Data Engineering and Semantics
هندسة البيانات و دلالاتها

University of Virginia | School of Data Science

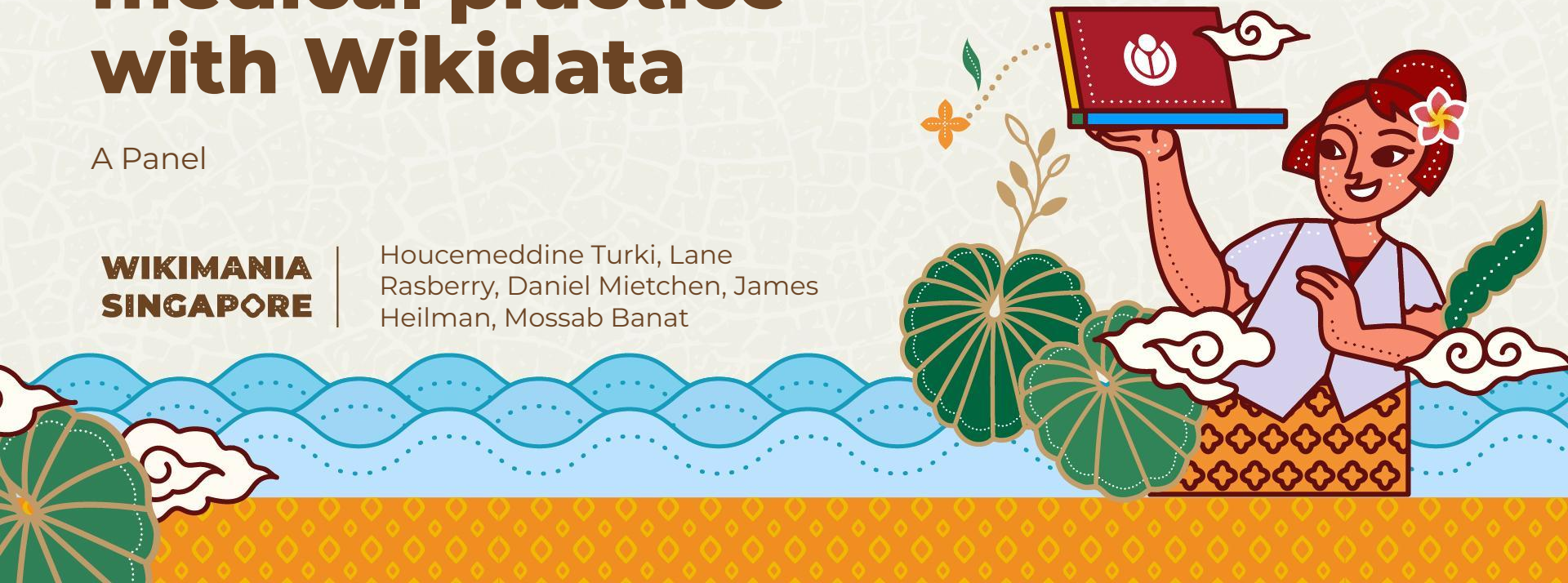
SCAN ME

Let us upgrade medical practice with Wikidata

A Panel

WIKIMANIA SINGAPORE

Houcemeddine Turki, Lane Rasberry, Daniel Mietchen, James Heilman, Mossab Banat



Disclosure

This work is a part of the “Adapting Wikidata to support clinical practice using Data Science, Semantic Web and Machine Learning” Project, funded by the Wikimedia Research Fund of the Wikimedia Foundation.

WIKIMEDIA FOUNDATION

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This is a panel

There will be brainstorming about Wikidata and healthcare

It begins with a 20-minute presentation about how Wikidata is currently used in medical practice. Then, there will be a 35-minute discussion between the panelist regarding the state-of-the-art and motivations of Wikidata for healthcare.

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Speakers

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Houcemeddine Turki
Tunisia
User:Csisc

Lane Rasberry
United States of America
User:Bluerasberry

Daniel Mietchen
Germany
User:Daniel Mietchen

James Heilman
Canada
User:Doc James

Mossab Banat
Jordan
User:Avicenno

Thursday, August 17 (15:30-16:30 Singapore)

We are Wikimedians, not only Wikipedians.

We should benefit from every single open resource within our movement.

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Wikidata

- Structured ontological database
- Statements in the form of triples
- Multilingual support
- Semantic alignment to external resources
- Plenty of tools for parsing and enriching the database
- Linked to Wikipedia

A rich network of medical knowledge.

Supporting various aspects and easily extensible to cover new unsupported ones.

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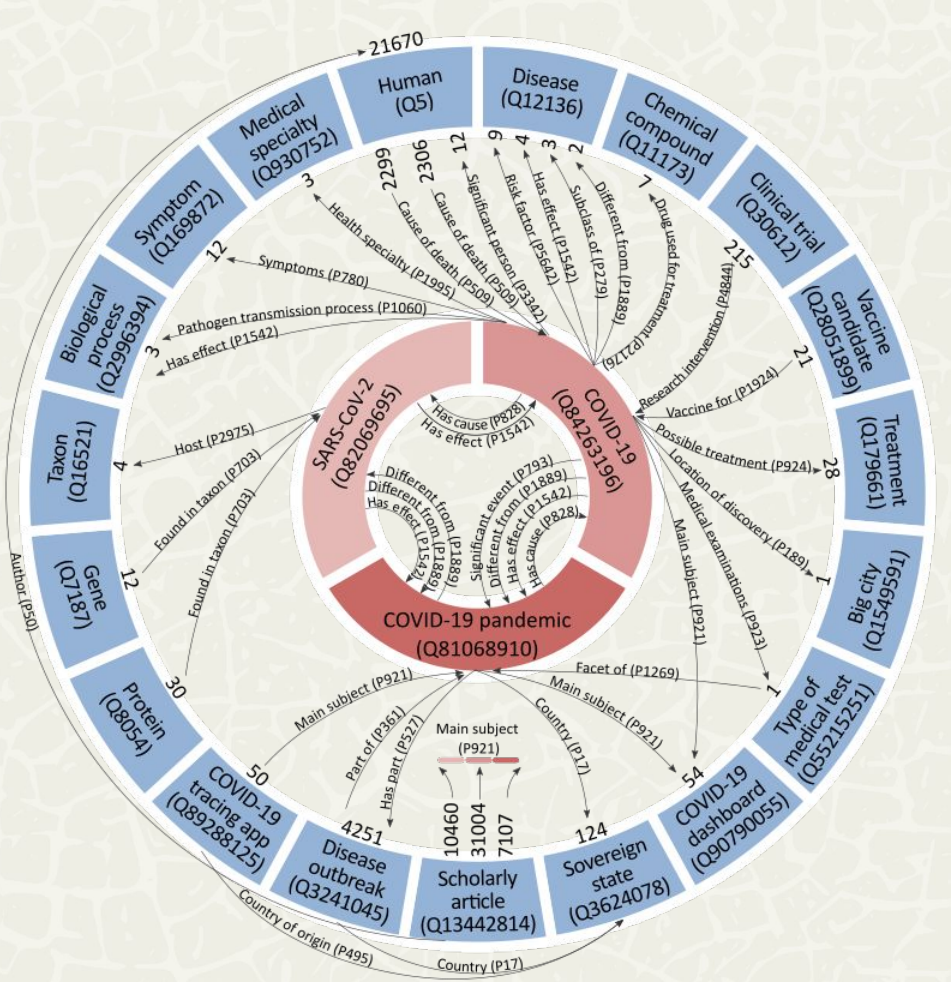
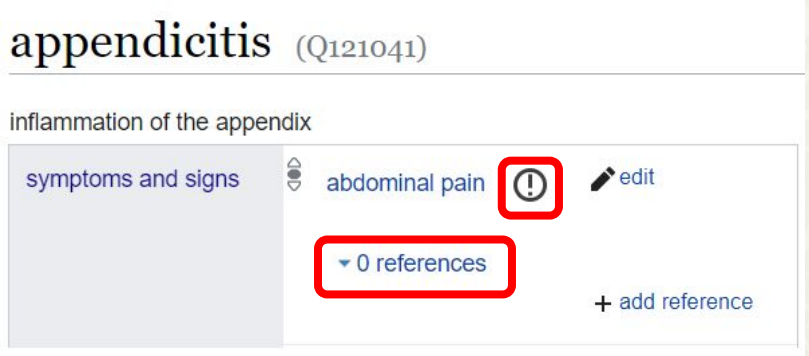


However...



- **Limited number of references**
- Several relations are imprecise
- External resources are not fully imported
- Several types of information are still not supported
- Data models and EntitySchemas do not represent all the medical classes
- Data inconsistencies

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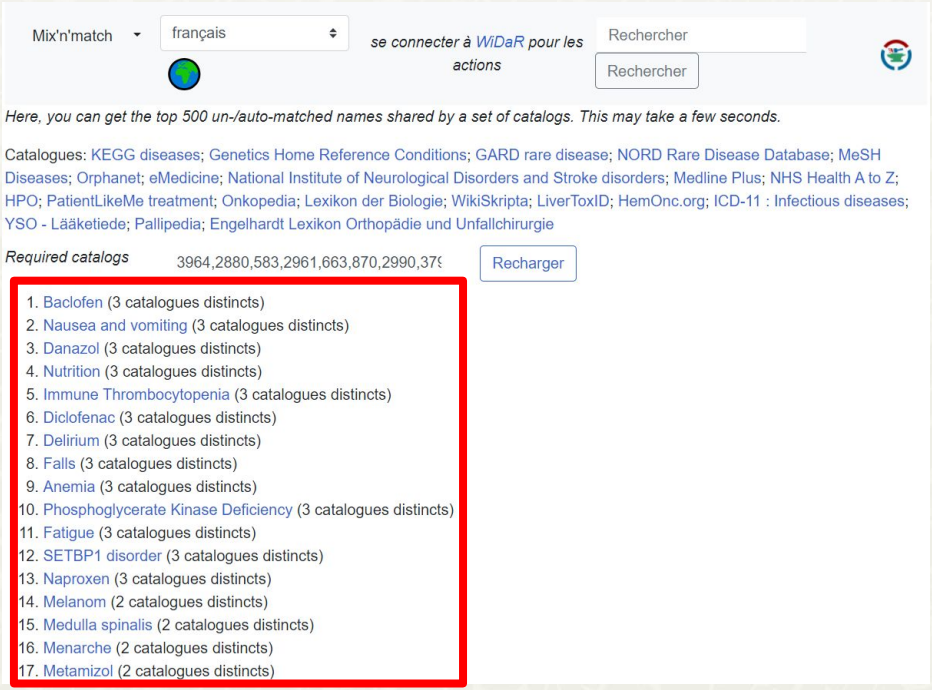

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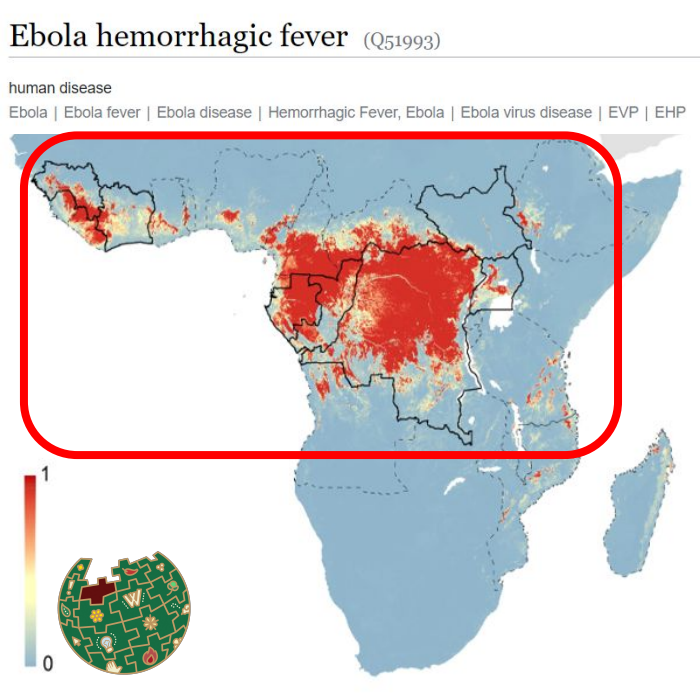

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However...

Wikidata:Database reports/EntitySchema directory

< Wikidata:Database reports

This is a programmatically generated directory of EntitySchemas. Any changes made to this page will be lost during the next update.
To configure how this page is generated see the Configuration. Updated: 2023-07-01 13:20 (UTC)

Contents [hide]
3 biology
4 chemistry
16 molecular biology
18 science
20 taxon

No EntitySchema for surgical therapies.

appendectomy (Q620840)

surgical removal of the vermiform appendix
appendicectomy
edit

In more languages
Configure

Language	Label	Description	Also known as
English	appendectomy	surgical removal of the vermiform appendix	appendicectomy

Statements

instance of	ectomy of appendix 0 references	edit add reference add value

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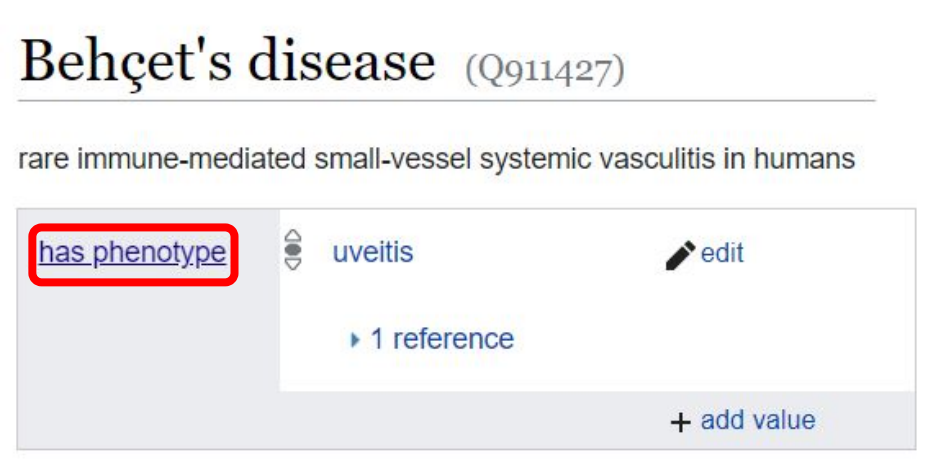

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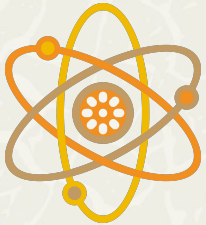
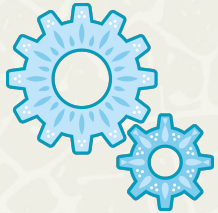
- **Data inconsistencies**

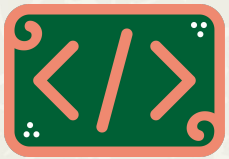
What we need to do



Raising awareness about Wikidata as an open medical resource.



Enriching and validating medical knowledge in Wikidata.



Creating tools to reuse medical knowledge in Wikidata.

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Raising awareness about Wikidata as an open medical resource

Convincing communities of the value of Wikidata as an open biomedical database

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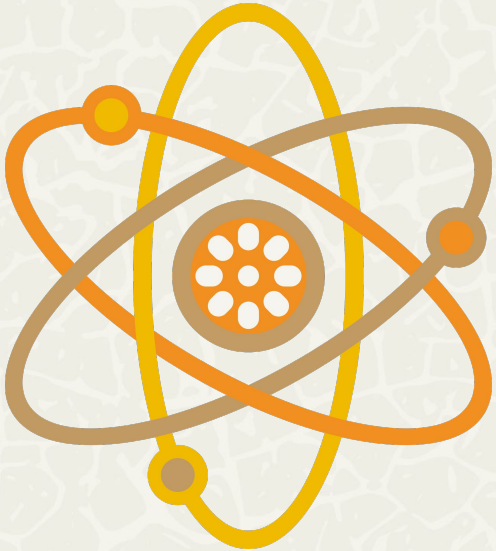

Making Wikidata useful for the Wikimedia community

Maintaining the original function of Wikidata as a support to other projects

Source: Pfundner, A., Schönberg, T., Horn, J., Boyce, R. D., & Samwald, M. (2015). Utilizing the Wikidata system to improve the quality of medical content in Wikipedia in diverse languages: a pilot study. *Journal of medical Internet research*, *17*(5), e4163. doi:10.2196/jmir.4163.

Sharing Wikidata with the scientific community

Showing Wikidata as a flexible hub for semantic web research

Source: Mietchen, D., Hagedorn, G., Willighagen, E., Rico, M., Gómez-Pérez, A., Aibar, E., ... & Kinzler, D. (2015). Enabling open science: Wikidata for research (Wiki4R). *Research Ideas and Outcomes*, *1*, e7573. doi:10.3897/rio.1.e7573.

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Enriching and validating medical knowledge in Wikidata

Creating a knowledge-based system for enhancing Wikidata as an open biomedical database

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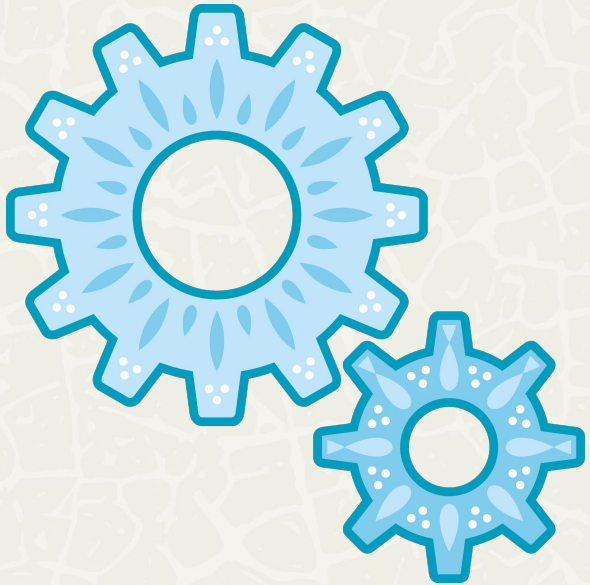
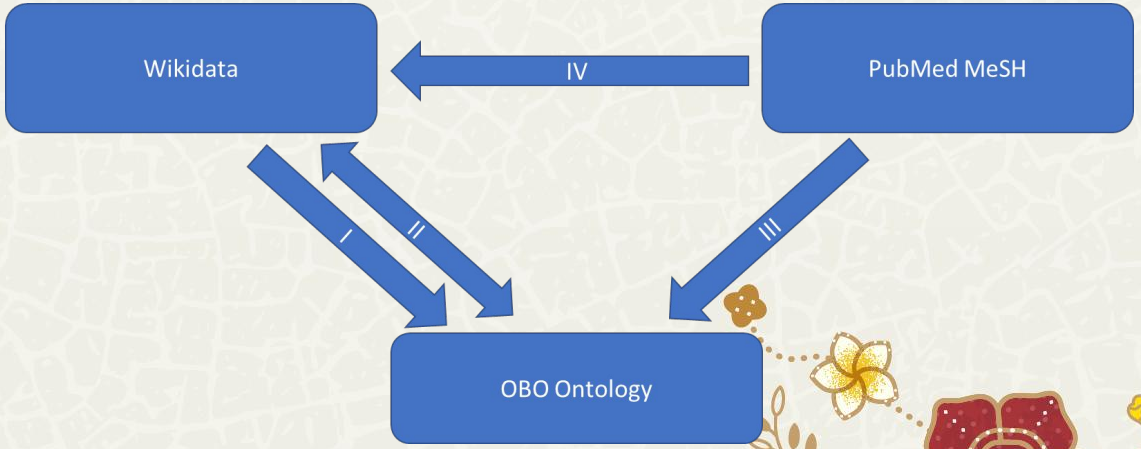


Enriching and validating medical knowledge in Wikidata

Creating a knowledge-based system for enhancing Wikidata as an open biomedical database

I. Verifying the alignment between Wikidata items and OBO ontology items
II. Verifying the alignment between Wikidata relations and OBO ontology relations
III. Finding missing relations through co-occurrence analysis of PubMed MeSH Keywords
IV. Adding references from PubMed to unsupported Wikidata statements



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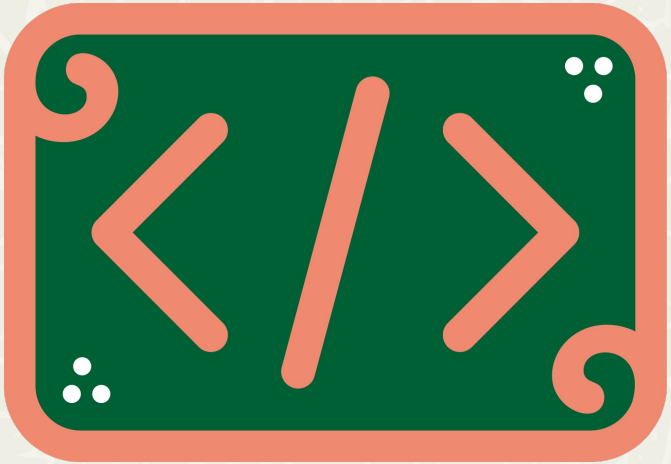
Source: Turki, H., et al. (2023). A framework for integrating biomedical knowledge in Wikidata with open biomedical ontologies and MeSH keywords. *Information Fusion* (forthcoming).

Creating tools to reuse medical knowledge in Wikidata

Developing real-world medical applications of Wikidata



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Computers will not take the place of physicians

They will help physicians with **4D jobs**:
Dirty, **D**ull, **D**angerous, and **D**ear

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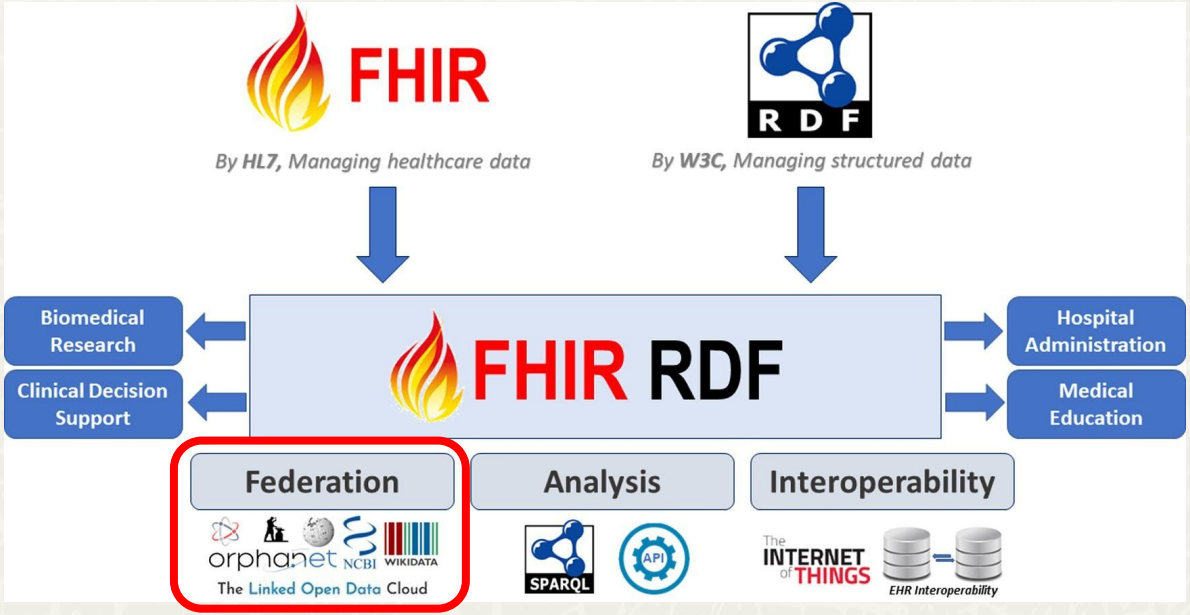
Wikidata-supported medical reasoning on EHR data

Mirroring Wikidata to semantically analyze electronic health records



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Source: Turki, H., Rasberry, L., Taieb, M. A. H., Mietchen, D., Aouicha, M. B., Pouris, A., & Bousrih, Y. (2022). Letter to the Editor: FHIR RDF - Why the world needs structured electronic health records. *Journal of Biomedical Informatics*, *136*, 104253. doi:10.1016/j.jbi.2022.104253.

MedCYN

An interactive web tool for clinical decision support based on Wikidata Query Service.

Source

URL

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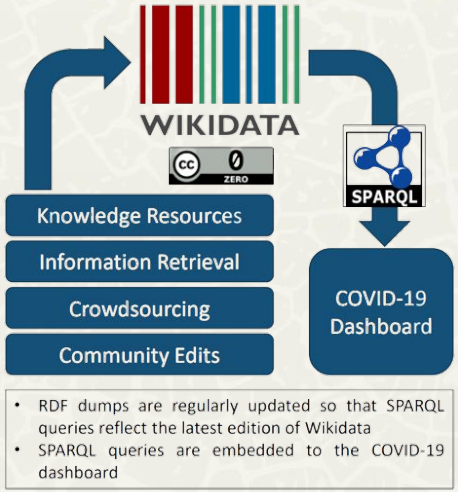
Source: Turki, H., Koubaa, M., Hadj Taieb, M. A., Hentati, N., & Ben Aouicha, M. (2023). Software Application Profile: MedCYN – Driving multilingual clinical decision support web tools with Wikidata's open knowledge graph and SPARQL. *International Journal of Epidemiology* (forthcoming).

COVID-19 dashboards

A web service providing a real-time update of the status of the COVID-19 pandemic



- RDF dumps are regularly updated so that SPARQL queries reflect the latest edition of Wikidata
- SPARQL queries are embedded to the COVID-19 dashboard

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Source: Turki, H., Hadj Taieb, M. A., Shafee, T., Lubiana, T., Jemielniak, D., Ben Aouicha, M., ... & Mietchen, D. (2022). Representing COVID-19 information in collaborative knowledge graphs: the case of Wikidata. *Semantic Web*, *13*(2), 233-264. doi:10.3233/SW-210444.

References

- **Turki, H.**, Shafee, T., Hadj Taieb, M. A., Ben Aouicha, M., Vrandečić, D., Das, D., & Hamdi, H. (2019). Wikidata: A large-scale collaborative ontological medical database. *Journal of Biomedical Informatics*, *99*, 103292. doi:10.1016/j.jbi.2019.103292.
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- **Turki, H.**, Jemielniak, D., Hadj Taieb, M. A., Labra Gayo, J. E., Ben Aouicha, M., **Banat, M.**, ... & **Mietchen, D.** (2022). Using logical constraints to validate statistical information about disease outbreaks in collaborative knowledge graphs: the case of COVID-19 epidemiology in Wikidata. *PeerJ Computer Science*, *8*, e1085. doi:10.7717/peerj-cs.1085.
- Pfundner, A., Schönberg, T., Horn, J., Boyce, R. D., & Samwald, M. (2015). Utilizing the Wikidata system to improve the quality of medical content in Wikipedia in diverse languages: a pilot study. *Journal of medical Internet research*, *17*(5), e4163. doi:10.2196/jmir.4163.
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- Bernstam, E. V., Smith, J. W., & Johnson, T. R. (2010). What is biomedical informatics?. *Journal of biomedical informatics*, *43*(1), 104-110. doi:10.1016/j.jbi.2009.08.006.
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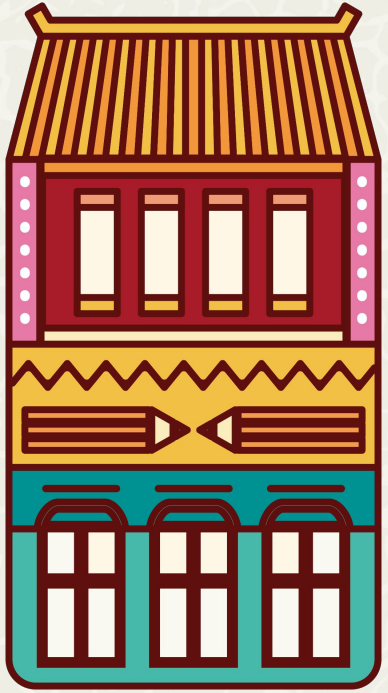
Question 1

What are good examples of Wikidata benefiting patient care or public health on a local or global level?



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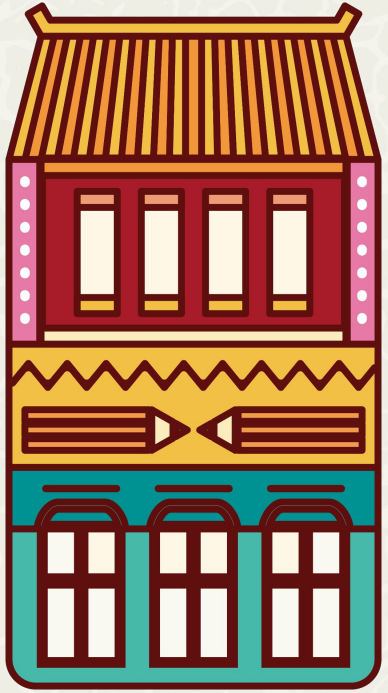
Question 2

What are the main pros and cons of Wikidata as a central medical knowledge hub vs. traditional databases?



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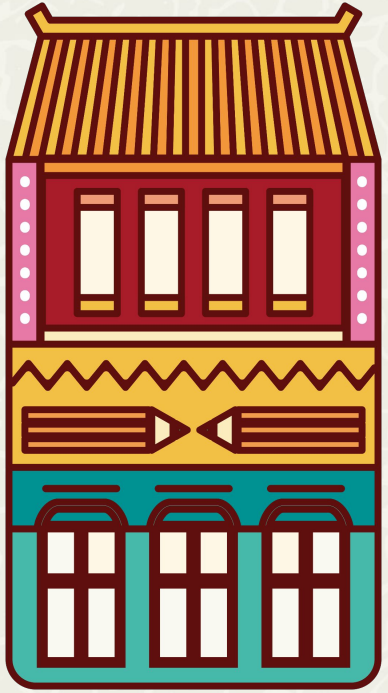
Question 3

What is Wikidata's role in enhancing situational awareness for emergency responders and medical teams?



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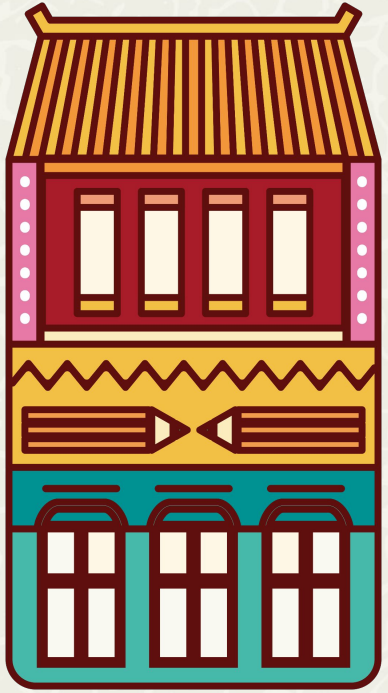
Question 4

In what ways does the utility of Wikidata differ between common and rare diseases?



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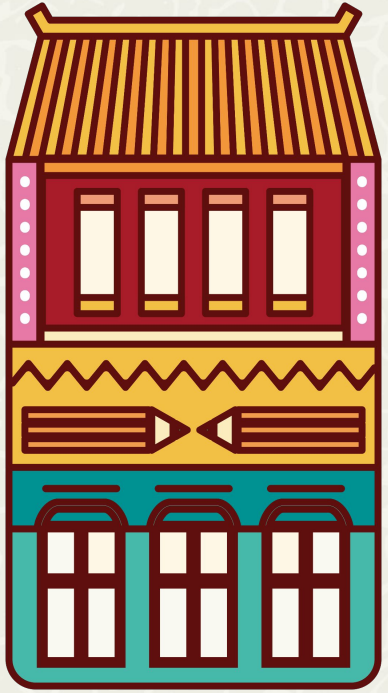
Question 5

How can healthcare providers be motivated to contribute to curating Wikidata and maintaining data quality?



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Any question

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