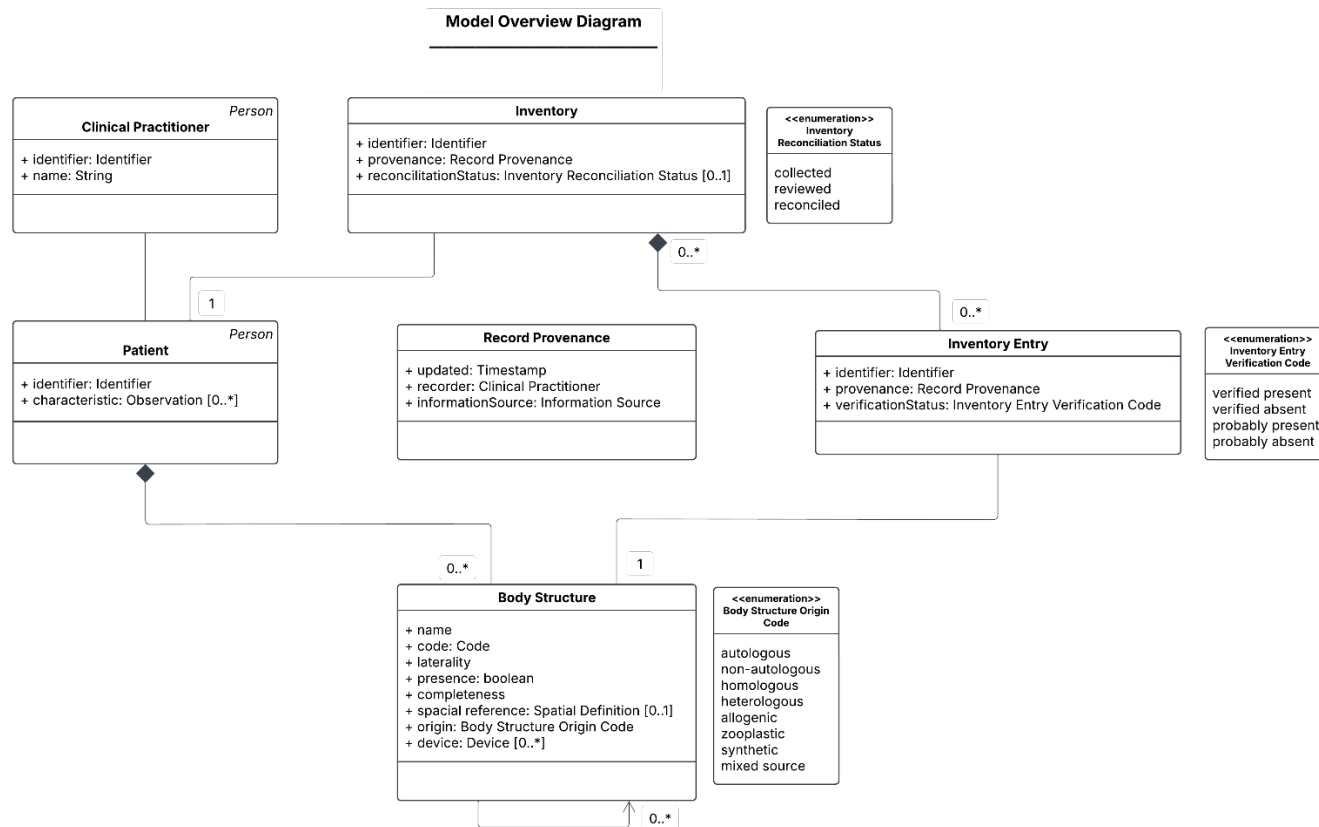
A patient with a neobladder is documented in the inventory, reminding clinicians to follow specialized protocols to prevent harm.

### **Prostatectomy with Artificial Urinary Sphincter**

The inventory notes an implanted AUS, ensuring clinicians know that standard urinary catheterization could be harmful and require adjustments.

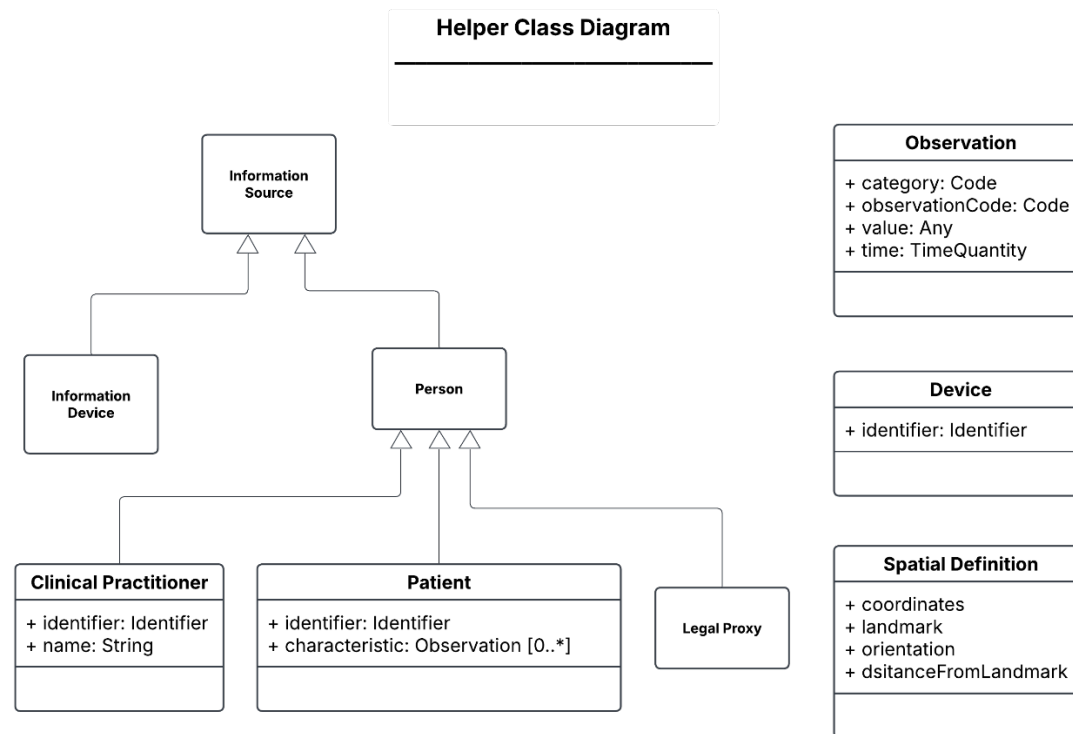
# Information Model

## Model





## Helper Classes



## Information Classes

### *Patient*

The patient is defined as the subject of potential, past, current, or future health-related care, services, or processes, and may also include participation as a research subject [1]. In various contexts, the term for the patient may differ (for example, “client” in community care or “resident” in long-term care). The patient is a type of person with attributes such as a patient identifier and characteristics, which are classified as observations. The patient is composed of multiple body structures. In EHR standards, the term **observations** refers to a class of concepts that can be documented based on direct patient care processes [10].

### *Body Structure*

A body structure is an anatomical part of the body such as a whole organ, a limb or its components [3], or an implanted device or prosthesis. A device is defined as any instrument, machine, contrivance, or implant intended to treat, cure, prevent, mitigate, or diagnose disease or abnormal conditions [4,5]. The Body Structure class outlines attributes such as name, laterality, presence or absence, **completeness**, spatial reference, related procedures, and codes or identifiers.

Body structures can be listed at multiple levels of granularity, and many body structure inventory items may appear in an anatomical inventory. The enumeration **Body Structure Origin Code** supports this class by categorizing the origin of an anatomical part:

- **Autologous**: Tissue, cells, or biological substances taken from the same individual. Example: An autologous skin graft uses the patient’s own skin [8].
- **Non-autologous**: Tissue, cells, or materials that are not taken from the same individual; they may come from a donor or be artificially created [8].
- **Homologous**: Tissue or cells taken from a donor of the same species; often synonymous with “allogeneic” or “homograft,” indicating a genetically different individual of that species [8].
- **Allogenic (Allogeneic)**: Tissue or cells from another individual of the same species who is genetically different. Example: A kidney transplant from a non-related human donor [8].
- **Syngenic**: Tissue or cells taken from a genetically identical individual, such as an identical twin (also called “isogeneic”) [8].
- **Heterologous**: Tissue, cells, or materials from a genetically dissimilar source; commonly from a different species (also called “xenogeneic”) [8].

- **Zooplastic:** Tissue or graft material taken from a non-human animal species [8].
- **Synthetic:** Materials created through chemical or other artificial processes rather than derived from living organisms [8].
- **Mixed Source (Autologous + Other):** A graft, transplant, or product that combines the patient's own biological materials with donor, animal, or synthetic sources [8].

Body structures are listed in the anatomical inventory as **Inventory Entries**. Each entry includes one body structure.

### ***Inventory Entry***

An Anatomical Inventory is a list or catalog of anatomical structures that a person has or does not have. It is used by healthcare providers to support clinical decision-making, diagnosis, care and treatment planning, and research. Each body structure entry has information such as verification status, a timestamp, and the person who recorded it, which is commonly referred to as **provenance** [2].

### ***Inventory***

An inventory is a list, a survey or roster of items associated with a patient. The use of an inventory is context-specific. An anatomical inventory is a list, survey or roster of body structures. The inventory class outlines attributes of the inventory such as identifier, time stamp, clinical practitioner or person who recorded the inventory and verification status.

### ***Clinical Practitioner***

A clinical practitioner is an individual who is directly or indirectly involved in delivering healthcare [7]. A clinical practitioner is a type of person and may have attributes such as a practitioner identifier and a name (for instance, Dr. A.G. Brown, MSP# 2868806).

### ***Provenance***

Provenance captures that origin, context and history of the anatomical inventory entry and the anatomical inventory including who created it, when it was created and its reconciliation status to ensure accountability and traceability in healthcare [2].

## Attribute Definitions

**Code:** refers to a concept from a terminology or code system (i.e. SNOMED CT) that ensure that clinical data is consistently represented, machine-readable and exchangeable [12].

**Completeness:** Refers to the structural wholeness of a body structure—whether an organ is fully intact, partially present, or otherwise altered.

**Identifier:** A value used to uniquely and unambiguously distinguish an entity within a specific context [11].

**Information source:** The entity that supplies the data (often a person or a device, but sometimes an organization).

**Laterality:** Indicates which side of the body a structure is located on (right, left, or bilateral).

**Name:** Represents the name a person uses.

**Observations:** Health-related data that can be measured, evaluated, or recorded during healthcare delivery, including laboratory values, vital signs, physical findings, and social determinants of health [10].

**Presence or absence:** A boolean attribute indicating whether an organ or structure is present (true) or absent (false).

**Procedure:** An action performed on or for a patient, practitioner, device, organization, or location (e.g., an operation, counseling, or a safety inspection) [9].

**reconciliationStatus:** Indicates the reconciliation status of the Anatomical Inventory. Example codes are provided in the **Inventory Reconciliation Status enumeration table** and include concepts "collected," "reviewed," and "reconciled."

**Updated: Timestamp:** Indicates when the current version of the artifact was created or last modified.

**verificationStatus:** Indicates the verification status of the entry. Example codes are provided in the **Inventory Entry Verification Code enumeration table** and include concepts "probably present," "probably absent," "verified present," and "verified absent."

## Helper Classes

### *Device*

Device is a helper class focused on **implants, prosthetics, and similar items** that remain inside or replace parts of the human body for an extended duration. Key attributes include:

- **identifier: Identifier** - a unique identifier for the item, such as a serial number or implant registration number.

### *Information Source*

This helper class is designed to track and differentiate whether data comes from a person (such as a healthcare professional, the patient themselves, or a legal proxy) or from a device.

### *Observation*

Observation is a helper class used to represent a single, measured or recorded piece of health-related data. It includes key attributes that define what was observed, how it is classified, when it was captured, and the actual value or finding:

- **category: Code** specifies the broad classification of the observation using a coded value from a recognized terminology.
- **observationCode: Code** indicates the specific observation concept from a recognized code system.
- **value: Any** captures the actual result of the observation, which can be a number, string, coded value, or another data type.
- **time: TimeQuantity** represents the date/time or time range when the observation was made, recorded, or applicable.

### *Spatial Definition*

A helper class used to describe the location and orientation of a body structure within a defined reference system. It includes attributes that specify coordinates, reference landmarks, directional orientation, and distances relative to these landmarks [13]. Such a class can help clinicians precisely record or visualize where a structure resides in the human body, or how far it is from a known anatomical point. Attributes within this helper class include:

- **coordinates:** Numeric or symbolic values indicating a structure's position (e.g., x/y/z coordinates) in a chosen reference frame.

- **landmark:** A designated point or region (e.g., a bony prominence or anatomical landmark) that provides a reference for orienting or locating the structure.
- **orientation:** A descriptor or angle indicating how the structure is aligned relative to axes or planes (e.g., anterior/posterior, superior/inferior).
- **distanceFromLandmark:** A measurable quantity (e.g., in millimeters or centimeters) indicating how far the structure is from the specified landmark.

## Contributors

Development of this initial model for ballot would not have been possible without the contribution(s) and participation by researchers, vendors, standards experts, government and jurisdictional representatives, and people with lived and living experience. For this ballot, we used an opt-in process for listing contributors. Those who opted-in include:

- Karen Courtney
- Kelly Davison
- Lorraine Constable

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