

# Initiating a One Digital Health Unified Terminology (ODH-UT) to Facilitate Community Expansion

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**Abstract.** One Digital Health (ODH) merges the Digital Health and One Health approaches to create a comprehensive framework for future health ecosystems. In this rapidly evolving field, a standardized vocabulary is not just a convenience, but a necessity to ensure efficient communication. This research proposes the development of a “One Digital Health-Unified Terminology” (ODH-UT) to facilitate communication among researchers and practitioners in Digital Health and One Health, addressing this crucial need.

**Keywords.** Controlled Vocabulary, One Digital Health, Digital Health, One Health, Terminology, Interprofessional Communication.

## 1. Introduction

One Digital Health (ODH) represents a groundbreaking fusion of digital health (DH) and one health (OH) conceptual approaches. This innovative approach encompasses all disciplines that broadly deal with human health, animal health, and the surrounding environment, contrasting with Planetary Health, which deals mainly with the environment and focuses on climate change, human health, and social determinants [1]. ODH offers a unique digital perspective on the ecosystem, population welfare, and animal health within an extensive framework [2]. As a dynamically expanding

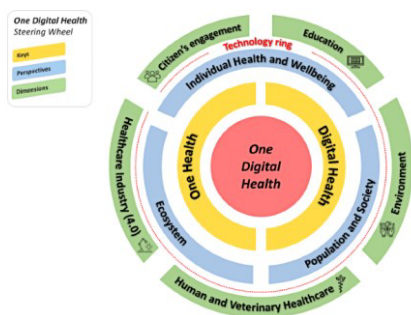
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knowledge domain, comprehensive tools are needed to support knowledge spreading and developing a community of interest communicating efficiently [3]. On the one hand, tailor-made architectures need to be designed with specific features to address the inside characteristics of the ODH paradigm [4]; on the other hand, developing a shared vocabulary is critical and challenging in building bridges between various research and practice domains within and outside the health informatics ground.

In the ODH realm of multidisciplinary and international research, it is crucial to acknowledge the vocabulary ambiguity that can emerge when specialists from different fields collaborate (e.g., health, medicine and nursing, engineering, data science, environmental sciences) [5]. An example of a prior research product dealing with such challenges is MIMO, the Medical Informatics and Digital Health Multilingual Ontology [3]. This domain ontology has the primary objective to serve as a collaborative tool, enhancing communication within international projects by providing translations in over 30 languages in the fields of medical informatics and digital health (<https://www.hetop.eu/hetop/rep/en/EFMIMIMO/>).

Hosted on the Health Terminology/Ontology Portal (HeTOP, <https://www.hetop.eu/hetop/en/>) [6], MIMO encompasses around 3,700 concepts constantly updated to reflect the most recent developments in its relevant fields. Along the same lines, by looking at the ODH community expansion with expertise worldwide, developing a “One Digital Health-Unified Terminology” (ODH-UT) is an additional fundamental block to facilitate collaboration and communication between the different actors involved in an ODH-oriented project. Below, we provide an overview of the One Digital Health-Steering Wheel (ODH-SW, Figure 1) as the basic block of knowledge that must be used to initiate ODH-UT. Then, we describe the results of this overview of our research journey, including the development of the ontology for ODH and the challenges we encountered.



**Figure 1.** The One Digital Health Steering Wheel conceptual framework [2].

## 2. Material and Methods

ODH-SW is the generic model defining the integration of “One Health” and “Digital Health” as key concepts, “Individual Health and well-being,” “Population and Society,” and “Ecosystem” as perspective concepts, and “Education,” “Environment,” “Human and Veterinary Healthcare,” “Healthcare Industry (4.0),” and “Citizen’s engagement” as dimension terms and concepts (T&Cs). All these keys, perspectives, and dimensions can be mutually combined. Moreover, the standard ODH T&Cs (as

defined in ODH-SW) may need to be adjusted to be more specific (narrower terms) or more general (broader terms), depending on the context and application use cases [7].

To build the first disclosed version of ODH-UT, we defined the following steps: **(1) Data sources selection:** T&Cs are initially determined based on the ODH-SW and expanded by considering a variety of sources, including existing healthcare terminologies such as the ones hosted on HeTOP (e.g., MeSH, NCIt, LOINC), terminologies such as the IEEE one, relevant scientific literature, and domain experts dealing with one health with a digital viewpoint and, similarly, with digital health with a One Health focus. **(2) T&Cs inclusion criteria** into ODH-UT comprises the following stages: *(2a) Alignment with the ODH-SW framework* concepts that should directly map to the key, perspective, and dimension components; *(2b) Comprehensiveness of the T&Cs* that should encompass a broad range of one health and digital health objects; *(2c) Unambiguousness* and as much as possible precise but easily understandable definition. **(3) ODH-UT curation** will be continuously undergone to ensure consistency and timely relevance. Thus, T&Cs will be normalized and reviewed by domain experts for accuracy, completeness, coherence, refinement, and harmonization; **(4) Version tracking** will be established to manage ODH-UT updates, supporting the incorporation of new T&Cs, revising existing ones, and addressing identified gaps. Further, this approach will help fit the FAIR principles [8,9]. Moreover, as a part of MIMO, the T&Cs of ODH-UT are periodically automatically aligned with the same ones existing in other terminologies and ontologies comprised in HeTOP, ensuring the availability of the most enriched version [3].

### 3. Results

The ODH-SW provides a comprehensive structure for integrating “One Health” and “Digital Health” T&Cs. To populate ODH-UT, we use the methodology disclosed above to provide the first unified terminology based on the seminal T&Cs used in the ODH-SW. Table 1 presents possible synonyms for each ODH-SW T&C and a harmonized definition that a broader multidisciplinary audience understands. On HeTOP, ODH-UT is defined as a branch of MIMO and will have the same cross-lingual characteristics.

**Table 1.** One Digital Health-Unified Terminology (ODH-UT) seminal version with definitions. The definitions are partially based on and adapted from MeSH and CISMef and extracted from HeTOP [6].

| ODH layer    | ODH component                    | Synonym(s)                                              | Definition                                                                                                                                                         |
|--------------|----------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Keys         | One Health                       | Global Health;<br>Unified Health;<br>Integrated Health. | One Health is an integrated and unifying approach to sustainably balancing and optimizing the linked and interdependent health of people, animals, and ecosystems. |
|              | Digital Health                   | eHealth;<br>Health Tech;<br>Health, Digital.            | Digital Health is the use of technology in medicine and other health professions to manage illnesses and health risks and promote wellness.                        |
| Perspectives | Individual Health and Well-being | Personal Health;<br>Wellness.                           | Individual Health and Well-being rely on an individual's physical, mental, and social well-being, focusing on personal health promotion and disease prevention.    |
|              | Population and Society           | Community Health;<br>Public Health.                     | The health of groups of people and animals, considering factors like social                                                                                        |

| ODH layer  | ODH component                   | Synonym(s)                                                                            | Definition                                                                                                                                                                                        |
|------------|---------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            | Ecosystem                       | Environmental Health;<br>Ecological Health.                                           | determinants and community-level interventions.<br>The health of the broader environment, including the interplay of living organisms and their surroundings, influences human and animal health. |
| Dimensions | Citizen's Engagement            | Public Participation;<br>Community Involvement.                                       | The involvement of individuals in health-related decision-making processes fosters collaboration between healthcare providers and the public.                                                     |
|            | Education                       | Literacy;<br>Knowledge;<br>Learning;<br>Dissemination.                                | Education promotes awareness, understanding, and acquisition of information and knowledge, empowering individuals, and communities to make informed decisions.                                    |
|            | Environment monitoring          | Environmental Factors;<br>Surroundings monitoring;<br>Ecological indicators tracking. | Surveillance of the external surroundings that impact health, including biological, chemical, physical, social, and cultural elements.                                                            |
|            | Human and veterinary healthcare | Delivery of health care;<br>Medical Care;<br>Animal Health Services.                  | Human and veterinary healthcare rely on all aspects of providing and distributing health services to a patient population (human or animal).                                                      |
|            | Healthcare Industry (4.0)       | Healthcare Industry;<br>Digital Transformation in Health.                             | The Healthcare Industry (4.0) integrates advanced technologies like artificial intelligence, big data, and IoT into healthcare systems to improve efficiency and patient outcomes.                |

#### 4. Discussion and Conclusions

A unified terminology like ODH-UT is critical to better communication and collaboration in the One Health and Digital Health domains. It can improve patient outcomes, monitoring, and decision-making across healthcare and environmental applications. Successful implementation requires collaboration from diverse stakeholders and ongoing refinement to stay relevant in a constantly evolving field. A robust ODH terminology (and domain ontology in the future) can unlock the potential of digital technologies to revolutionize healthcare, environmental efforts, and citizen empowerment.

ODH-UT will be extended as a real-world application to support the development of knowledge management and decision support tools as part of the OneAquaHealth project (<https://www.oneaquahealth.eu/>) having for main aims to (i) improve the sustainability and integrity of freshwater ecosystems in urban environments by investigating the interconnection of ecosystem health and human wellbeing and (ii) identify early warning (digital) indicators to enhance human and environmental monitoring. One challenge includes integrating health and ecological digital indicators as ODH-UT T&Cs.

As a branch of MIMO, ODH-UT will also support the indexation and search of pedagogical resources in CIDHR (Catalog and Index of Digital Health Teaching Resources) [10], as part of the SaNuRN project on Digital Health teaching in higher education [11].

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