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An Ontology for Precise Descriptions of Medical Free/Libre and Open Source Software (MEDFLOSS)

XII. International Workshop on eHealth in Emerging Economies
13.12.2019, Franziska Jahn, Thomas Karopka



AGENDA

- What is HITO?
- Background and Motivation of the HITO project
- Use Cases in HITO
- Description of Medical Free/Libre and Open Source Software (MEDFLOSS) with HITO
 - HITO classes and integrated catalogues
 - Example
- Help!

WHAT IS HITO?

- Spanish: hito = landmark, milestone
- Japanese: 人 = hito = person, human
- our German/Austrian interpretation (in English): **HITO = Health IT Ontology**



- for systematically describing application systems and software products in healthcare
- joint project of Prof. Ammenwerth (UMIT, Hall i. T., Austria) and Prof. Winter (Leipzig University, Germany) and their working groups

BACKGROUND AND MOTIVATION

- great variety of different software in healthcare (free/libre and open source software, commercial software)
- an installed and customized software in a healthcare institution leads to a usable „application system“
- communication about software and application systems in healthcare is sometimes difficult due to a missing consistent terminology





BACKGROUND AND MOTIVATION (2)

- In which situations could a consistent terminology of Health IT help?

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1. Evidence-based selection of software (based on evaluation studies)
2. **Comparison and selection of free/libre and open source software**
3. Comparison and selection of commercial software
4. Hiring health IT staff with certain software-related skills
5. Communication between CIOs, CEOs, IT staff, medical and nursing staff in healthcare institutions or health care networks

→ **HITO** is developed iteratively and agile by means of these use cases

OBJECTIVE OF THE HITO PROJECT

- a **Health IT Ontology (HITO)** to describe application systems and software products in healthcare systematically
 - description of software characteristics and their relationships
 - special focus on functional descriptions
 - integration of existing terminologies (e.g. SNOMED, WHO Digital Health Interventions classification)
 - integration of the folk taxonomy = folksonomy (set of user tags, „social tagging“)
 - Result: Folksonontology

THE MEDFLOSS USE CASE

DESCRIPTION OF SOFTWARE ON MEDFLOSS.ORG

Explore content

- Project Wizard
- ▼ Projects
 - by popularity
 - by application type
 - by enterprise function
 - by standard
- ▼ Bazaar
 - Service providers
 - Events
 - Publications
- IMIA OS WG
- Further resources

GNU Health

Rating: ★★★★★
Your rating: None Average: 3.9 (22 votes)

Status: [Active](#)

License: [GNU GPL](#)

Application type: [EMR](#) [Hospital Management System](#)

Enterprise function: [Clinical Documentation](#) [Record Management](#) [Patient Administration](#) [Report Generation](#) [Accounting](#) [Billing](#) [Coding](#) [Statistical Analysis](#) [Staff Management](#) [Epidemiology](#) [Medication Management](#)

Standard: [HL7](#) [ICD10](#)

Language: [Dutch](#) [English](#) [French](#) [Greek](#) [Indonesian](#) [Italian](#) [Portuguese](#) [Spanish](#) [Vietnamese](#)

Client type: [Mobile](#) [Native](#) [Web-based](#)

Platform: [Android](#) [Cross-platform](#)

Programming language/toolkit: [Python](#) [GTK+](#) [Tryton](#)

Database: [PostgreSQL](#)

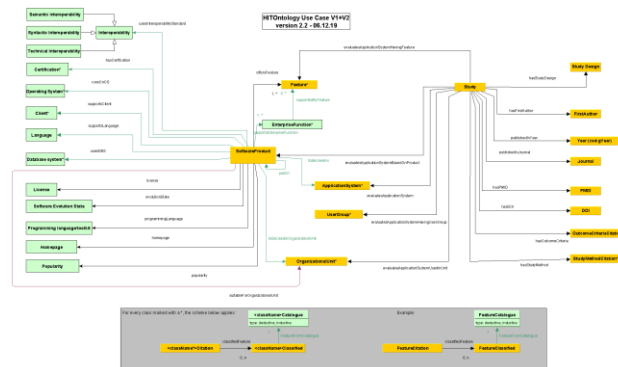
Project description:
GNU Health (previously known as "Medical") is a free Health and Hospital Information System that provides the following functionality:

- Electronic Medical Record (EMR)
- Hospital Information System (HIS)
- Health Information System

TERMINOLOGY OF MEDFLOSS.ORG

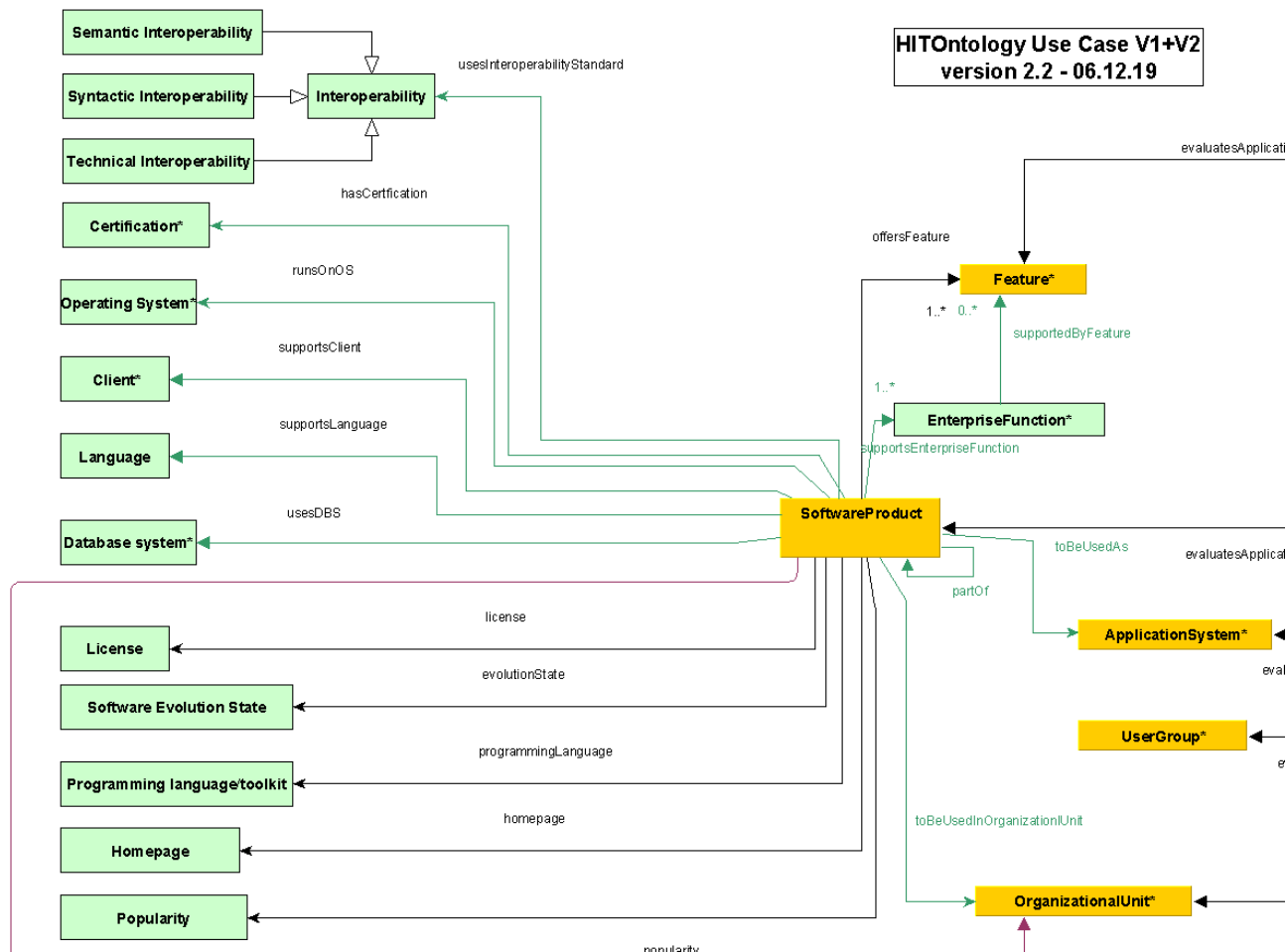
- uncontrolled growth of terminology to describe software in the past years
 - misassignments of descriptors to characteristics
 - use of synonyms and homonyms (e.g. EHR, EMR, HIS ...)
- more refinements and possibilities to describe, e.g., mobile health applications are needed
- no established terminologies included

→ HITO may help!



HITO CLASSES

- Feature
- Enterprise function
- License
- Standards for interoperability
- Certification
- Language
- User group
- Organizational unit
- ...



USE OF TERM CATALOGUES

- Certain characteristics like
 - Feature
 - Enterprise Function
 - User group
 - Application type
 - ...
- ... can either be described
 - **in own words** („folksonomy“) or
 - **with the help of term catalogues** (WHO-DHI classification, SNOMED CT, reference model for health information systems) or
 - **both** (which means linking folksonomy and catalogues)!

EXAMPLES FOR TERM CATALOGUES IN HITO (1)

SYSTEM CATEGORIES

A	Census, population information & data warehouse*
B	Civil registration and vital statistics
C	Client applications
D	Client communication system
E	Clinical terminology and classifications*
F	Community-based information system
G	Data interchange interoperability and accessibility*
H	Electronic medical record*
I	Emergency response system*
J	Environmental monitoring system*
K	Facility management information system
L	Geographic information system (GIS)
M	Health finance and insurance information system*
N	Health management information system (HMIS)
O	Human resource information system
P	Identification registries and directories*
Q	Knowledge management system*
R	Laboratory and diagnostics information system*
S	Learning and training system
T	Logistics management information system (LMIS)
U	Pharmacy information system*
V	Public health and disease surveillance system*
W	Research information system
X	Shared Health Record and health information repositories*
Y	Telemedicine

- WHO's Classification of Digital Health Interventions v1.0 (WHO-DHI)
- can be used to describe the
 - **application type**
 - features
 - enterprise functions

EXAMPLES FOR TERM CATALOGUES IN HITO (1)

The screenshot displays the HITO interface for a concept. At the top, there are tabs for 'Concept Details' and 'Expression Constraint Queries'. Below this, a 'Concept Details' section contains sub-tabs: 'Summary', 'Details', 'Diagram', 'Expression', 'Refsets', 'Members', and 'Refer'. The 'Details' tab is active. Under 'Parents', there is a link to 'Location within hospital premises (environment)'. A blue box highlights the selected concept: 'Hospital department (environment)' with SCTID: 284548004. Below this, it shows the full name '284548004 | Hospital department (environment) |' and two language versions: 'en Hospital department' and 'en Hospital department (environment)'. At the bottom, a section titled 'Children (16)' lists various departments, each with a yellow circle icon and a right-pointing arrow.

Concept Details Expression Constraint Queries

Concept Details

Summary Details Diagram Expression Refsets Members Refer

Parents

Location within hospital premises (environment)

Hospital department (environment) ☆ ⓘ No attrib

SCTID: 284548004

284548004 | Hospital department (environment) |

en Hospital department

en Hospital department (environment)

Children (16)

- Accident and Emergency department (environment)
- Anesthetic department (environment)
- Clinical oncology department (environment)
- Diagnostic imaging department (environment)
- Ear, nose and throat department (environment)
- Medical department (environment)
- Newborn nursery unit (environment)
- Obstetrics and gynecology department (environment)

- SNOMED CT
- can be used to describe
 - ← — organizational units
 - or user groups
- for which/whom a software is relevant

USER INTERFACES OF HITO (1): FACETED BROWSING

The screenshot shows a web browser window with the URL <https://hitontology.github.io/facetedbrowsing/softwareproduct.html>. The page title is "HITO Software Products". On the left, there are two faceted browsing panels. The top panel, "Classified Feature", has a dropdown menu open showing a list of features including "Audit (1)", "Manage Administration", "Manage Care Coord", "Manage Clinical Doc", "Manage Clinical Hist", "Manage Clinical Wor", "Manage Healthcare I", "Manage Healthcare I", and "Manage Medication". The bottom panel, "Feature Citation", also has a dropdown menu open showing a list of citations including "Access Management", "Account Types (1)", "Administration Ortho", "Administrative Data", and "All Surgeries Informa". The main content area is a table with four columns: "Name", "Homepage", "License", and "Operating System". The table lists several software products, including Bahmni, GNU Health, Orthanc, AGFA PACS IMPAX, AGFA RIS Elefante, Abbott i-Stat, CSC Med Chart, Cerner Millennium Power Orders, and Cerner First Net. A red arrow points to the "Operating System" column header, with the text "Choose categories for your search." next to it.

Name	Homepage	License	Operating System
Bahmni	https://www.bahmni.org/	Affero General Public License	CentOS
GNU Health	https://www.gnuhealth.org/	GNU General Public License	Linux
Orthanc	https://www.orthanc-server.com/	GNU Free Documentation License	["Linux", "Unix", "Mac OS"]
AGFA PACS IMPAX			
AGFA RIS Elefante			
Abbott i-Stat			
CSC Med Chart			
Cerner Millennium Power Orders			
Cerner First Net			

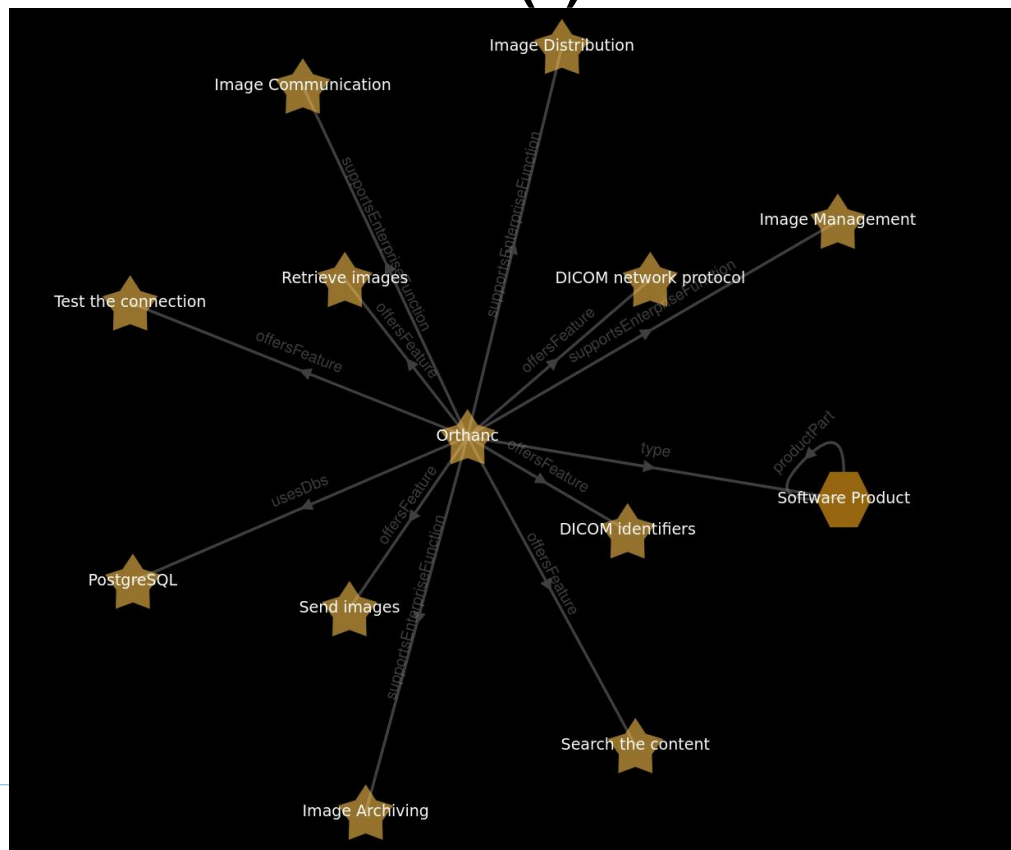
Choose categories for your search.

USER INTERFACES OF HITO (2): LOD VIEW

The screenshot shows a web browser window with the URL <https://hitontology.eu/ontology/Orthanc>. The page title is "Orthanc" and the URL is repeated below it. On the right, it says "AN ENTITY OF TYPE: **SoftwareProduct**". Below this, there is a section for **rdfs:comment** with the text "The enterprise function citations are based on the medfloss website." Below this, there is a table of properties and their values.

rdfs:label	Orthanc
rdf:type	hito:SoftwareProduct ↳ Software Product
hito:homepage	< https://www.orthanc-server.com/ >
hito:license	dbpedia:GNU_Free_Documentation_License
hito:programmingLanguage	dbpedia:C++
hito:runsOnOs	dbpedia:Linux dbpedia:Mac_OS

USER INTERFACES OF HITO (3): GRAPH VISUALIZATION



HOW CAN WE HELP YOU?

- Make your software retrievable and comparable to other software (FLOSS & commercial).

HOW CAN YOU HELP US?

- Describe your software with the help of HITO.
- Make suggestions for term catalogues to be included in HITO.
- Make suggestions for improving the user interfaces of HITO.

Feel free to contact us: franziska.jahn@imise.uni-leipzig.de
THANK YOU on behalf of the HITO team!



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THANK YOU!

Franziska Jahn

Leipzig University, Medical Faculty, IMISE

Härtelstr. 16-18, 04107 Leipzig

T +49 341 97-16194

franziska.jahn@imise.uni-leipzig.de

www.imise.de, www.uni-leipzig.de, www.hitontology.eu

GNUHealth ORT[]ANC

GNUHealth CON 2019

IV INTERNATIONAL GNU HEALTH CONFERENCE
DEC. 13-15, LIÈGE, BELGIUM
#GNUHEALTHCON



Introduction to MedFLOSS

Thomas Karopka
co-chair ISfTeH CCTOS WG
co-chair EFMI LIFOSS WG
past chair IMIA OS WG
Tkaropka@gmail.com
<https://www.linkedin.com/in/thomaskaropka/>



Medical Free/Libre and Open Source Software

Structured project database, service providers, publications, events, ...

Projects

Bazaar

Privacy

Home



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Follow us

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Welcome at Medfloss.org

Medfloss.org provides a comprehensive and structured overview of Free/Libre and Open Source Software (FLOSS) projects in the domains of medical informatics and health care delivery. It is an open information portal that aims to foster the exchange of ideas, knowledge and experiences about existing projects and the related ecosystem.

Beside actual [software projects](#) also [professional service providers](#), [events](#) and [scientific publications](#) are listed. Try the [Project Wizard](#) to find relevant projects for your use case.

For more information please refer to the [Mission Statement](#).

Provided in cooperation with:



IMIA Open Source Health Informatics Working Group



EFMI Working Group Libre/Free and Open Source Software in Health Informatics



ISfTeH Collaborative Care Team in Open Source Working Group

MedFLOSS

- Database about Free/Libre and Open Source Software in Health Care
- Online since 2010
- Developed by Holger Streidl
- Maintainers: Holger Streidl, Hans Demski, Thomas Karopka and the Community
- Supported by IMIA OS WG, EFMI LIFOSS WG and ISfTeH CCTOS WG



IMIA Open Source Health Informatics Working Group



EFMI Working Group Libre/Free and Open Source Software in Health Informatics



ISfTeH Collaborative Care Team in Open Source Working Group

Projects

- Only projects that are released under an Free or Open Source License
- Currently MedFLOSS contains **381** projects
- MedFLOSS **does not** contain FLOSS projects from the Domain of Bioinformatics or Computational Biology
- There are other communities for Bio:
- e.g. Open Bioinformatics Foundation:
https://www.open-bio.org/wiki/Main_Page

Bazaar: Professional Service Providers

Bazaar of Medical Free/Libre and Open Source Software

HAVES - professional service providers

Companies or other institutions that are offering support and more for a specific project.

- FLOSS needs professional support services in order to be acceptable for health care providers
- Very few health care providers have the capacity to care for the IT system in house
- In MedFLOSS we have currently **116** professional service providers listed

Events related to FLOSS-HC

MEET - events

Conferences, exhibitions, working group meetings and other events related to medical FLOSS.

Upcoming events	Date
IWEEE2018/GNUHealthCon2018	Fri, 2018/11/23 to Sun, 2018/11/25

- It is important to meet other FLOSS enthusiasts and exchange experience (and hopefully code as well ;-))
- Currently we have a list of 54 past events and three upcoming events.

Publications about FLOSS-HC

READ - publications

Articles about medical FLOSS projects published in scientific journals.

- The academic world is build on publications
- Something that is not published does not exsist in the academic world
- Therefore it is important to show the value and the potential of FLOSS in health care by good publications
- Currently MedFLOSS lists 478 publications

Search by application type



Medical Free/Libre and Open Source Software

Structured project database, service providers, publications, events, ...

[Projects](#)[Bazaar](#)[Privacy](#)

[Home](#) » [by application type](#)



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Application types

🔗 [CDMS](#) [9] - Clinical Data Management System

🔗 [Data/Knowledge base](#) [1]

🔗 [Disaster/Disease Management](#) [11]

🔗 [EHR](#) [12] - Electronic Health Record (EHR) *A subset of each care delivery organization's EMR, presently assumed to be summaries like ASTM's Continuity of Care Record (CCR) or HL7's Continuity of Care Document (CCD), is owned by the patient and has patient input and access that spans episodes of care across multiple CDOs within a community, region, or state (or in some countries, the entire country).* Definition taken from: "[Electronic Medical Records vs. Electronic Health Records: Yes, There Is a Difference](#)", Healthcare Information and Management Systems Society (HIMSS), last accessed 2012/10/15

🔗 [EMR](#) [75] - Electronic Medical Record (EMR) *An application environment composed of the clinical data repository, clinical decision support, controlled medical vocabulary, order entry, computerized provider order entry, pharmacy, and clinical documentation applications. This environment supports the patient's electronic medical record across inpatient and outpatient environments, and is used by healthcare practitioners to document, monitor, and manage health care delivery within a care delivery organization (CDO). The data in the EMR is the legal record of what happened to the patient during their encounter at the CDO and is owned by the CDO.* Definition taken from: "[Electronic Medical Records vs. Electronic Health Records: Yes, There Is a Difference](#)", Healthcare Information and Management Systems Society (HIMSS), last accessed 2012/10/15

🔗 [Hospital Management System](#) [39]

🔗 [Integration Platform/Middleware](#) [39]

Help us to maintain MedFLOSS

- Read more in the Mission Statement:

Mission Statement

Our Mission

Medfloss.org provides a comprehensive and structured overview of Free/Libre and Open Source Software (FLOSS) projects in the domains of medical informatics and health care delivery. It is an open information portal that aims to foster the exchange of ideas, knowledge and experiences about existing projects and the related ecosystem.

The Medfloss.org Portal

Since its launch in February 2010 Medfloss.org is intended to be an open content platform in which everyone is welcome and invited to participate. Submissions will be reviewed and might be moderated in order to keep the site clean from off-topic content and spam. In detail the following features and services are available at this site:

- **Join us** and help maintaining MedFLOSS

...so that we can provide you with the best information
about FLOSS in HC_