Talking Standards:
How Formal Ontology Addresses the Heterogeneity Challenge Standardisation in the Health Sector

Webinar: HSBooster.eu
September 7th 2023

Dr Pamela Hussey and Dr Subhashis Das

Context - View: Information/Computational

1. EU policy places FAIR data at the centre of its strategic plans to support European values and citizen wellbeing.

2. Digital communication is the vehicle which supports a knowledge economy

3. The EUhubs4data provides open data sources for data driven innovation https://euhubs4data.eu/datasets/

4. In health and social care harmonised standards to advance interoperability are key enablers to address heterogenous data ,deliver patient centred integrated services and advance trustful AI

5. Here, we present examples of our work designed to provide guidance and influence transformation for future sustainable health service delivery

In the Irish Context

Historically Standardisation of health data is slow to evolve. Disease Registries, Survey, Census, and Admin data are used in many cases to support health policy and strategic planning.

With the publication of the Health Information Bill 2023 , and AI Standards and Assurance Roadmap it is anticipated transformation will pick up in pace, see policy links
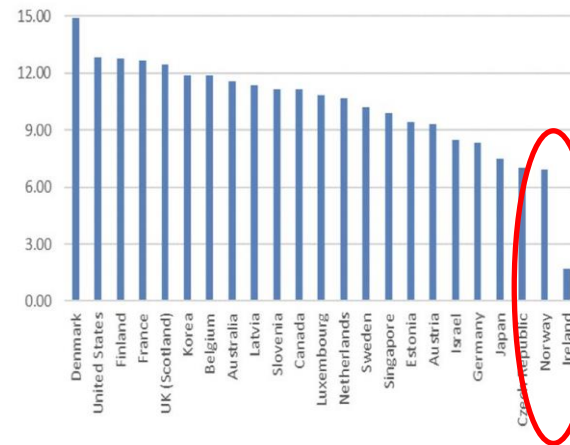
1.https://www.gov.ie/en/publication/6f6a6-health-information-bill-2023/

2.https://www.nsai.ie/images/uploads/general/NSAI_AI_report_digital.pdf

An example health data catalogue resources from Ireland

3.https://data.gov.ie/dataset?theme=Health

Figure 3.1. Key national health care datasets governance elements

Note: The score is the sum of the proportion of national health care datasets meeting 15 governance elements. The maximum score is 15. See Annex B.31.
Source: Author.

Data Governance National Datasets in Health
https://www.oecd.org/health/health-at-a-glance

CeIC Approach

CeIC, DCU focus is on the digitalisation of health care and optimising value through design science. Conducting research using Open Innovation 2.0 principles to benefit, empower and engage the citizen. Core to this focus is addressing the heterogeneity issue through testing and guidance on De Jure standards to inform data dictionaries / catalogues.

DCU
Centre for
e-Integrated
Care

National
Data Dictionary

Some of CeIC PDCA Activities
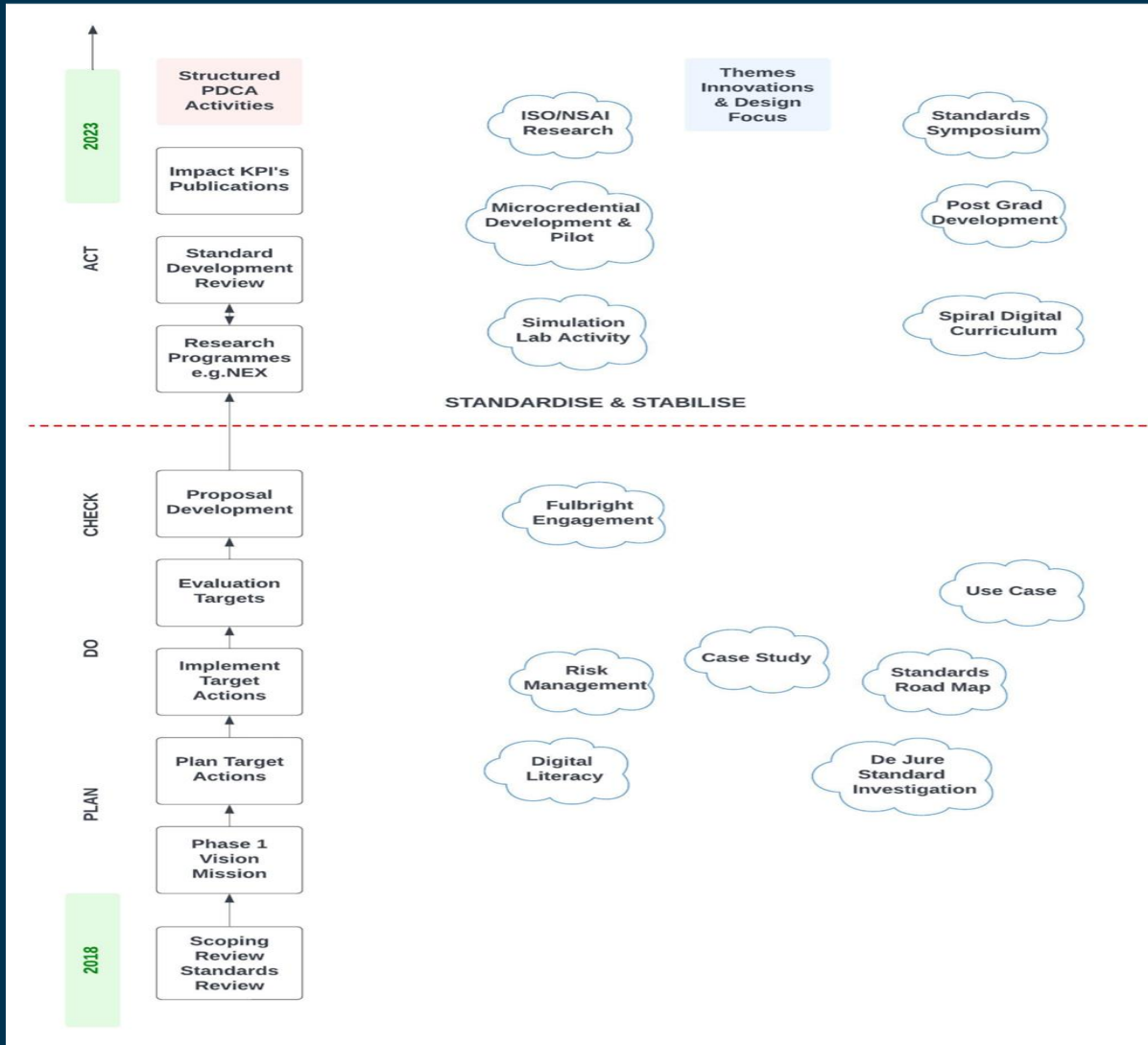
Key Standard Activities 2019-2023

- Adopting Use Case& PDCA Methodologies

- Creation of an organic standards roadmap to address heterogeneity

- Engagement in ISO13940 Task Force and creation of phase one ontology for Contsys

- Patient and domain expert facing Use Case development to determine requirement and clear value proposition using SDG's and WHO PCICF as pillars

- Dissemination of Findings through Open Science to inform Knowledge Acquisition.
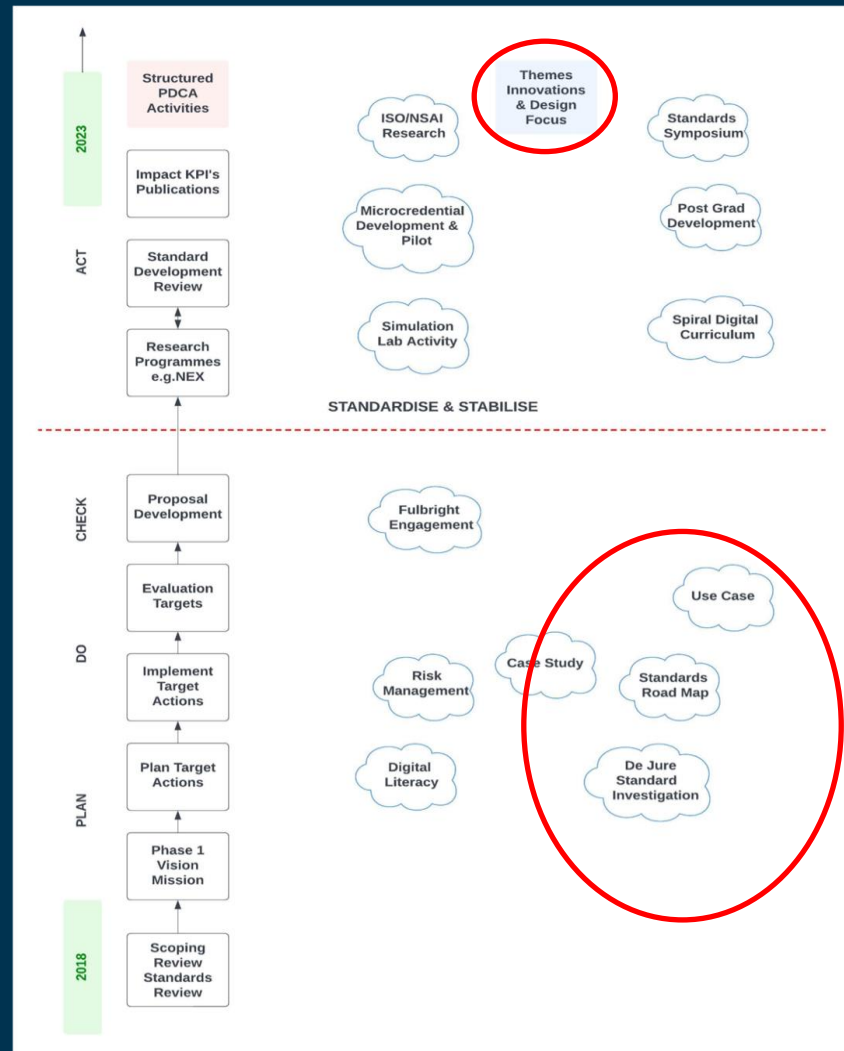
Understanding Viewpoints: Models/Frameworks
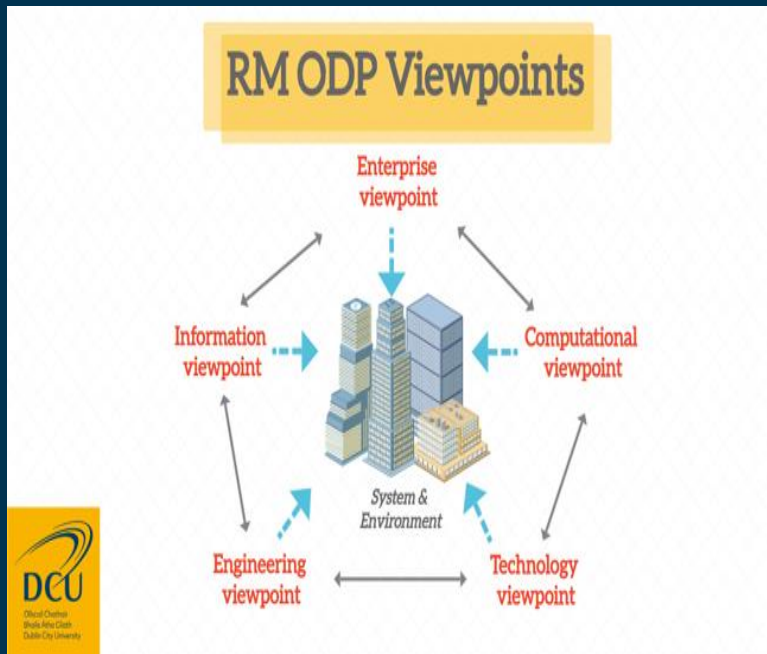
See RM-ODP and ISO23903:2021
Health informatics — Interoperability and integration reference
architecture Bernd Blobels Work
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8992002/

Some Key Standards for Guidance

- Defining a Standards Roadmap and applying different standards along the continuum of development to address data integration and access at the enterprise level is the only sustainable approach that delivers a resilient value proposition

- Key Resources: Enterprise ISO 23903 Core Architecture ISO 23903:2021 Health informatics — Interoperability and integration reference architecture — Model and framework

- Harmonised Standards , Conformity Assessment Tools Legislative Requirement To Comply with ESO See Listing https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards_en

Domain Cases Problem Identification

Concepts for Continuity of Care
ISO 13940:2015
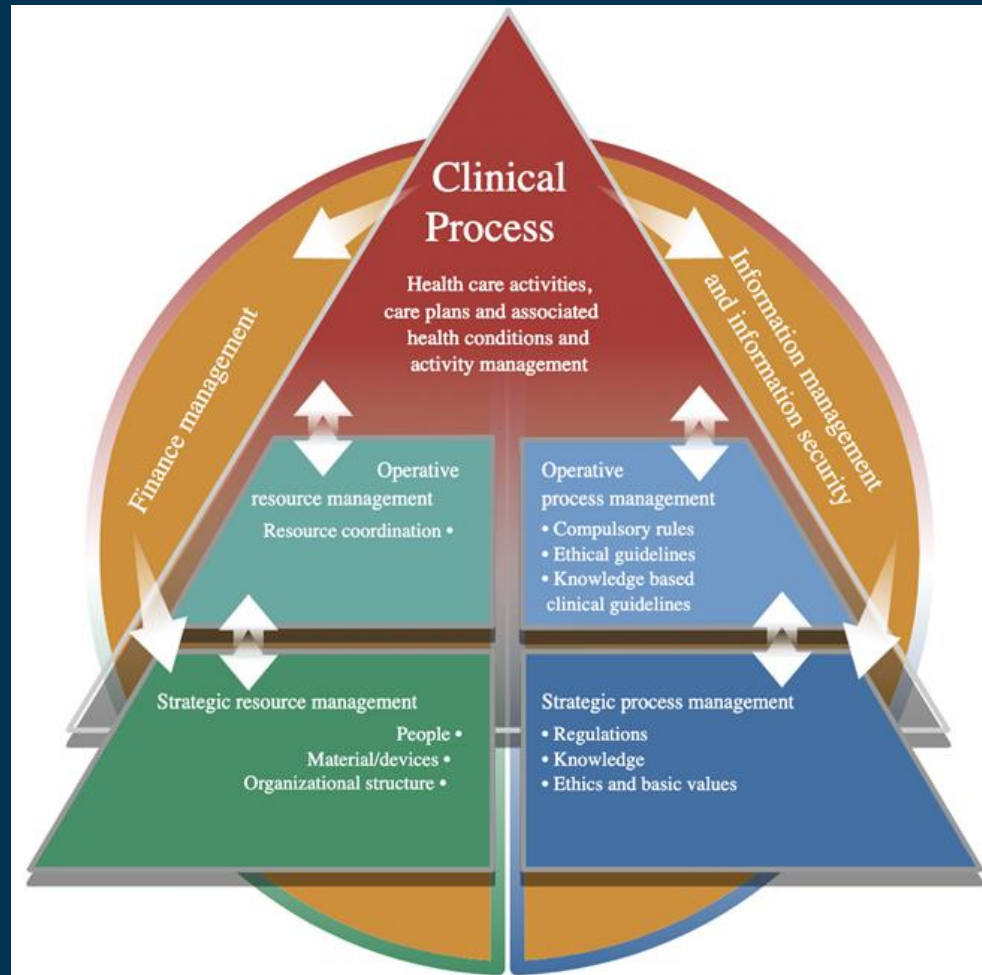
*Note ISO CD published for comment 8th August 2023

Semantic Level 3 and Level 4

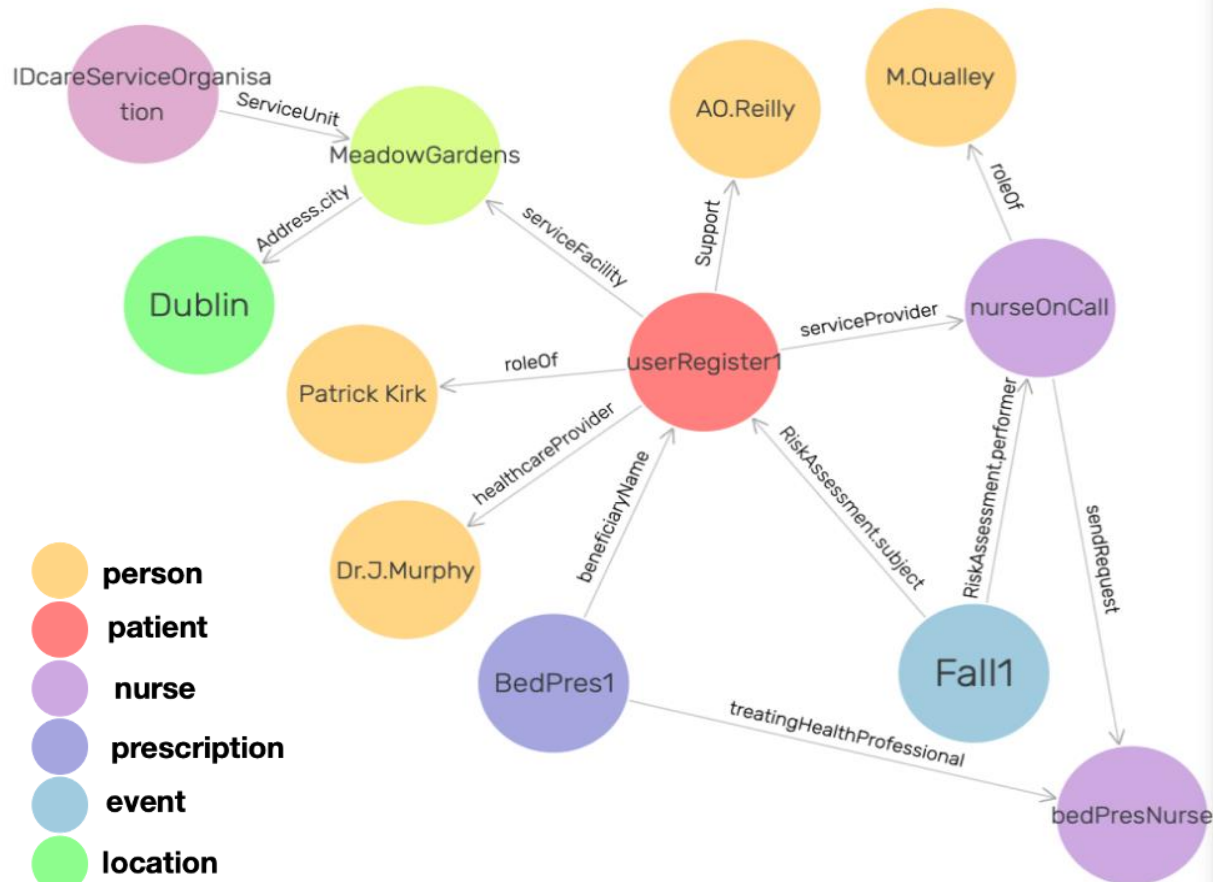**Ontology ISO/IEC 21838-1:2021**

**Information technology — Top-level ontologies (TLO)
Conceptual layer for linking data and identifying
properties and their relationships**
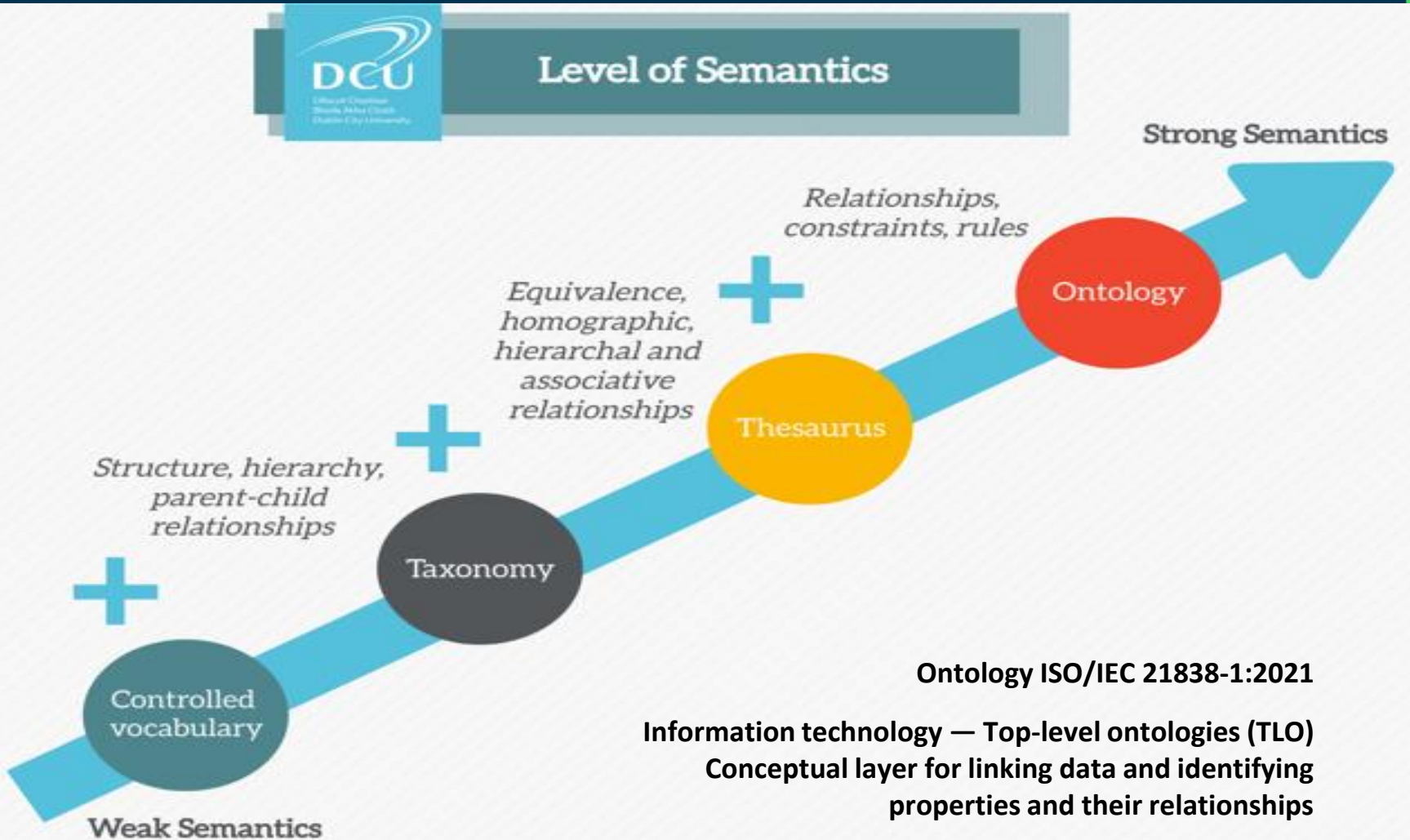
Contsys ISO 13940 Formal Ontology
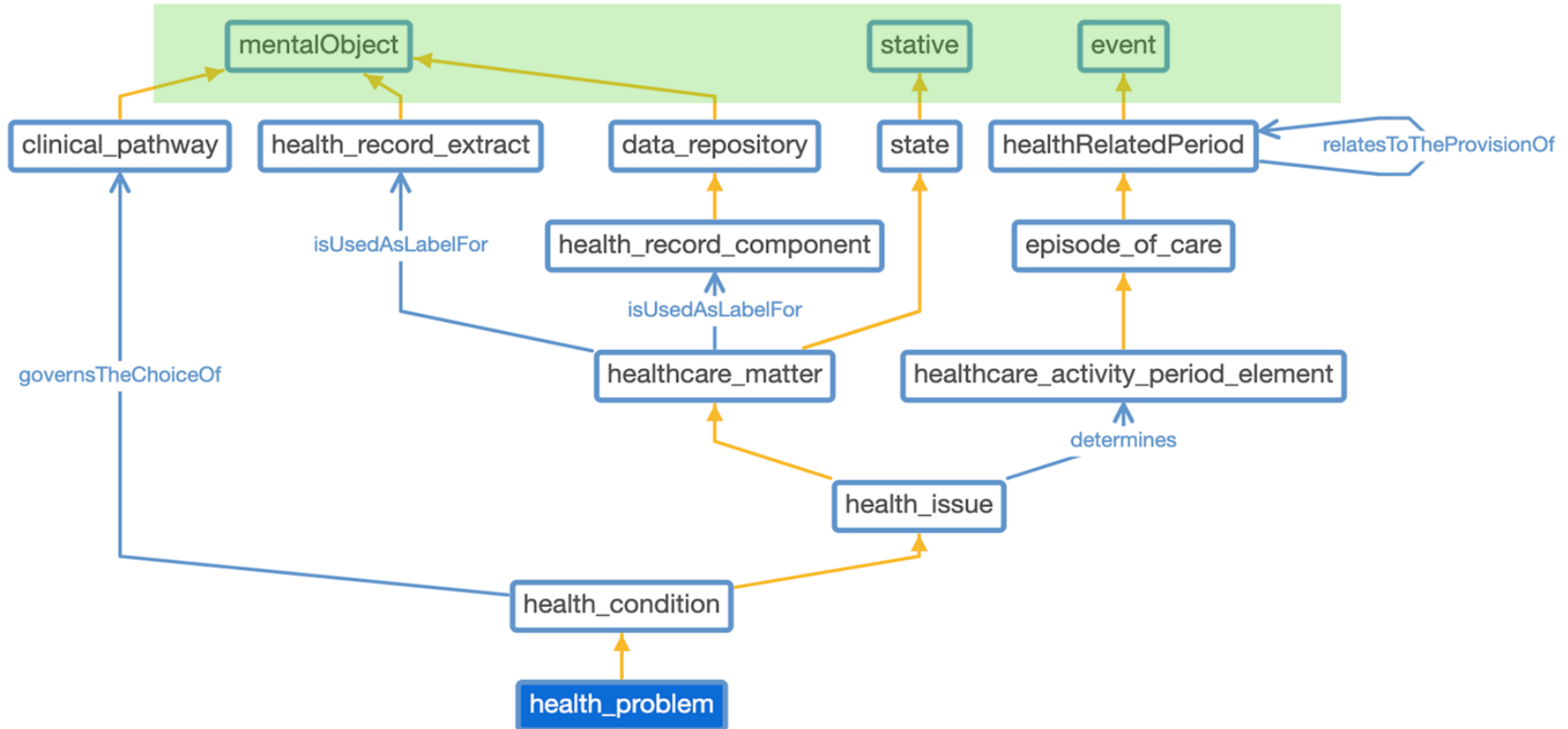
Knowledge Graph - Linked Data

Further Reading and Information

Subhashis Das * and Pamela Hussey

ADAPT Centre & CeIC, Dublin City University (DCU), D09FW22 Dublin, Ireland; pamela.hussey@dcu.ie
* Correspondence: subhashis.das@dcu.ie

Abstract: The rapid advancement of digital technologies and recent global pandemic-like scenarios have pressed our society to reform and adapt health and social care toward personalizing the home care setting. This transformation assists in avoiding treatment in crowded secondary health care facilities and improves the experience and impact on both healthcare professionals and service users alike. The interoperability challenge through standards-based roadmaps is the lynchpin toward enabling the efficient interconnection between health and social care services. Hence, facilitating safe and trustworthy data workflow from one healthcare system to another is a crucial aspect of the communication process. In this paper, we showcase a methodology as to how we can extract, transform and load data in a semi-automated process using a common semantic standardized data model (CSSDM) to generate a personalized healthcare knowledge graph (KG). CSSDM is based on a formal ontology of ISO 13940:2015 ContSys for conceptual grounding and FHIR-based specification to accommodate structural attributes to generate KG. The goal of CSSDM is to offer an alternative pathway to discuss interoperability by supporting a unique collaboration between a company creating a health information system and a cloud-enabled health service. The resulting pathway of communication provides access to multiple stakeholders for sharing high-quality data and information.

Latest paper

Some key papers

- [HL7-FHIR-Based ContSys Formal Ontology for Enabling Continuity of Care Data Interoperability](#)

- [ContSOnto: a formal ontology for continuity of care](#)

- [Development of an Interoperable-Integrated Care Service Architecture](#)

- [A Knowledge Graph to Understand Nursing Big Data: Case Example for Guidance](#)

More Information

Website : www.dcu.ie/ceic **Twitter** : https://twitter.com/home **LinkedIn**: https://www.linkedin.com/in/ceic-dcu/