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Acknowledgement

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Contents

1. Foreword

This document comprises a collection of Instagram carousels and posts produced by the OntoTrans communication and dissemination team. It accompanies the whitepaper "Social Media – the Art Nouveau of Communicating Research Projects to Citizens?" written by the same authors.

The carousels were produced using the Instagram post templates of the design platform Canva.[1] All artworks we used were royalty-free images and we obeyed the respective licenses of Canva[2], pixabay[3], Adobe Stock[4] and Shutterstock[5].

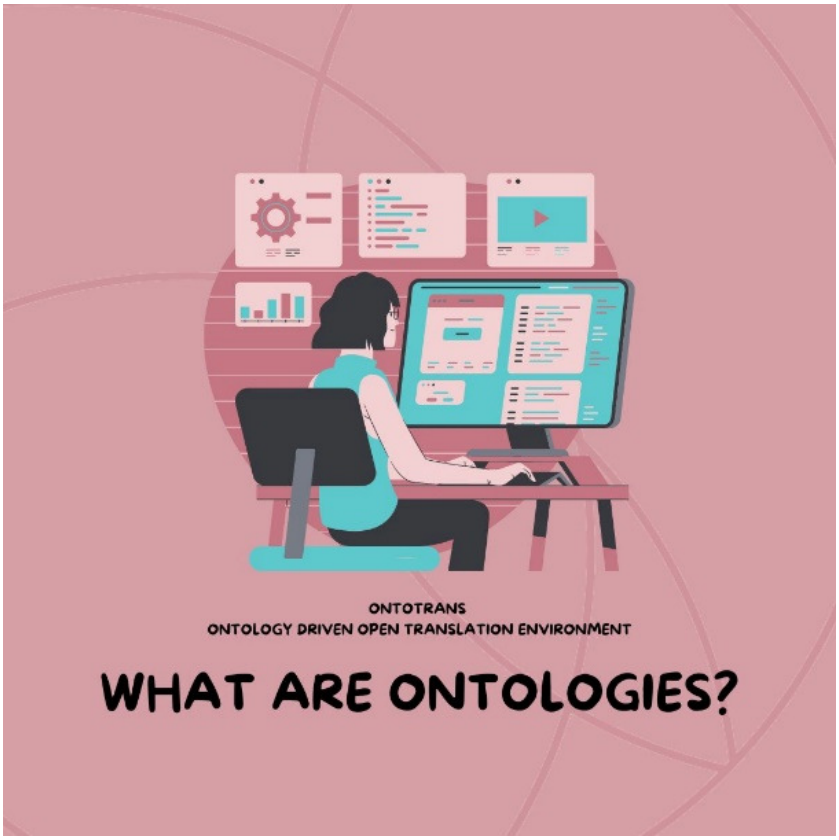
[1] https://www.canva.com/
[2] https://www.canva.com/licensing-explained/
[3] https://pixabay.com/service/license-summary/
[4] https://stock.adobe.com/uk/license-terms
[5] https://support.shutterstock.com/s/article/Standard-License-vs-Enhanced-License?language=en_US

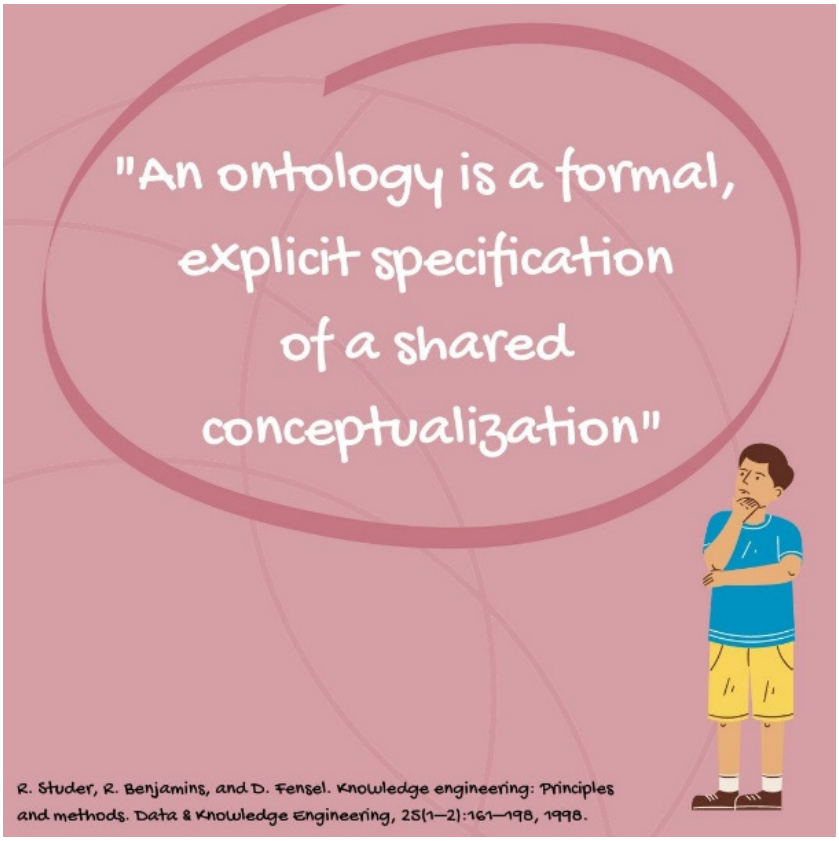
2. Posts about Ontology

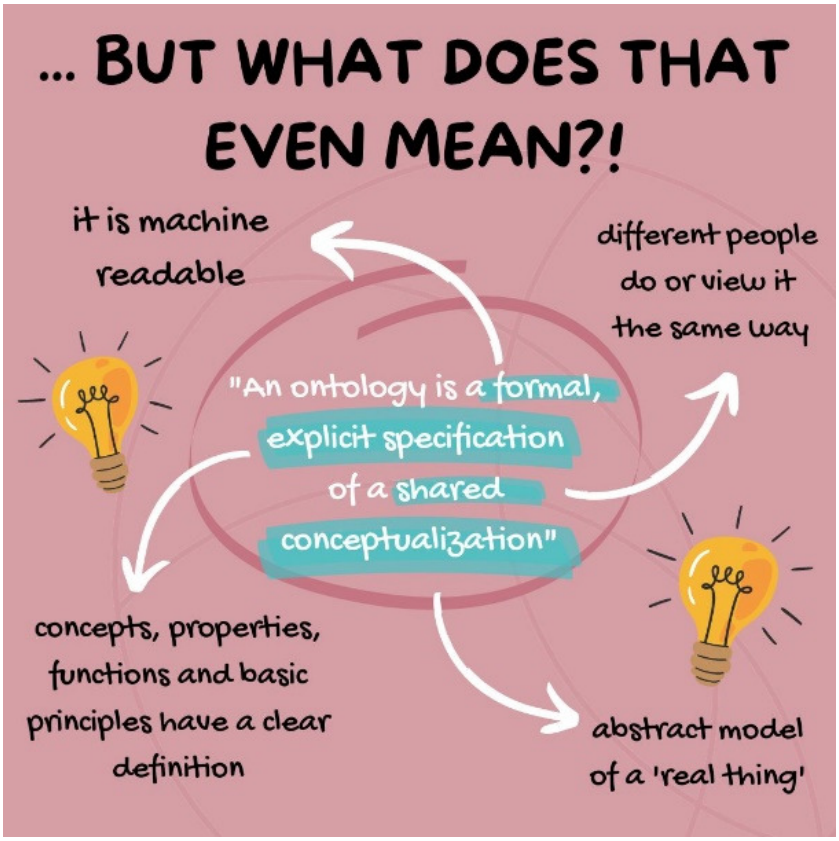
2.1. What are Ontologies?

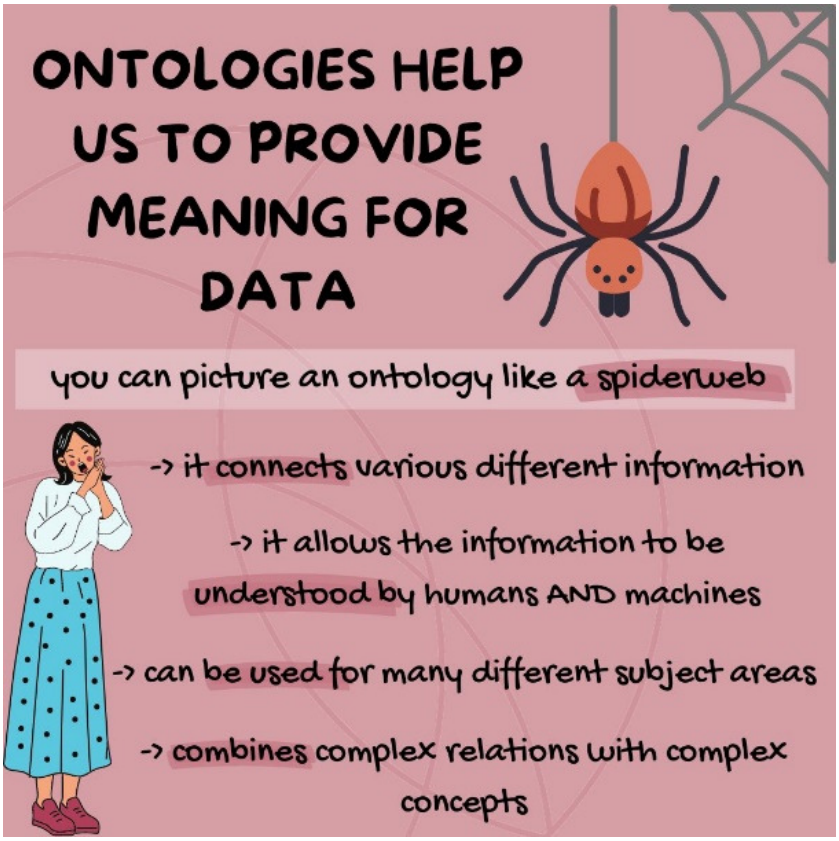
Published on 23rd May 2022

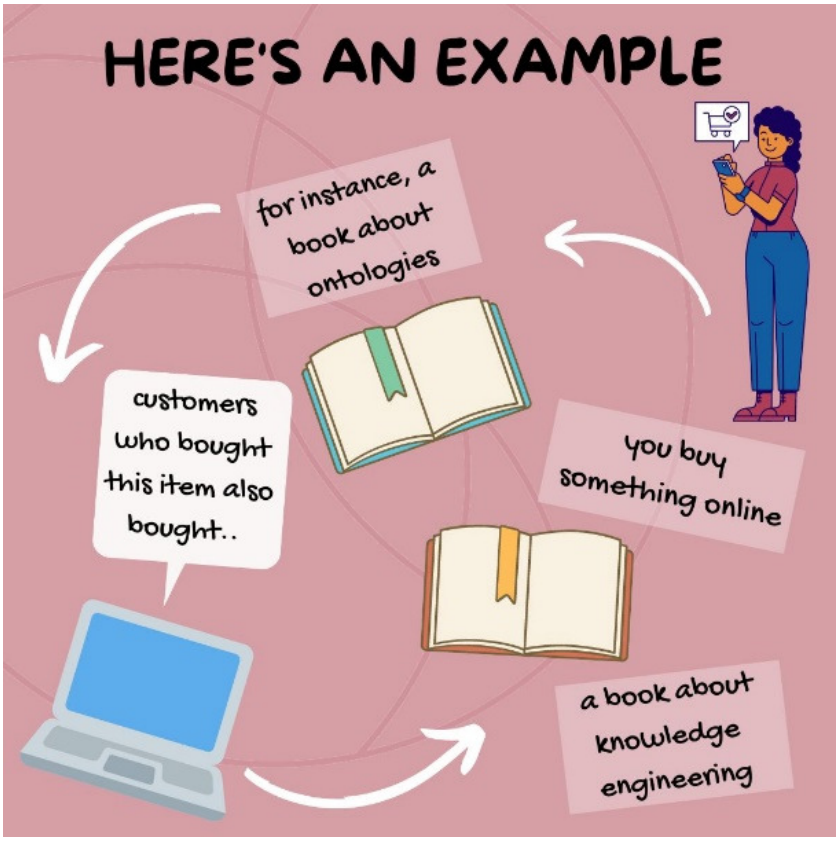
Artworks by 09910190, Drawcee, Maxicons, sketchify, Sparklestroke Global, and Twemoji.

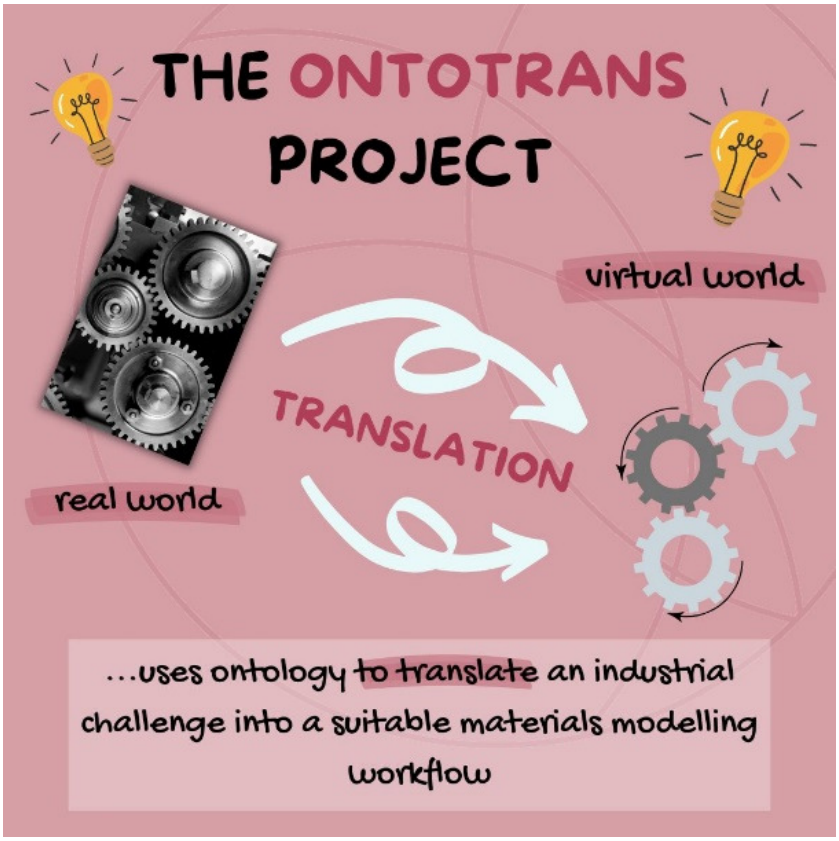



"An ontology is a formal, explicit specification of a shared conceptualization"
R. Studer, R. Benjamins, and D. Fensel. Knowledge engineering: Principles and methods. Data & Knowledge Engineering, 25(1–2):161–198, 1998.


... BUT WHAT DOES THAT EVEN MEAN?!
it is machine readable
different people do or view it the same way
"An ontology is a formal, explicit specification of a shared conceptualization"
concepts, properties, functions and basic principles have a clear definition
abstract model of a 'real thing'


ONTOLOGIES HELP US TO PROVIDE MEANING FOR DATA
you can picture an ontology like a spiderweb
-> it connects various different information
-> it allows the information to be understood by humans AND machines
-> can be used for many different subject areas
-> combines complex relations with complex concepts


HERE'S AN EXAMPLE
for instance, a book about ontologies
you buy something online
customers who bought this item also bought..
a book about knowledge engineering

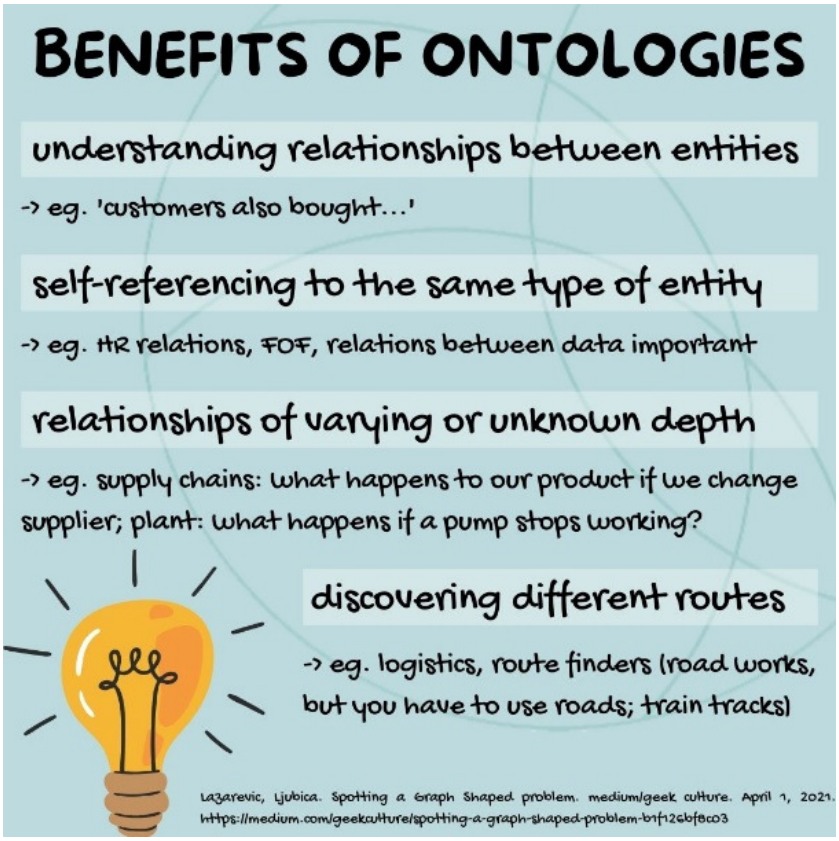

THE ONTOTRANS PROJECT
virtual world
TRANSLATION
real world
...uses ontology to translate an industrial challenge into a suitable materials modelling workflow

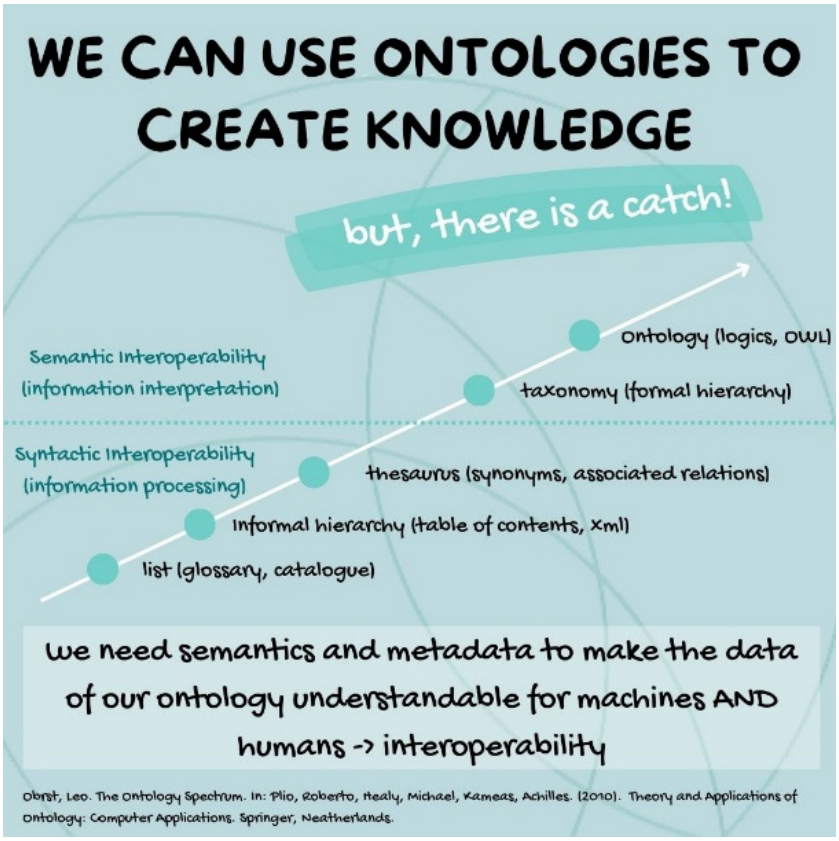
2.2. Why do we use Ontologies?

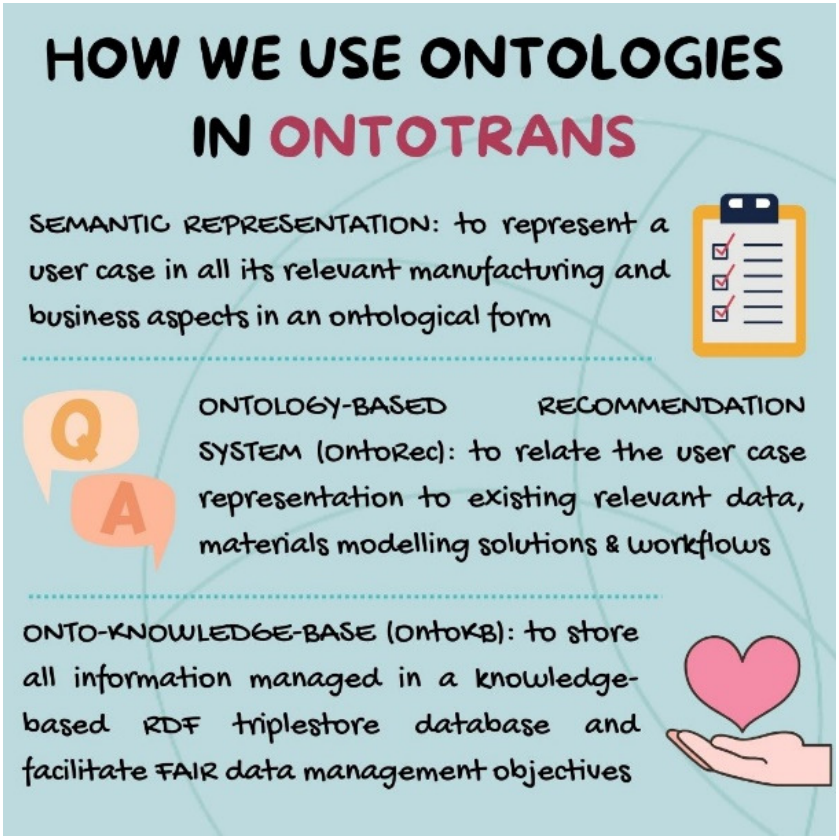
Published on 27th May 2022

Artworks by Aficons studio, amethyststudio, iconsy, PorpuRi, ReaxionLab from pixabay, and sketchify.


WHAT CAN ONTOLOGIES DO FOR US?
many databases
Frontend
machine learning and AI
ONTOLOGIES
-> detect hidden info - 'knowlege inference'
-> can explain things to ML & AI and connect domains


BENEFITS OF ONTOLOGIES
understanding relationships between entities
-> eg. 'customers also bought...'
self-referencing to the same type of entity
-> eg. HR relations, FOF, relations between data important
relationships of varying or unknown depth
-> eg. supply chains: what happens to our product if we change supplier; plant: what happens if a pump stops working?
discovering different routes
-> eg. logistics, route finders (road works, but you have to use roads; train tracks)
Lazarevic, Ljubica. Spotting a Graph Shaped problem. medium/geek culture. April 1, 2021. https://medium.com/geekculture/spotting-a-graph-shaped-problem-b1f126bf8c03

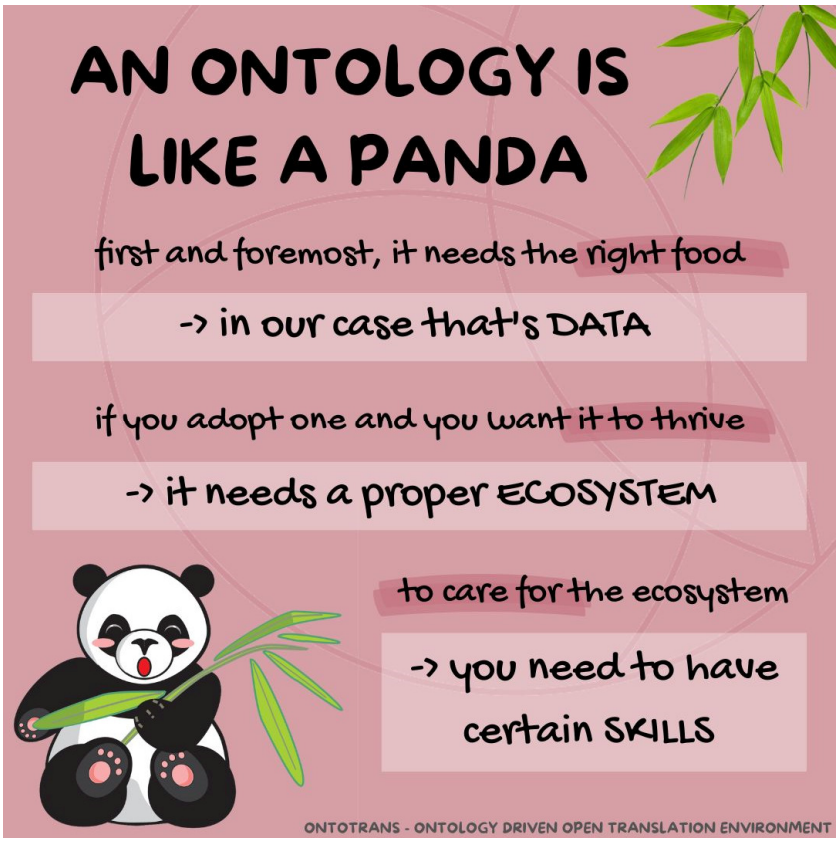

WE CAN USE ONTOLOGIES TO CREATE KNOWLEDGE
but, there is a catch!
Semantic Interoperability (information interpretation)
Ontology (logics, OWL)
taxonomy (formal hierarchy)
Syntactic Interoperability (information processing)
thesaurus (synonyms, associated relations)
informal hierarchy (table of contents, xml)
list (glossary, catalogue)
we need semantics and metadata to make the data of our ontology understandable for machines AND humans -> interoperability
Obrst, Leo. The Ontology Spectrum. In: Pilo, Roberto, Healy, Michael, Kameas, Achilles. (2010). Theory and Applications of Ontology: Computer Applications. Springer, Neatherlands.


HOW WE USE ONTOLOGIES IN ONTOTRANS
SEMANTIC REPRESENTATION: to represent a user case in all its relevant manufacturing and business aspects in an ontological form
Q
A
ONTOLOGY-BASED RECOMMENDATION SYSTEM (OntoRec): to relate the user case representation to existing relevant data, materials modelling solutions & workflows
ONTO-KNOWLEDGE-BASE (OntoKB): to store all information managed in a knowledge-based RDF triplestore database and facilitate FAIR data management objectives

2.3. An Ontology is like a Panda

Published on 2nd June 2022

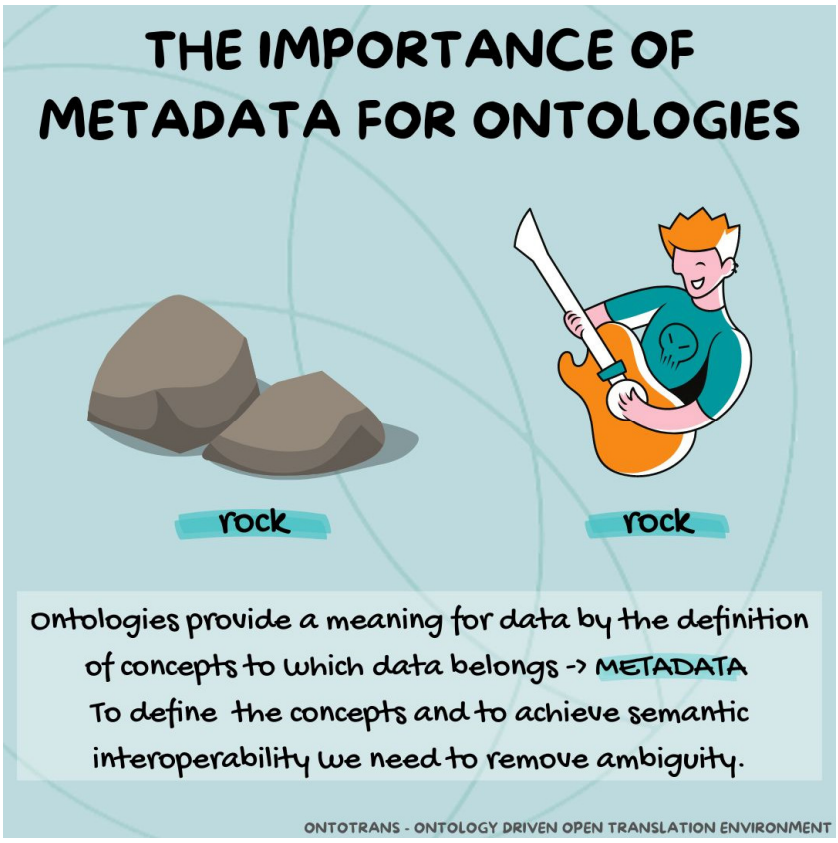
Artworks by Harvey Eichmann's images and Lunesse.



2.4. The Importance of Metadata for Ontologies

Published on 6th July 2022

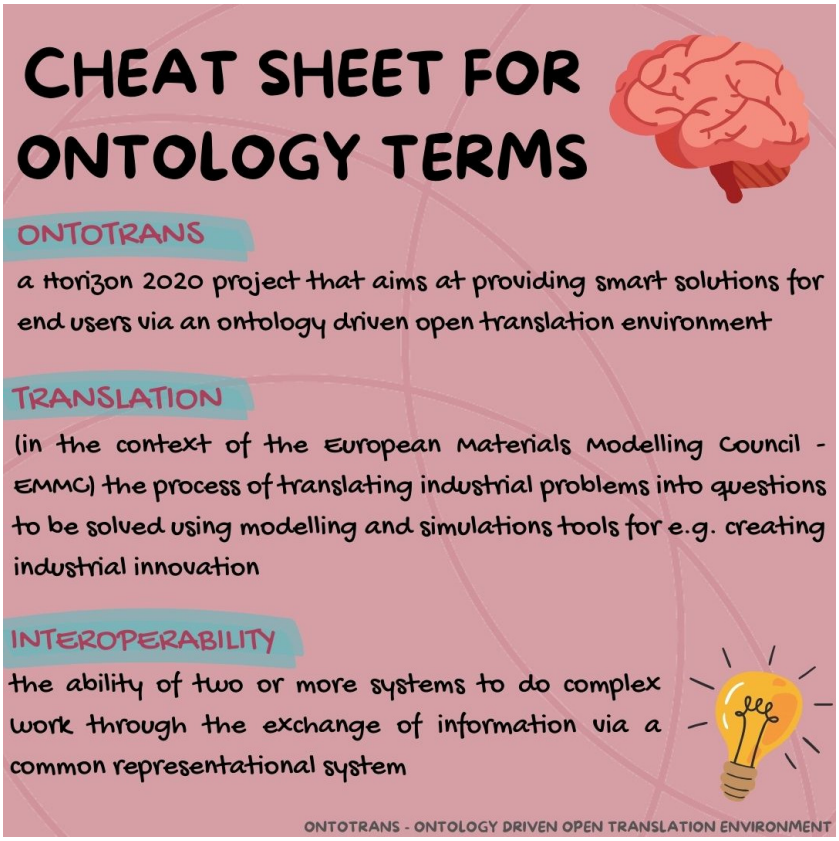
Artworks by OpenClipart-Vectors from pixabay and sketchify.



2.5. Cheat Sheet

Published on 19th August 2022

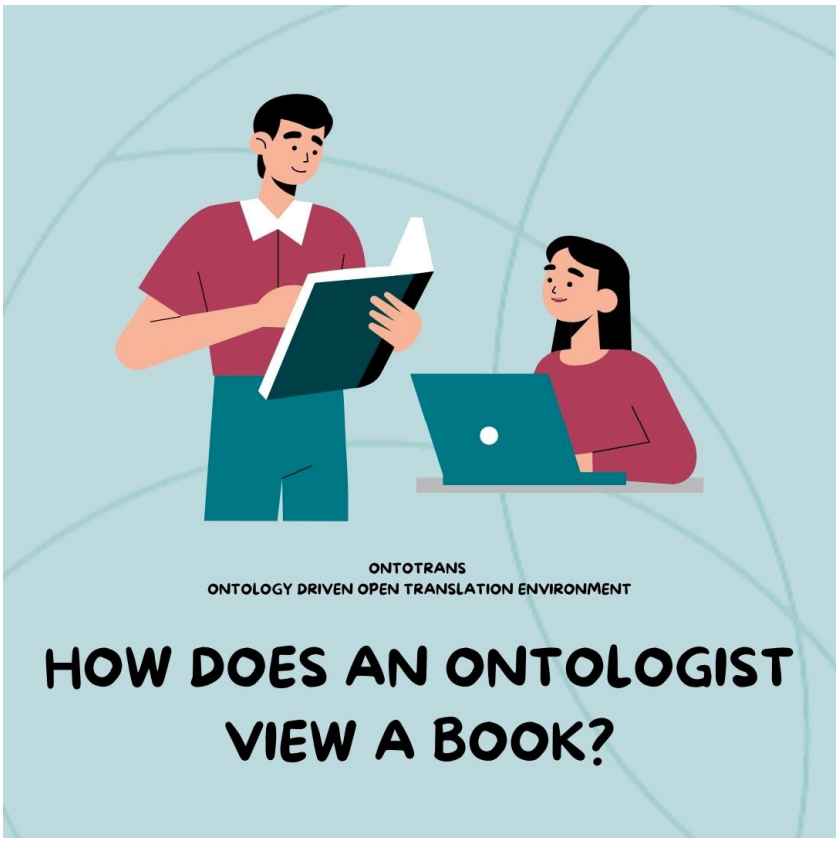
Artworks by HtcHnm from pixabay and sketchify.



2.6. How does an Ontologist view a Book?

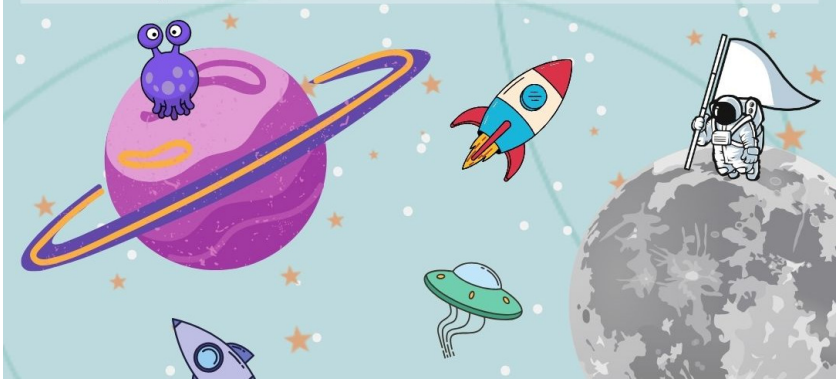
Published on 15th September 2022

Artworks by amethyststudio, Clker-Free-Vector-Images from pixabay, Iconsy, OpenClipart-Vectors from pixabay, rayagustioardi from pixabay, sparklestroke, and sketchify



A BOOK CAN MEAN MANY THINGS TO DIFFERENT PEOPLE

There are no absolute definitions of the ontological nature of objects (such as books) - except for the definition of the universe and the single indivisible quantum elements of which it is made up.



AN ONTOLOGIST'S MULTIPLE PERSPECTIVES OF A BOOK

Physicalistic: A solid which is an aggregate of organic and inorganic molecules

Holistic/ Persistance: A whole and an object

Semiotics: A sign that stands e.g. for the life of a person (a biography)

Physicalistic/Reductionistic: A hierarchy of physical entities: book -> pages -> paper -> fiber -> ...

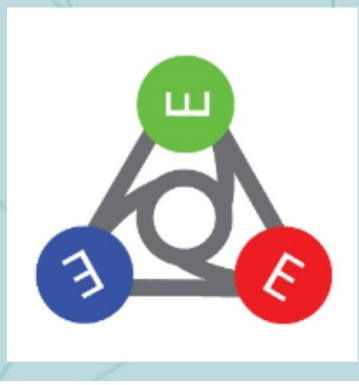
Symbolic/Reductionistic: A hierarchy of book -> chapters -> pragraphs -> words -> symbols

FOR ONTOTRANS WE BRING IN THE EMMO

Elementary Multiperspective Material Ontology

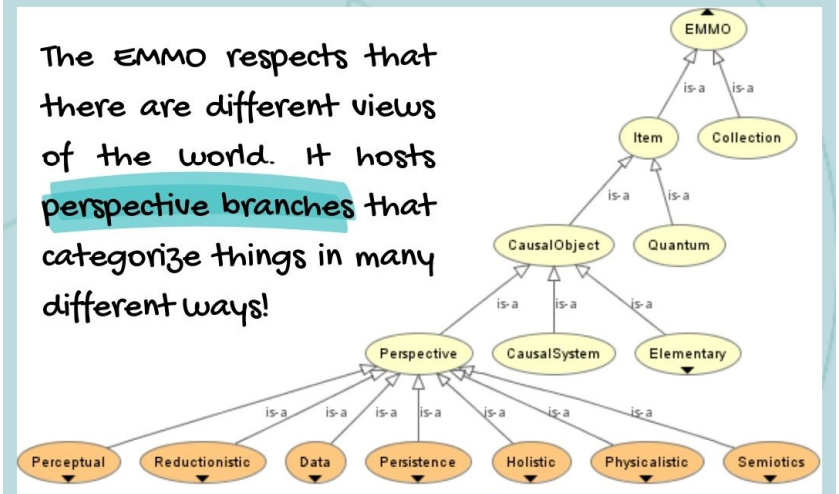
-> the EMMO is a semantic framework for the applied science

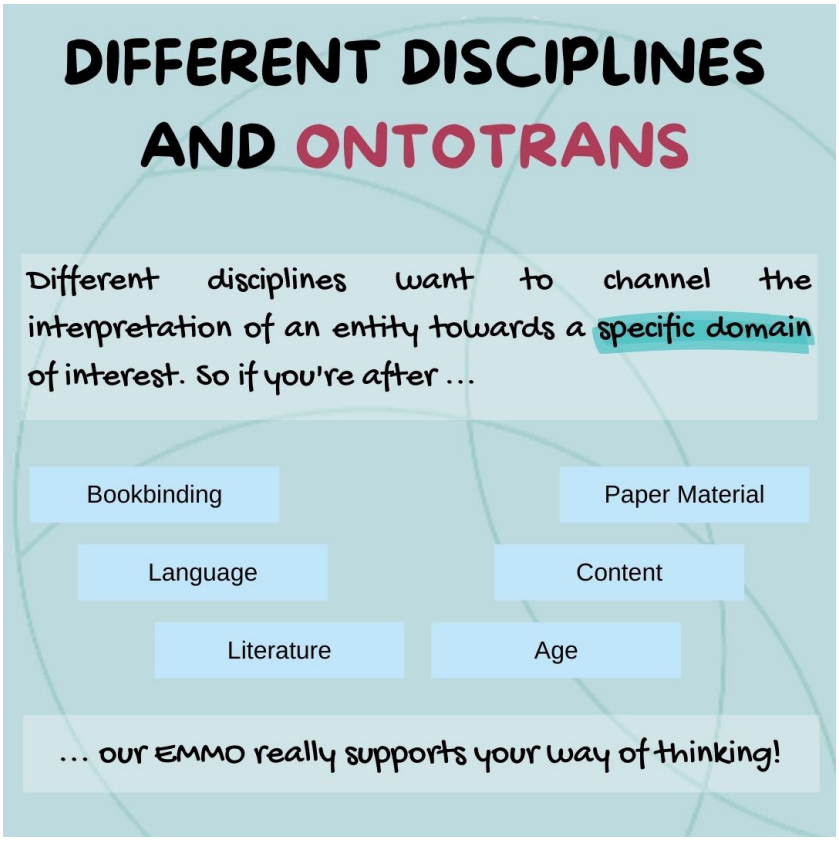
for more information about the EMMO look here: https://github.com/emmo-repo/EMMO



THE EMMO HAS THE RIGHT BRANCHES

The EMMO respects that there are different views of the world. It hosts perspective branches that categorize things in many different ways!

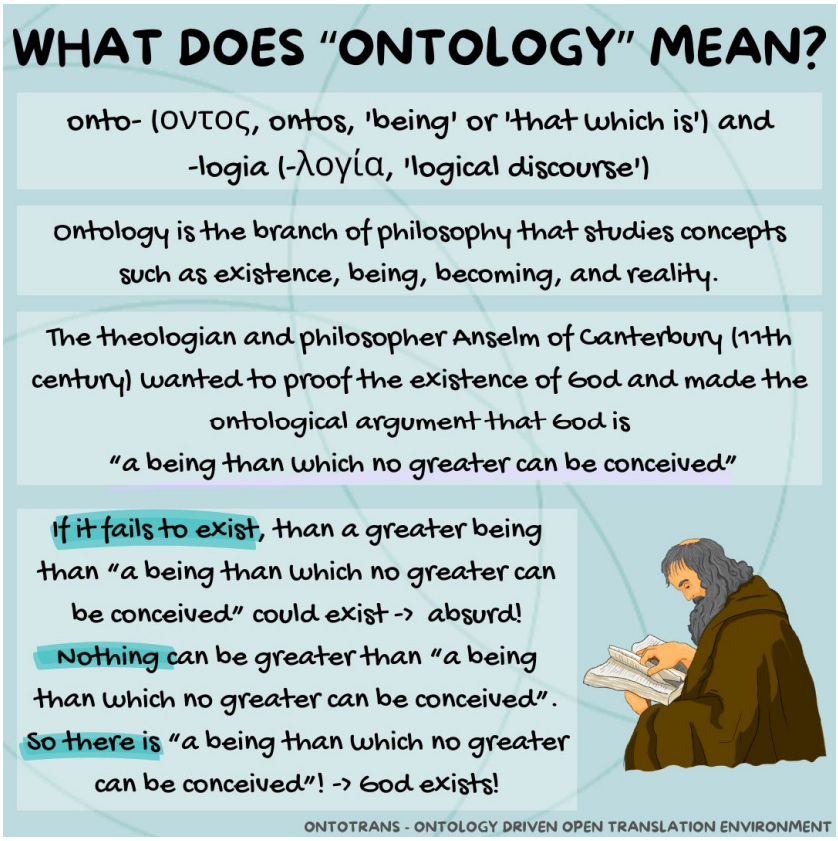



DIFFERENT DISCIPLINES AND ONTOTRANS
Different disciplines want to channel the interpretation of an entity towards a specific domain of interest. So if you're after ...
Bookbinding
Paper Material
Language
Content
Literature
Age
... our EMMO really supports your way of thinking!

2.7. What does “Ontology” mean?

Published on 23rd November 2022

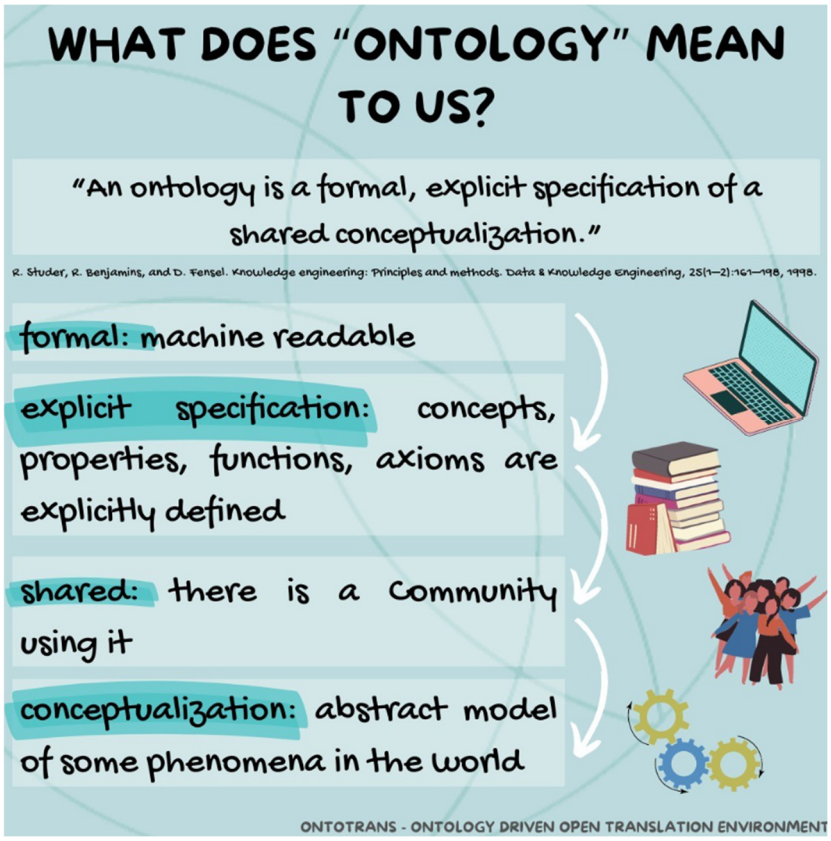
Artworks by DibuJuante-10 from pixabay.



2.8. What does “Ontology” mean to us?

Published on 9th January 2023

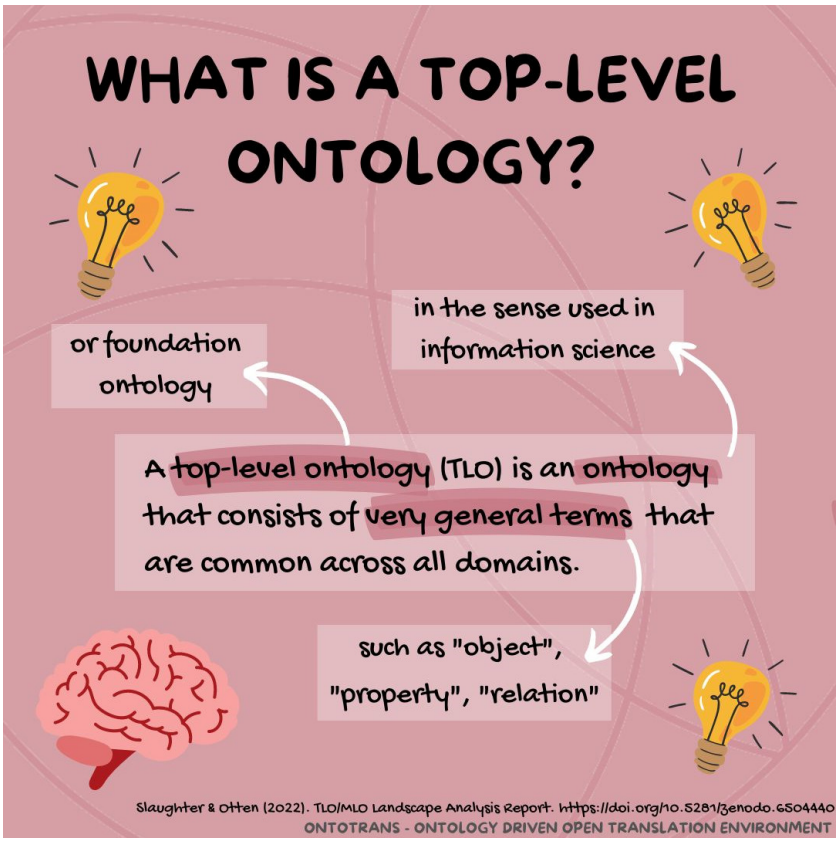
Artworks by 09910190, Mathilde Dare's Images, and sketchify.



2.9. What is a TOP-level Ontology?

Published on 17th May 2023

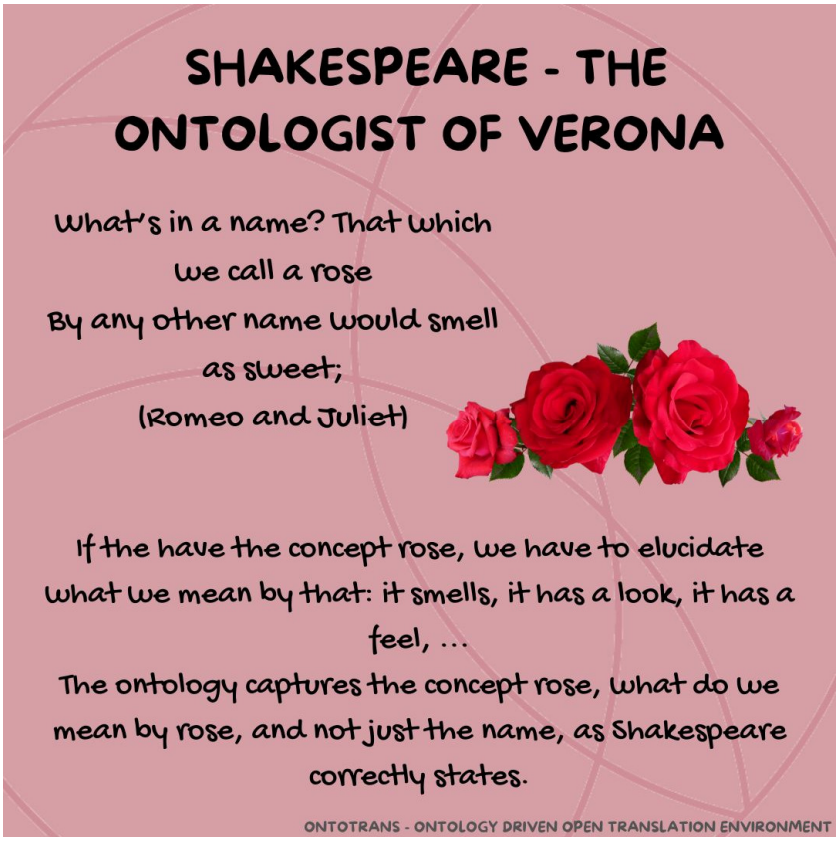
Artworks by sketchify and sparklestroke.



2.10. Shakespeare - The Ontologist of Verona

Published on 19th May 2023

Artworks by Buntysmum from pixabay.



2.11. Who should bring Ontologies to your Organisation?

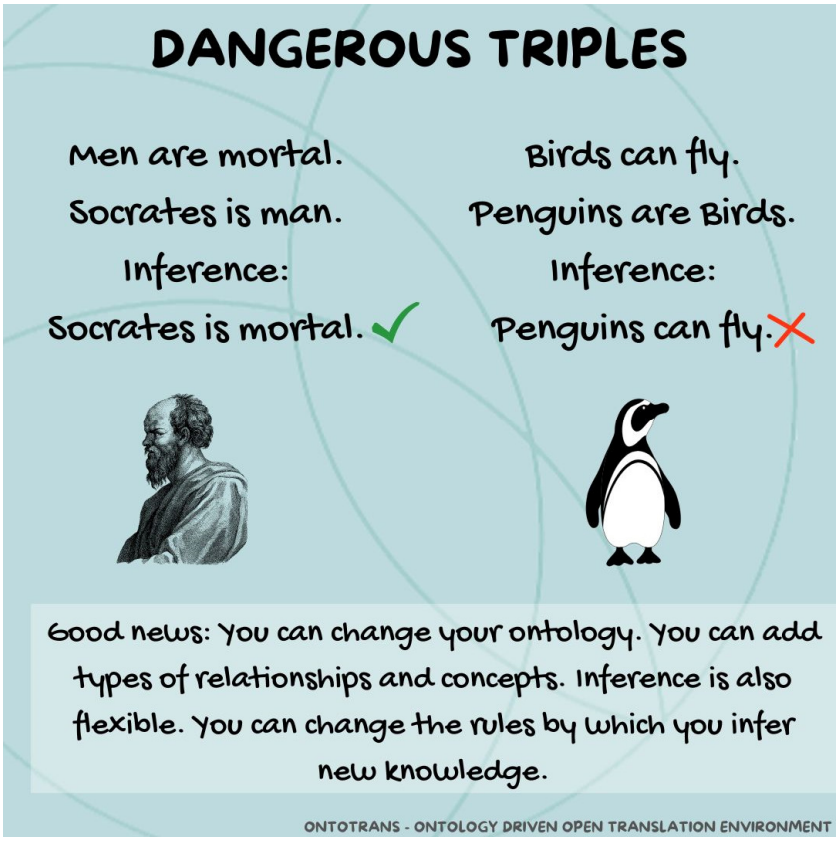
Published on 2nd June 2023

Artworks by sketchify.

2.12. Dangerous Triples

Published on 23rd June 2023

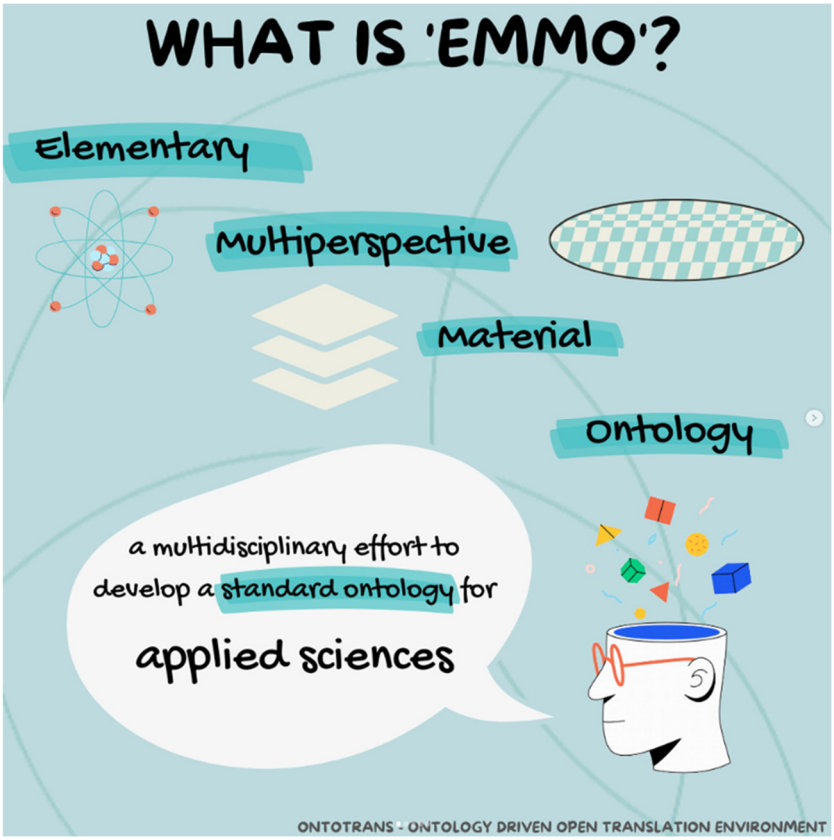
Artworks by Clker-Free-Vector-Images from pixabay and GDJ from pixabay.

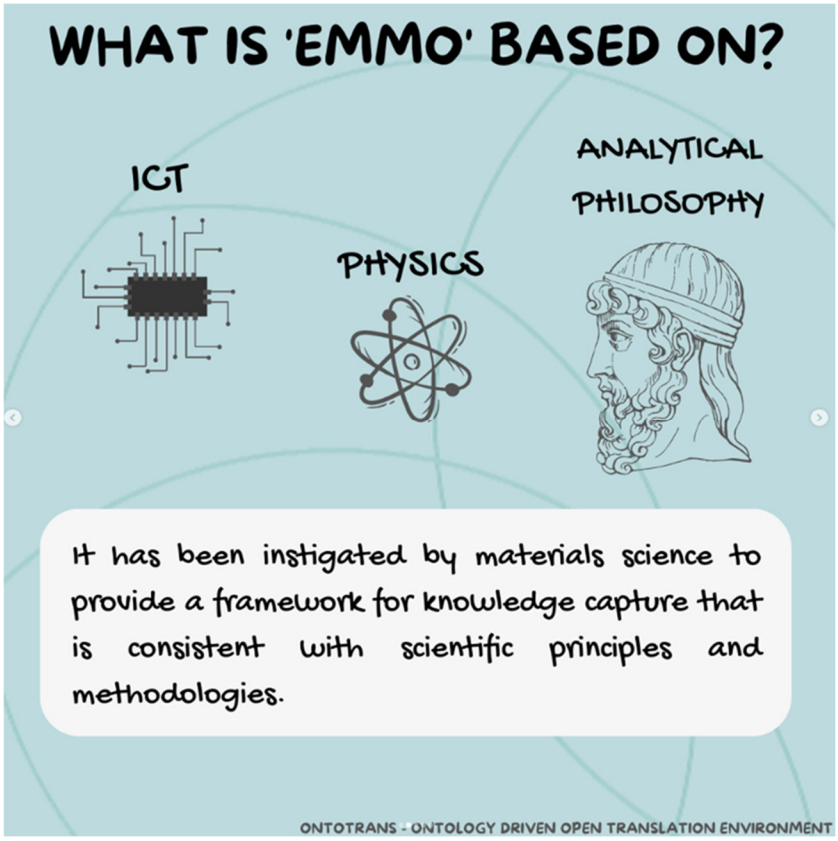


2.13. What is EMMO?

Published on 25th August 2023

Artworks by Eucalyp, Fusion Books, GDJ from pixabay, Rizkreativ, sinisamaric1 from pixabay, and xnimrodx.




WHAT IS 'EMMO' BASED ON?
ICT
PHYSICS
ANALYTICAL PHILOSOPHY
It has been instigated by materials science to provide a framework for knowledge capture that is consistent with scientific principles and methodologies.
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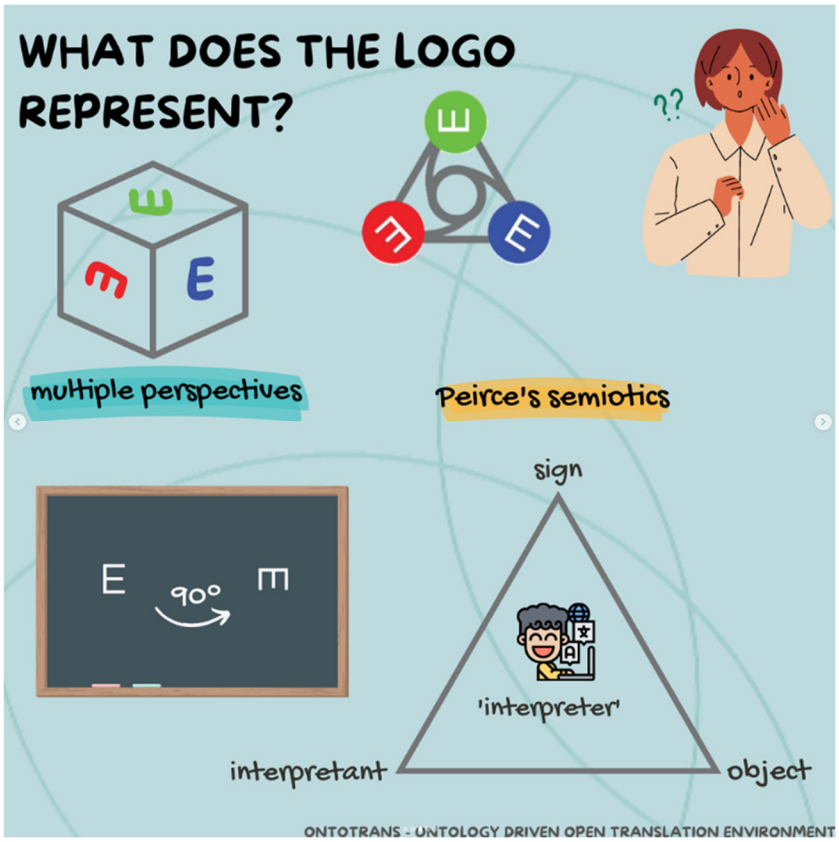
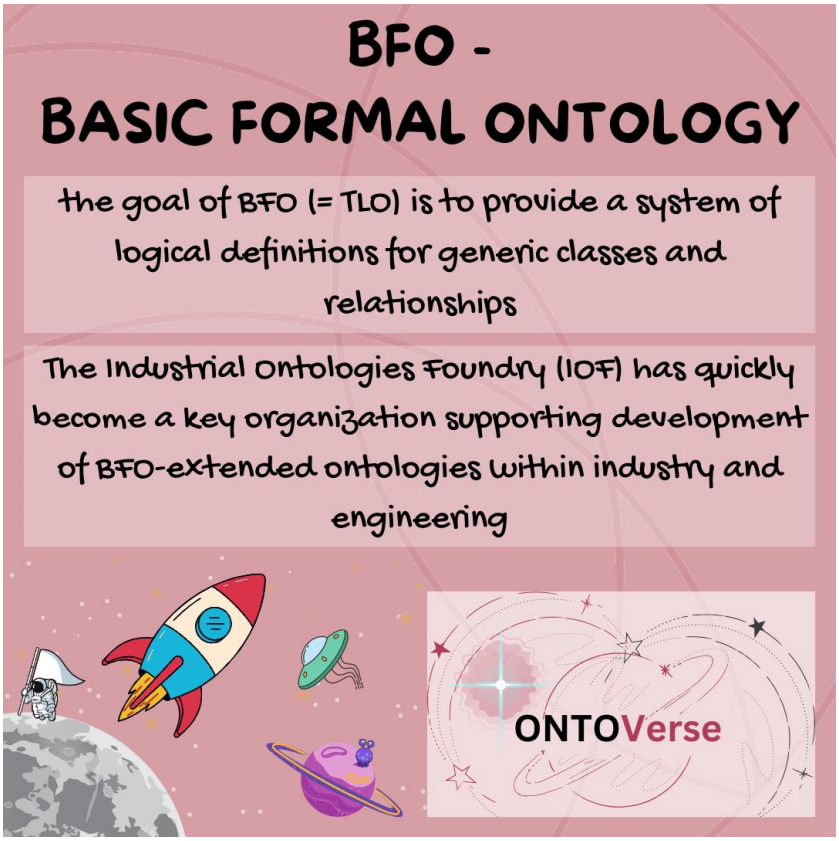

WHAT DOES THE LOGO REPRESENT?
multiple perspectives
Peirce's semiotics
E
90°
m
sign
'interpreter'
interpretant
object
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


∃ (there exists) a Whole
World Ontology
released under a Creative Commons
CC BY 4.0 license
Find out more:
https://github.com/emmo-repo/EMMO
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

2.14. BFO - Basic Formal Ontology

Published on 12th September 2023

Artworks by amethyststudio, Clker-Free-Vector-Images from pixabay, iconsy, OpenClipart-Vectors from pixabay, rayagustioardi from pixabay, sketchify, and zzzvector from pixabay.

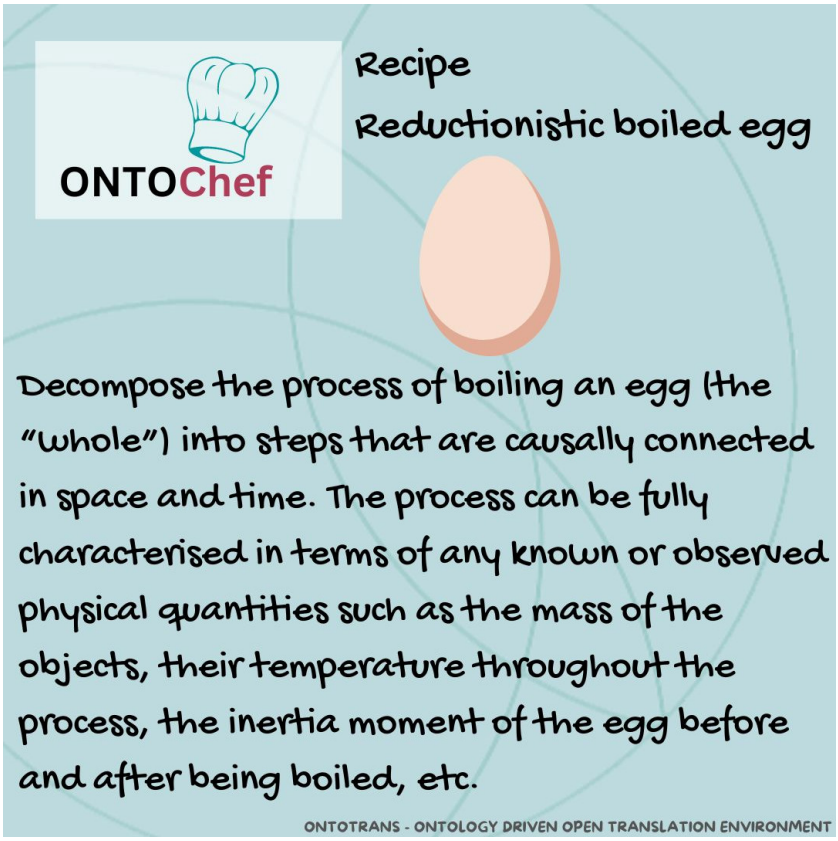



More recently, BFO has also become an ISO standard.
BFO was adopted to be the top-level ontology of IOF, an ecosystem of ontology resources designed to promote interoperability in digital manufacturing and related fields.
https://basic-formal-ontology.org/
Slaughter & Otten (2022). TLO/MLO Landscape Analysis Report. https://doi.org/10.5281/zenodo.6504440

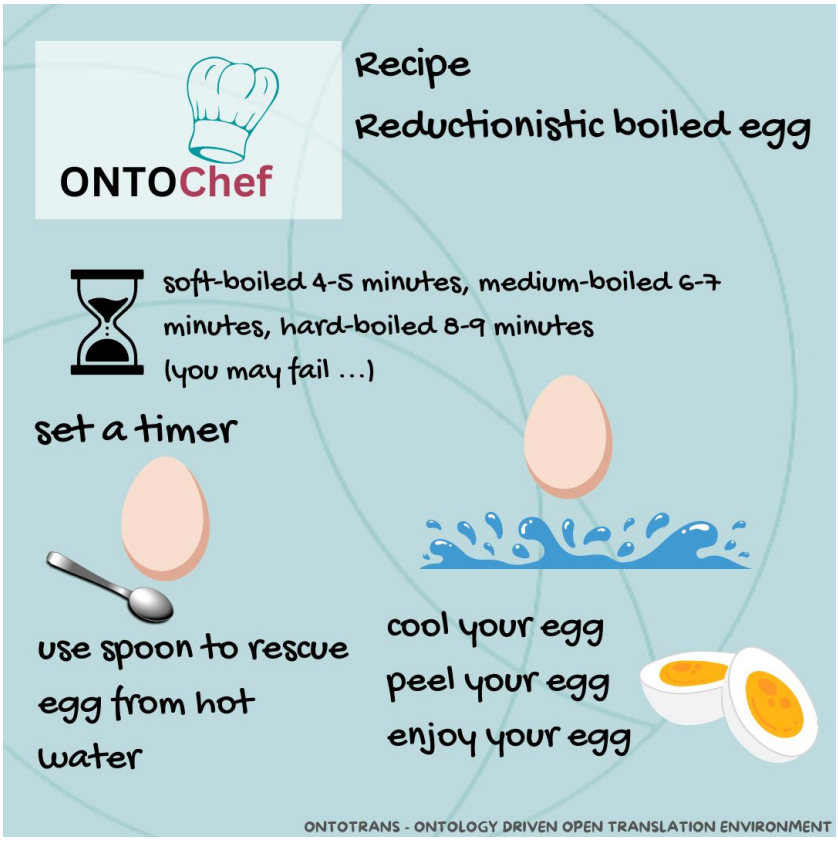
2.15. ONTOChef

Published on 19th September 2023

Artworks from Bomsymbols, Clker-Free-Vector-Images from pixabay, Drawcee, OpenClipart-Vectors from pixabay, Riskawatiusman, Rita Juwita, sketchify, and Twemoji.


ONTOChef
Recipe
Reductionistic boiled egg
Decompose the process of boiling an egg (the "whole") into steps that are causally connected in space and time. The process can be fully characterised in terms of any known or observed physical quantities such as the mass of the objects, their temperature throughout the process, the inertia moment of the egg before and after being boiled, etc.
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


ONTOChef
Recipe
Reductionistic boiled egg
water in sauce pan
put on stove
wait until 100 C
use spoon to lower egg into boiling water
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


ONTOChef
Recipe
Reductionistic boiled egg
soft-boiled 4-5 minutes, medium-boiled 6-7 minutes, hard-boiled 8-9 minutes (you may fail ...)
set a timer
use spoon to rescue egg from hot water
cool your egg
peel your egg
enjoy your egg
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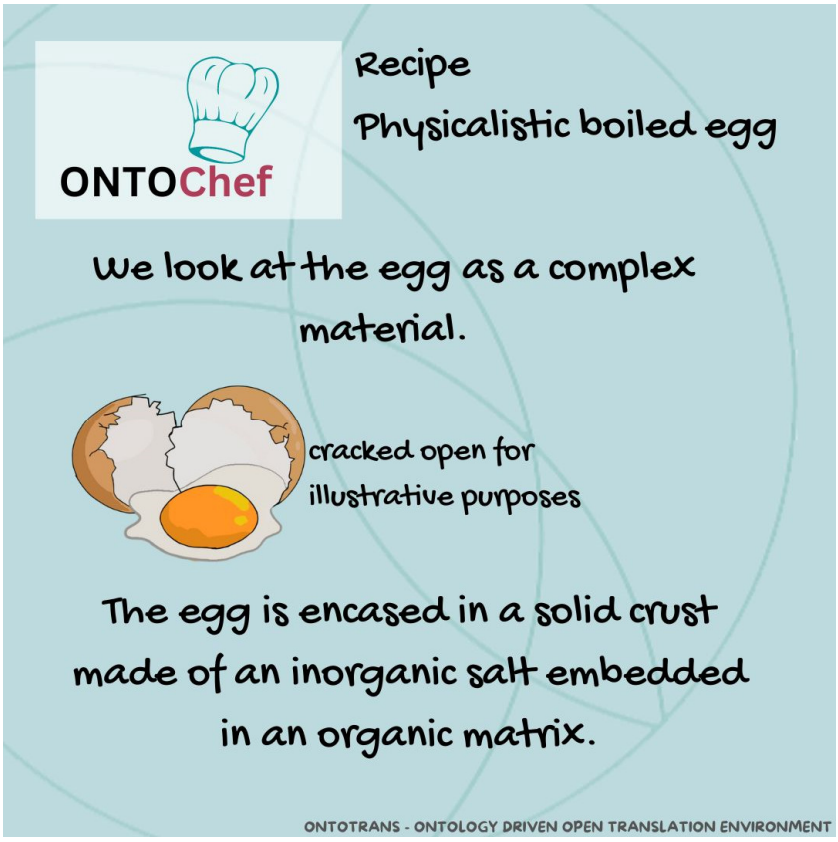
ONTOChef
Recipe
Physicalistic boiled egg
We look at the egg as a complex material.
cracked open for illustrative purposes
The egg is encased in a solid crust made of an inorganic salt embedded in an organic matrix.
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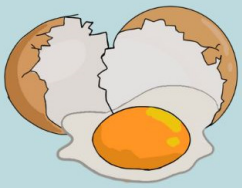
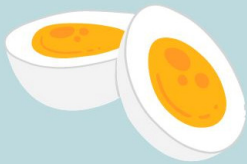
ONTOChef

Recipe

Physicalistic boiled egg

Boiling the egg then transforms the microscopic structure of the proteins in the egg's white and yolk, turning them from a gel to a solid.





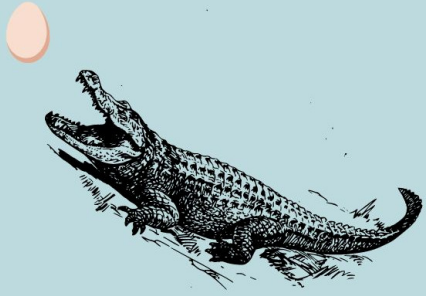
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

ONTOChef

Bonus Recipe

Holisitc Egg

Eggs are food, just eat …



Thanks to our MasterChef Otello M. Roscioni

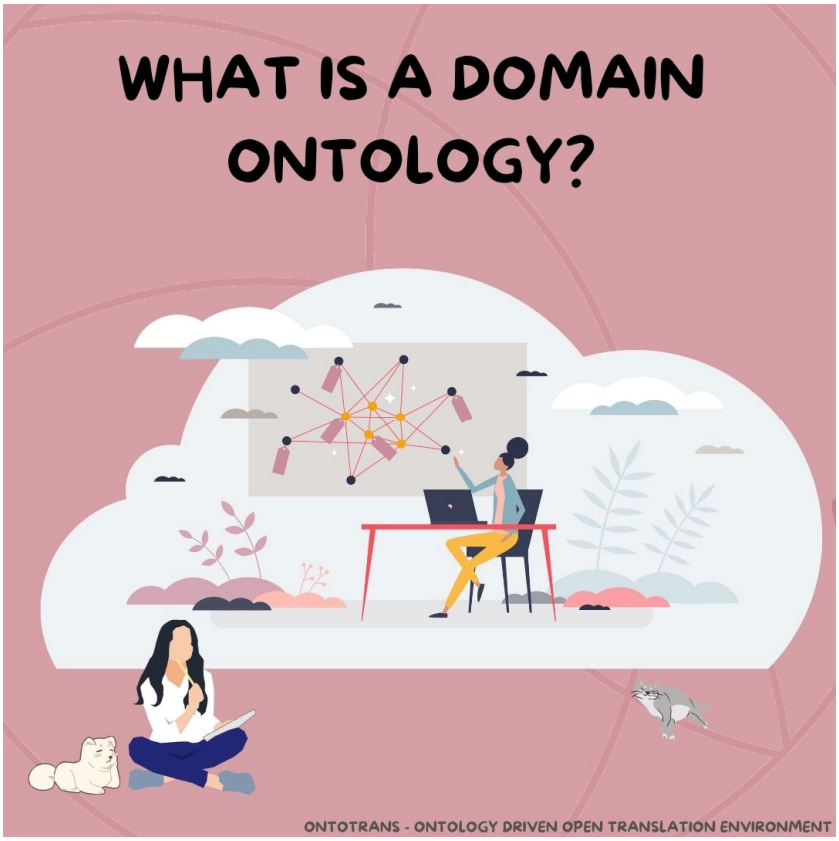
https://materialsmodelling.com/how-to-boil-an-egg

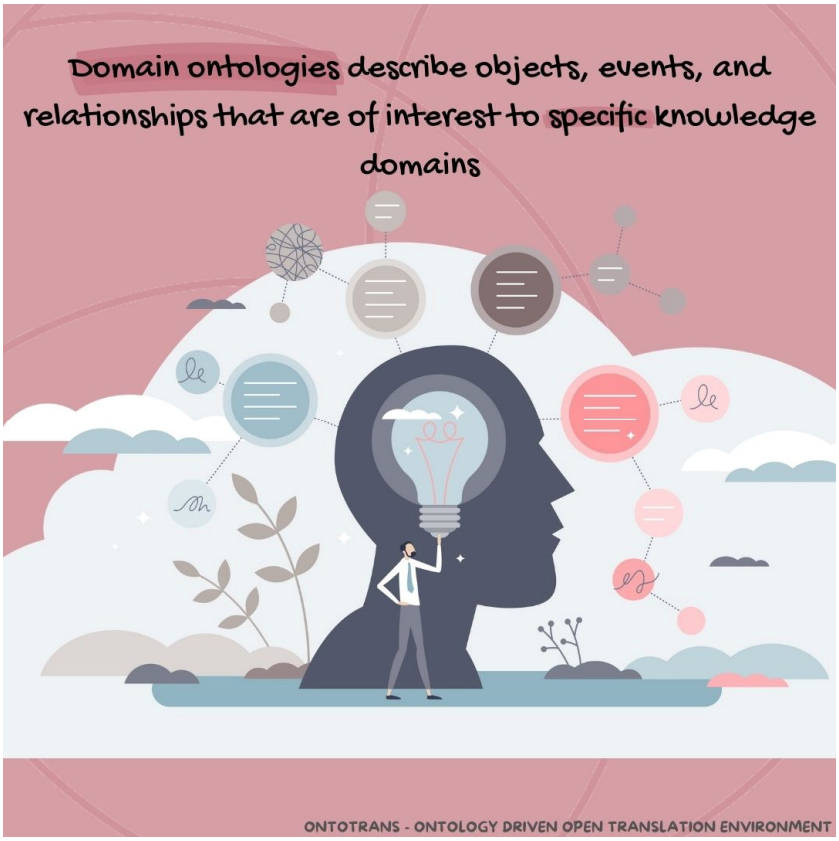
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

2.16. What is a Domain Ontology?

Published on 26th September 2023

Artworks by Adobe Stock, Drawcee, sketchify, Vectorium, and Wizard Studio's Images.




Domain ontologies describe objects, events, and relationships that are of interest to specific knowledge domains
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MaterialsMine
A materials ontology to support publication and exploration of data involving nanomaterials and metamaterials.
CHAMEO
A domain ontology for materials characterisation
Biological Imaging Methods Ontology
A structured vocabulary of sample preparation, visualization, and imaging methods used in biomedical research.
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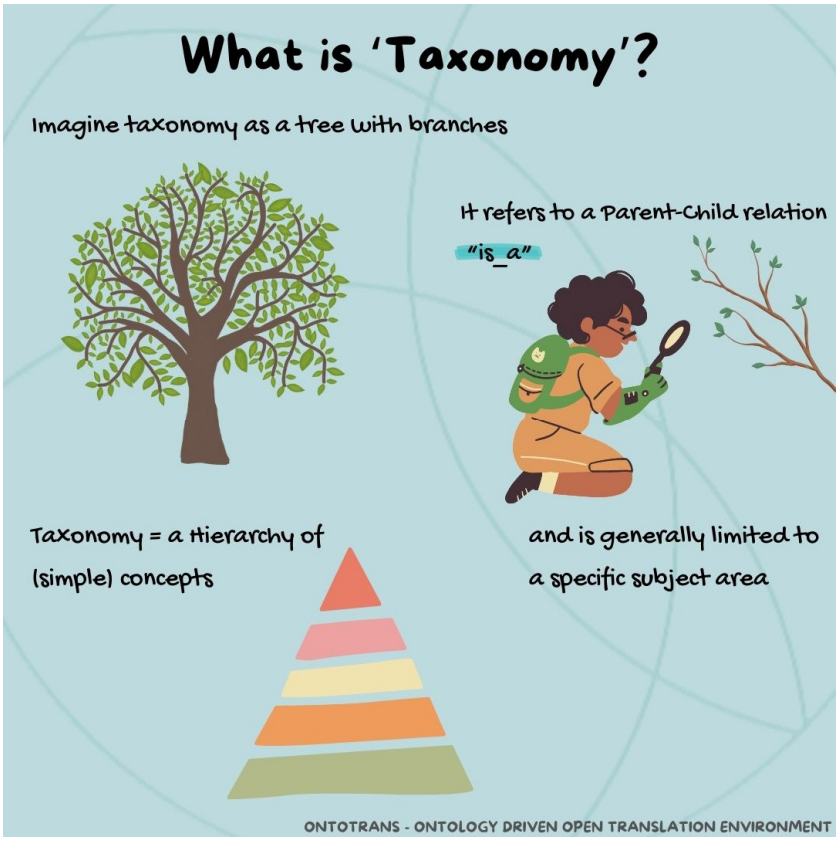
Do you use or know
any domain ontologies?
ONTOTRANS
Ontology driven Open Translation Environment
for more information visit ontotrans.eu
or follow our social media channels
The OntoTrans Project received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 862136

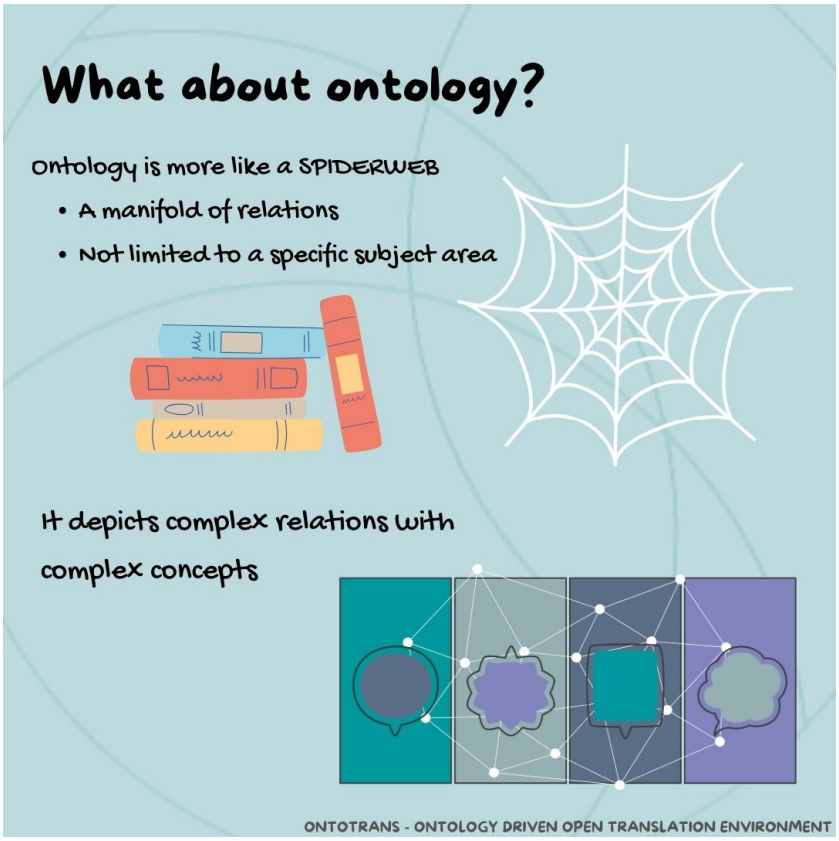
2.17. Taxonomy vs. Ontology

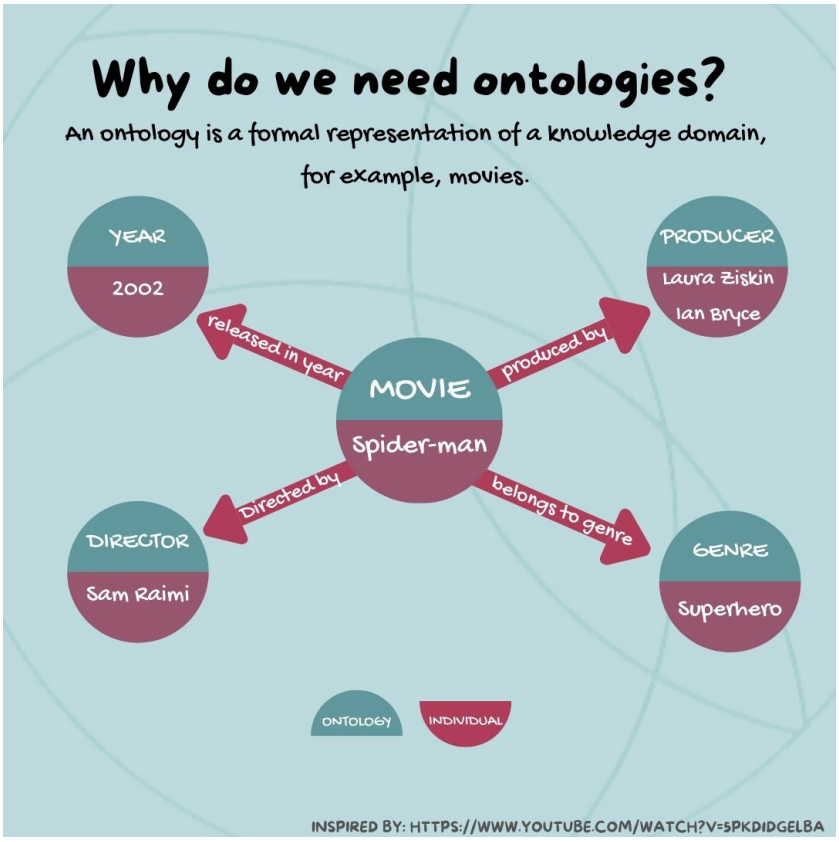
Published on 13th October 2023

Artworks by Adobe stock, amethyststudio, Fannan Studio, Fusion Books, Gambar, hannahlouise123 from pixabay, iconsy, Procrea RosZie from pixabay, Rima Riani, sketchify, Sketchify Education, sparklestroke, and venicedesigns.


What is 'Taxonomy'?
Imagine taxonomy as a tree with branches
It refers to a Parent-Child relation
"is_a"
Taxonomy = a Hierarchy of
(simple) concepts
and is generally limited to
a specific subject area
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


Why do we need taxonomies?
Taxonomy organises and classifies data for analysis
For example, to understand a text through classification


What about ontology?
Ontology is more like a SPIDERWEB
• A manifold of relations
• Not limited to a specific subject area
It depicts complex relations with complex concepts
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

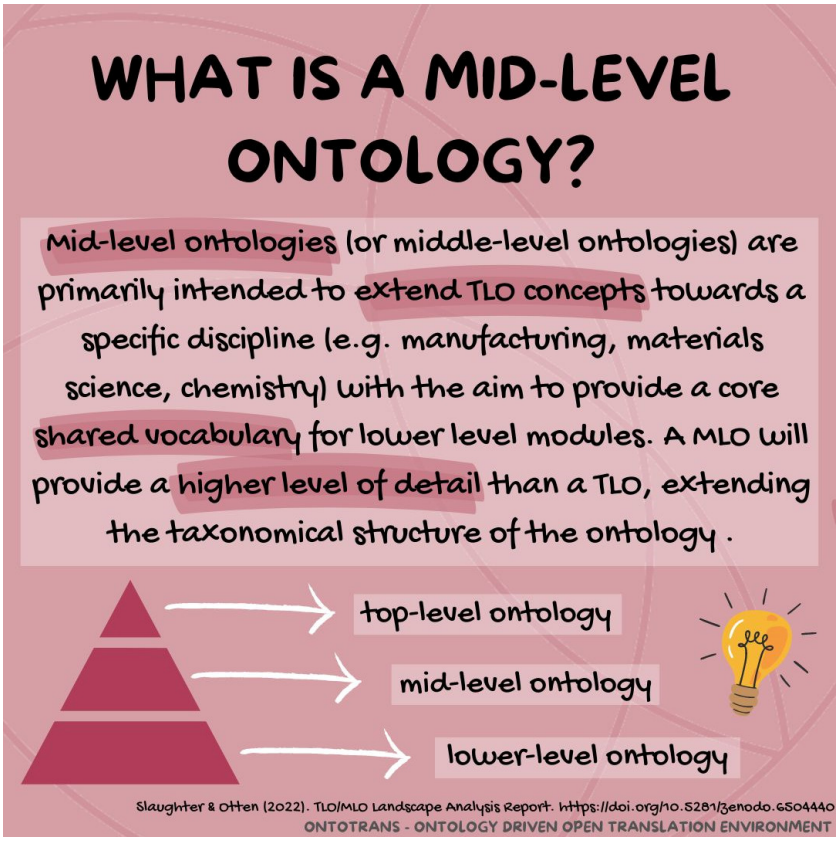

Why do we need ontologies?
An ontology is a formal representation of a knowledge domain, for example, movies.
YEAR
2002
released in year
PRODUCER
Laura Ziskin
Ian Bryce
produced by
MOVIE
Spider-man
Directed by
belongs to genre
DIRECTOR
Sam Raimi
GENRE
Superhero
ONTOLOGY
INDIVIDUAL
INSPIRED BY: HTTPS://WWW.YOUTUBE.COM/WATCH?V=5PKDIDGELBA


Now a computer can also "understand" what we know about movies.

2.18. What is a Mid-level Ontology?

Published on 19th October 2023

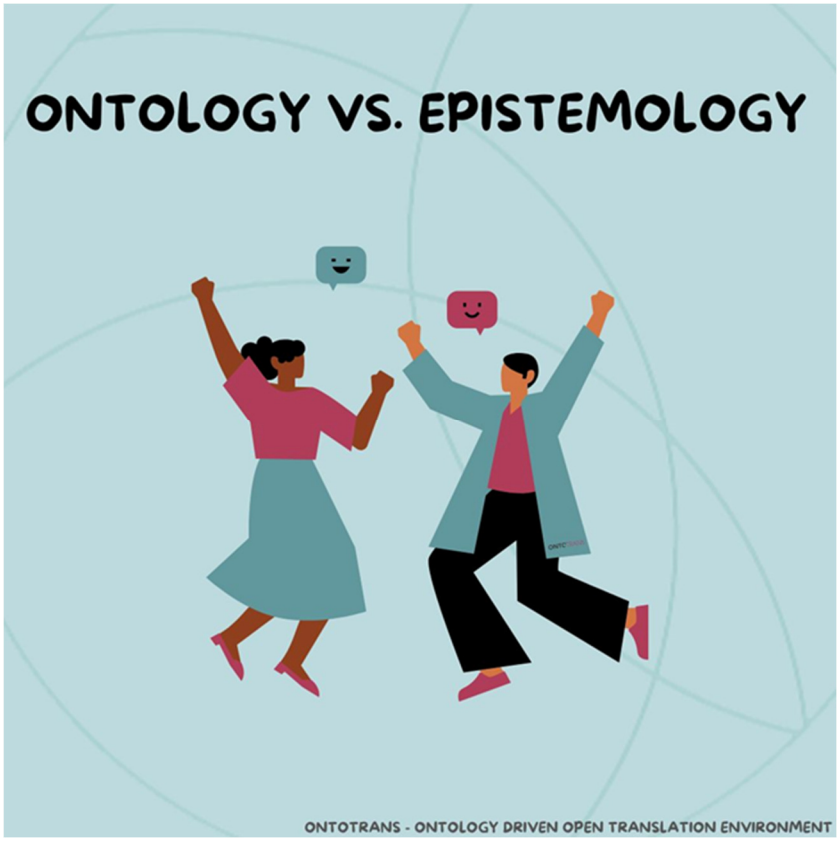
Artworks by sketchify.

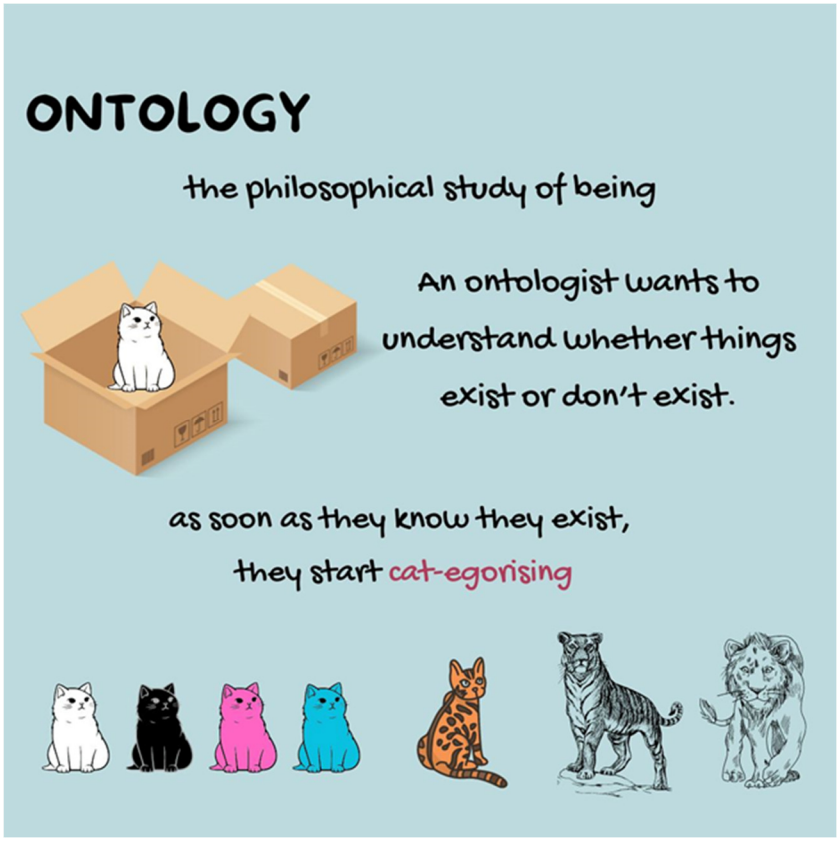


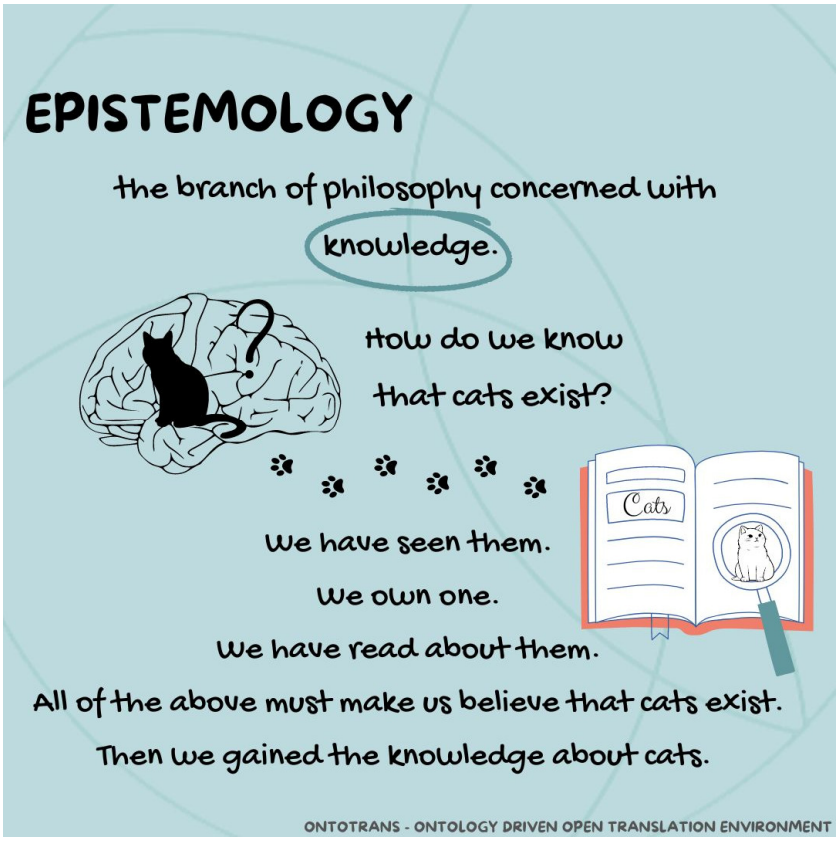
2.19. Ontology vs. Epistemology

Published on 10th November 2023

Artworks by amethyststudio, Clker-Free-Vector-Images from pixabay, EMBASY, iconsy, Lohrelei from pixabay, Maddie Red, OpenClipart-Vectors from pixabay, sketchify, sparklestroke. and Unfold X.



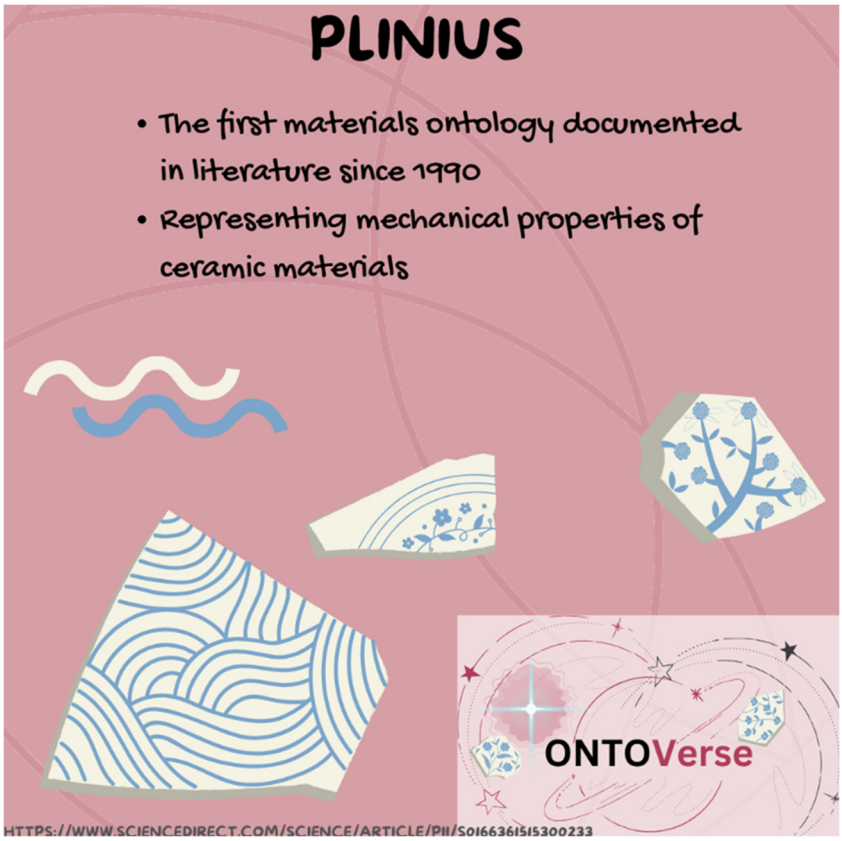

ONTOLOGY
the philosophical study of being
An ontologist wants to understand whether things exist or don't exist.
as soon as they know they exist, they start cat-egorising


EPISTEMOLOGY
the branch of philosophy concerned with knowledge.
How do we know that cats exist?
Cats
We have seen them.
We own one.
We have read about them.
All of the above must make us believe that cats exist.
Then we gained the knowledge about cats.
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

2.20. Plinius

Published on 25th November 2023

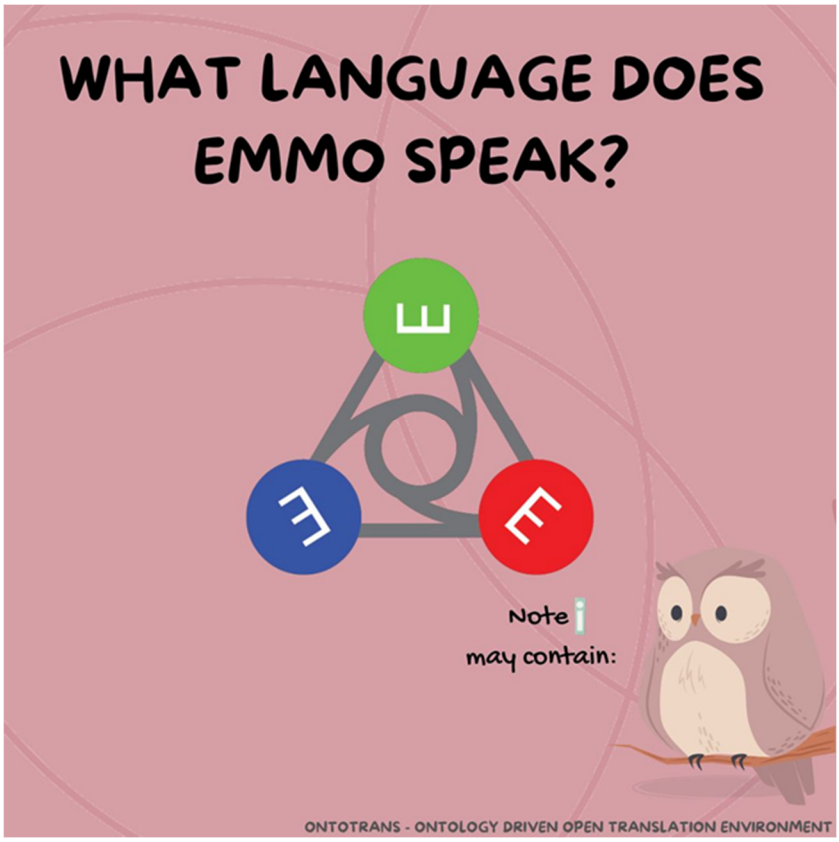
Artworks by Sketchify Education and Sketchify Spain.



2.21. What Language does EMMO Speak?

Published on 23rd February 2024

Artworks by Atdaographic, MW's Images, sketchify, Sketchify Italy, and sparklestroke.



OWL

WEB ONTOLOGY LANGUAGE

EMMO speaks OWL which describes semantic relationships:

- CLASSES
- PROPERTIES
- INDIVIDUALS
- DATA VALUES

In fact, EMMO speaks OWL DL (description logic) to provide the maximum expressiveness while retaining computational completeness;
It includes restrictions such as type separation (e.g., a class cannot be an individual or property, a property can not be an individual or class, ...)

ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

HOW DOES OWL LOOK LIKE?

Here is an example of how OWL would describe chicken topping on a pizza

```
<!--  http://www.co-ode.org/ontologies/pizza/pizza.owl#ChickenTopping  -->
▼<owl:Class rdf:about="http://www.co-ode.org/ontologies/pizza/pizza.owl#ChickenTopping">
   <rdfs:subClassOf rdf:resource="http://www.co-ode.org/ontologies/pizza/pizza.owl#MeatTopping"/>
  ▼<rdfs:subClassOf>
    ▼<owl:Restriction>
       <owl:onProperty rdf:resource="http://www.co-ode.org/ontologies/pizza/pizza.owl#hasSpiciness"/>
       <owl:someValuesFrom rdf:resource="http://www.co-ode.org/ontologies/pizza/pizza.owl#Hild"/>
     </owl:Restriction>
   </rdfs:subClassOf>
   <rdfs:label xml:lang="en">ChickenTopping</rdfs:label>
   <rdfs:label xml:lang="pt">CoberturaDeFrango</rdfs:label>
   <skos:prefLabel xml:lang="en">Chicken</skos:prefLabel>
</owl:Class>
```

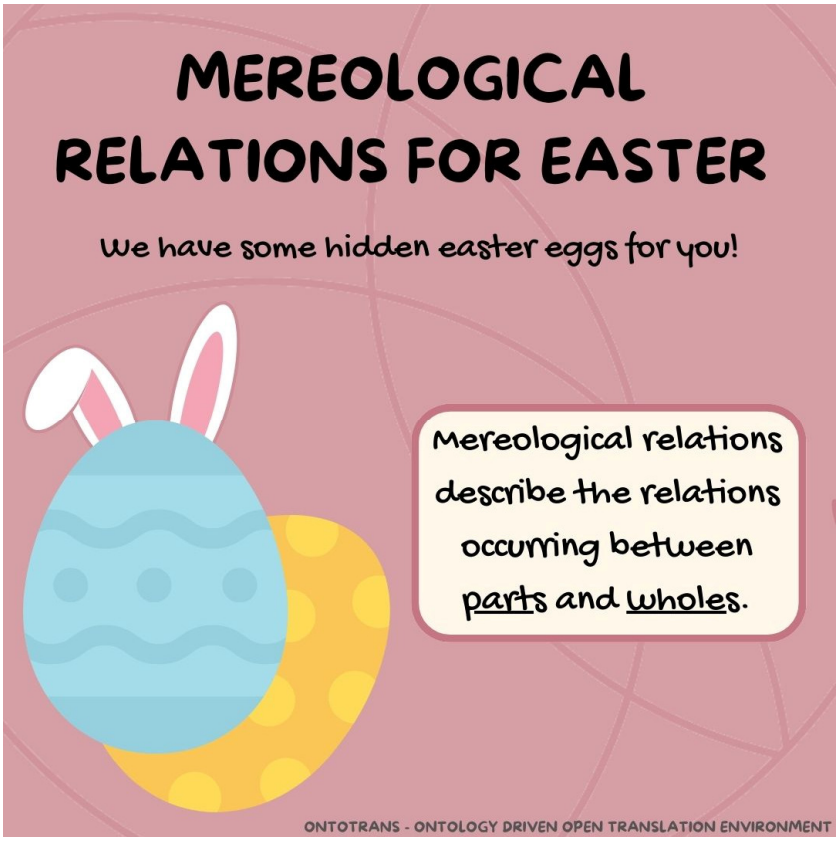
https://protege.stanford.edu/ontologies/pizza/pizza.owl

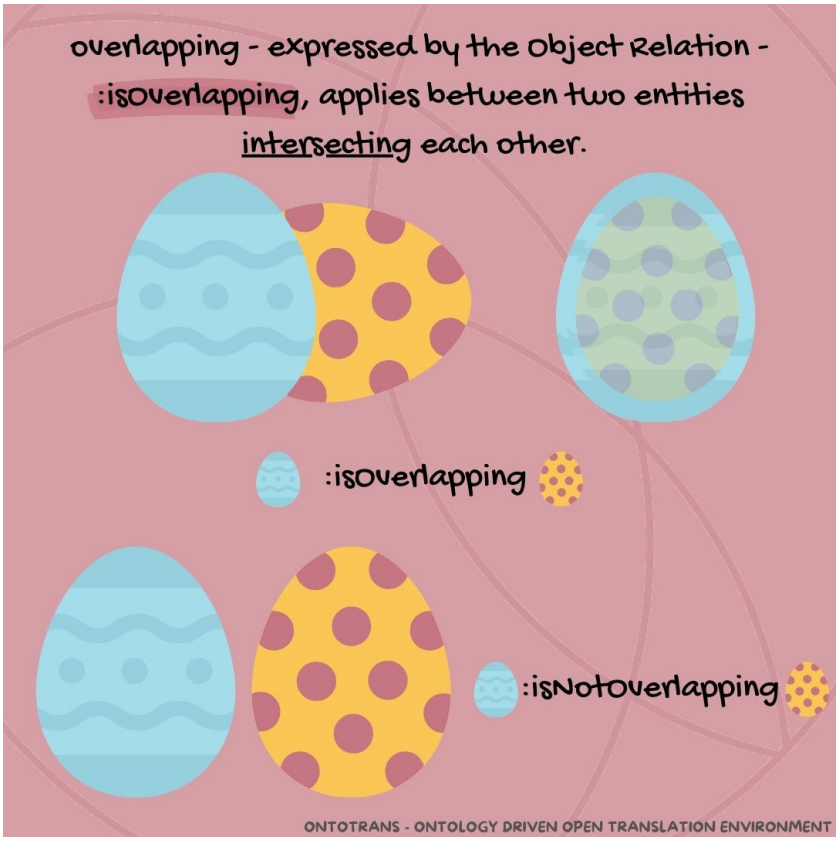
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

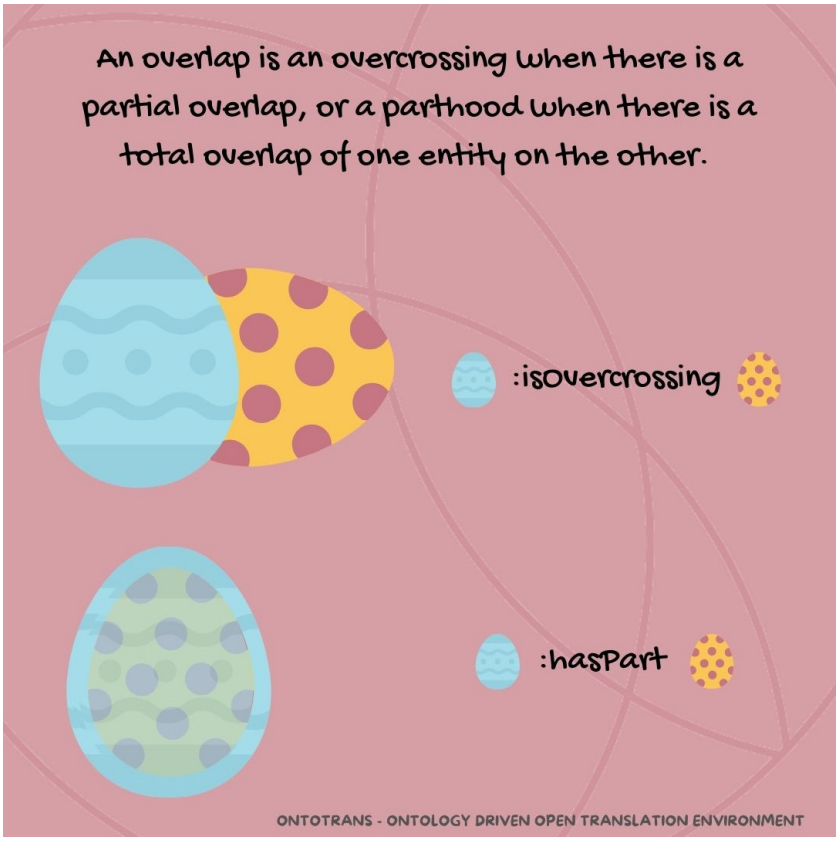
2.22. Mereological Relations for Easter

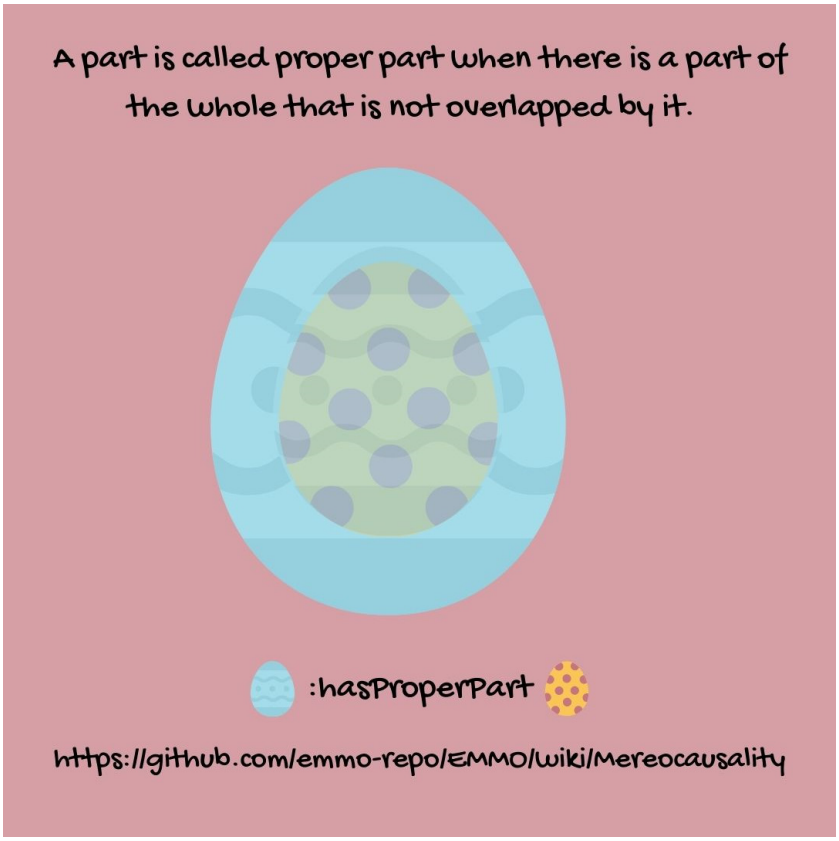
Published on 1st April 2024

Artworks by Canva Layouts and Eduardo Chaves.




overlapping - expressed by the Object Relation - :isOverlapping, applies between two entities intersecting each other.
:isOverlapping
:isNotOverlapping
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


An overlap is an overcrossing when there is a partial overlap, or a parthood when there is a total overlap of one entity on the other.
:isOvercrossing
:hasPart
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


A part is called proper part when there is a part of the whole that is not overlapped by it.
:hasProperPart
https://github.com/emmo-repo/EMMO/wiki/Mereocausality

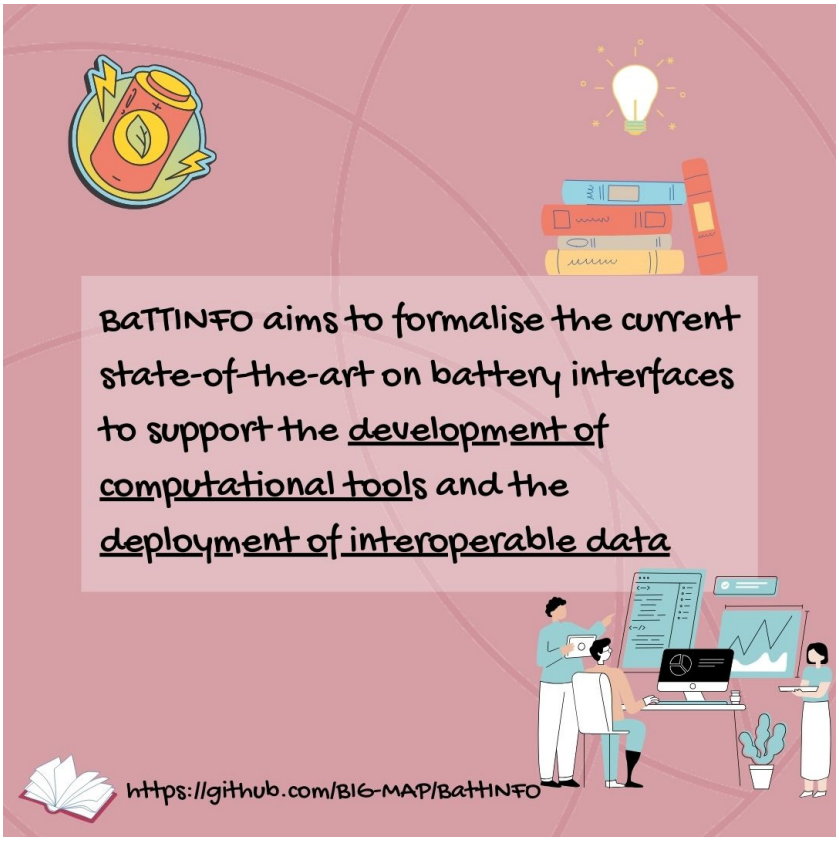

Happy Easter to all who celebrate!
ONTOTRANS
Ontology driven Open Translation Environment
for more information visit ontotrans.eu
or follow our social media channels
The OntoTrans Project received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 862136

2.23. BattINFO - Battery Interface Ontology

Published on 30th April 2024

Artworks by iconsy, sketchify, Surakit, and Trendify

Logos by https://battery2030.eu/battery2030/projects/big-map/


BATTINFO aims to formalise the current state-of-the-art on battery interfaces to support the development of computational tools and the deployment of interoperable data
https://github.com/BIG-MAP/BattINFO

3. Posts about OntoTrans

3.1. What is OntoTrans?

Published on 2nd January 2023

Artworks by Clker-Free-Vector-Images from pixabay, iconsy, nhorphai, OpenClipart-Vectors by pixabay, sketchify, Sketchify Education, and Wanicon.

WHAT IS ONTOTRANS?

OntoTrans is an ontology - based OPEN TRANSLATION ENVIRONMENT (OTE) that will support industry in solving their innovation challenges more efficiently by providing access to relevant information and efficent use of materials modelling

HOW DOES ONTOTRANS DO THAT?

1) At the beginning, it all starts with an innovation challenge. In the first step, OntoTrans defines the challenge as an innovation case, i.e., the specific process we wish to improve.

HOW DOES ONTOTRANS DO THAT?

2) OntoTrans then represents the innovation case in a standard ontological form. This means that all the relevant concepts of the innovation case and how they relate to each other are taken into account.

innovation case

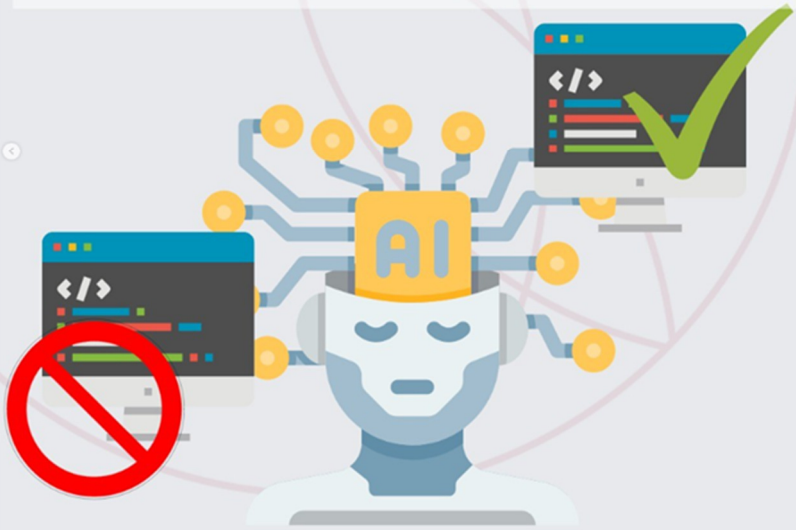
ontological form

HOW DOES ONTOTRANS DO THAT?

3) OntoTrans then connects the new innovation case via the ontology with existing relevant information sources, i.e., available data and materials modelling solutions

HOW DOES ONTOTRANS DO THAT?

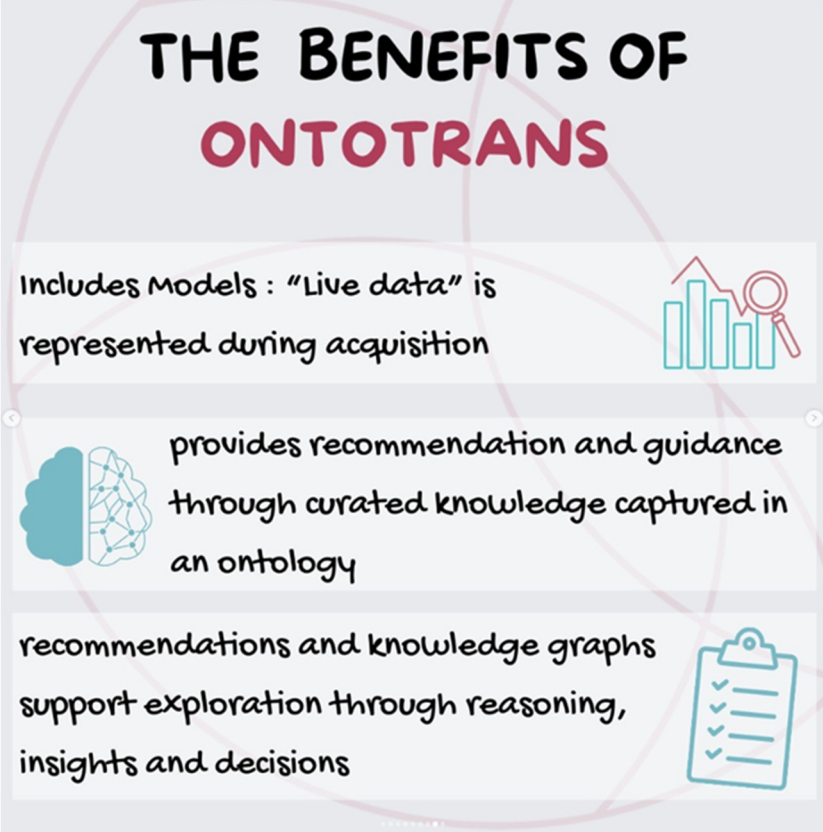
4) OntoTrans then recommends appropriate materials modelling workflow options



THIS MEANS ONTOTRANS

is a Knowledge Management System for Research and Innovation, that …

… reflects and maintains enterprise knowledge
… combines diverse content in connected data sources
… finds and utilises relevant information more quickly
… provides more transparency
… makes better informed decisions
… uncovers insights


THE BENEFITS OF
ONTOTRANS
Includes Models : "Live data" is represented during acquisition
provides recommendation and guidance through curated knowledge captured in an ontology
recommendations and knowledge graphs support exploration through reasoning, insights and decisions

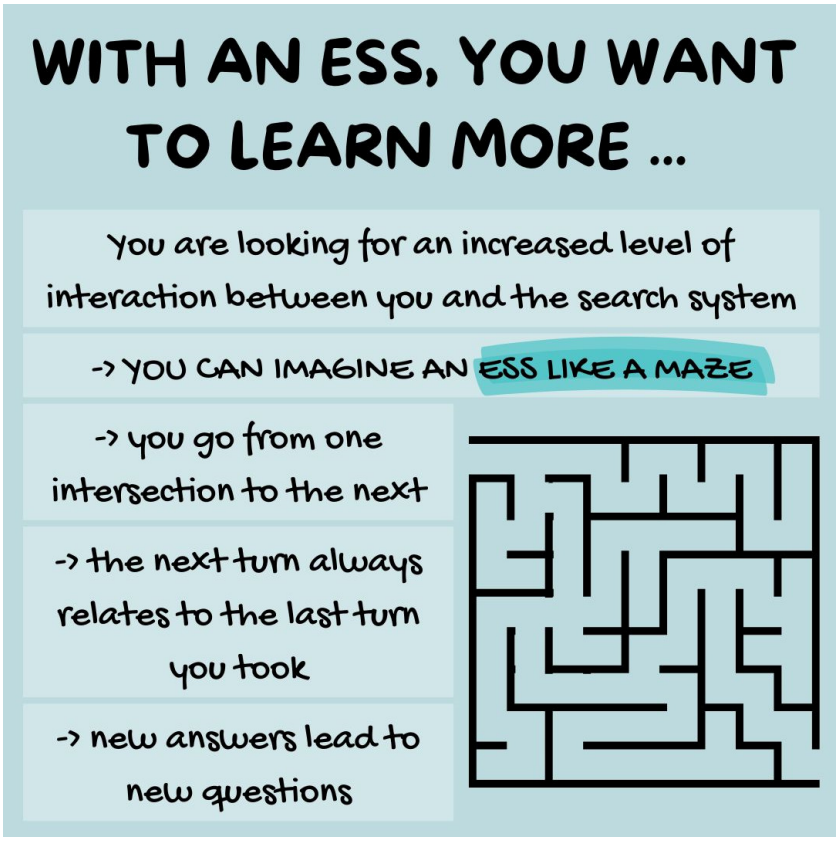
3.2. The OntoTrans ESS

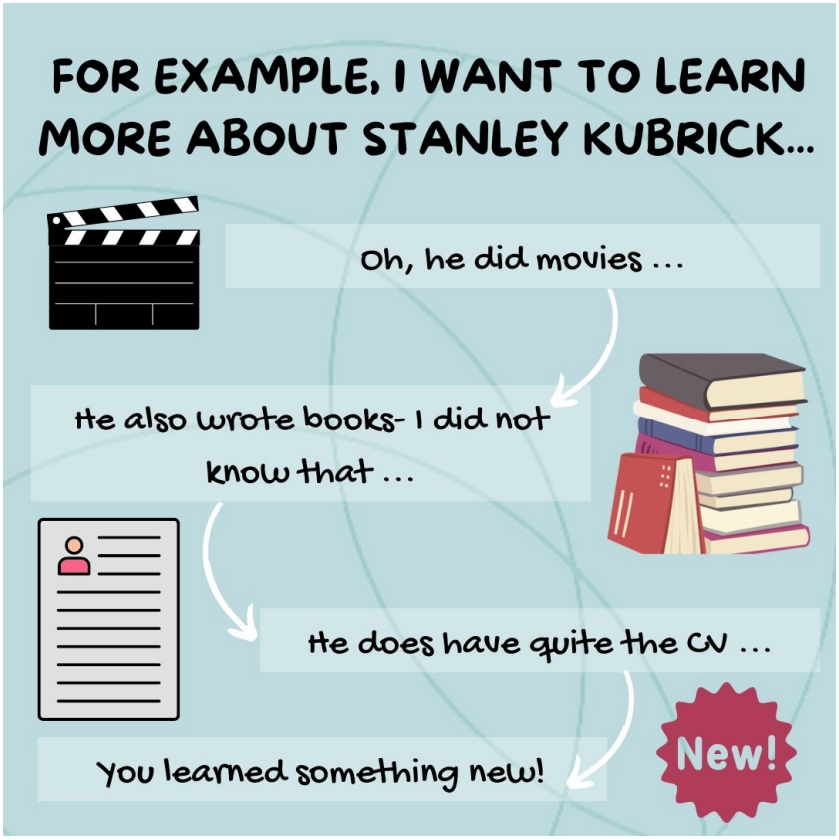
Published on 8th May 2023

Artworks by Clker-Free-Vector-Images from pixabay, Divyansh100 from pixabay, Mathilde Dare's Images, Mememie, Muhammad Atiq, OpenClipart-Vectors from pixabay, Procrea, Sketchify Education, and Vectorart86.


WHAT HAPPENS WHEN YOU SEARCH ON THE INTERNET?
Traditional search systems heavily rely on the popular query-response paradigm. They are very successful for well-defined information needs with a precise goal in mind.


'WHAT IS THE LONGEST RIVER IN SOUTH AMERICA?'
Very precise question: you are looking for a specific body of water on a specific continent.
You "google" it - or use another search engine of your choice
You find a clear answer: The Amazon River, 6,400 km long - now you KNOW!!!!
??
??


WITH AN ESS, YOU WANT TO LEARN MORE ...
You are looking for an increased level of interaction between you and the search system
-> YOU CAN IMAGINE AN ESS LIKE A MAZE
-> you go from one intersection to the next
-> the next turn always relates to the last turn you took
-> new answers lead to new questions

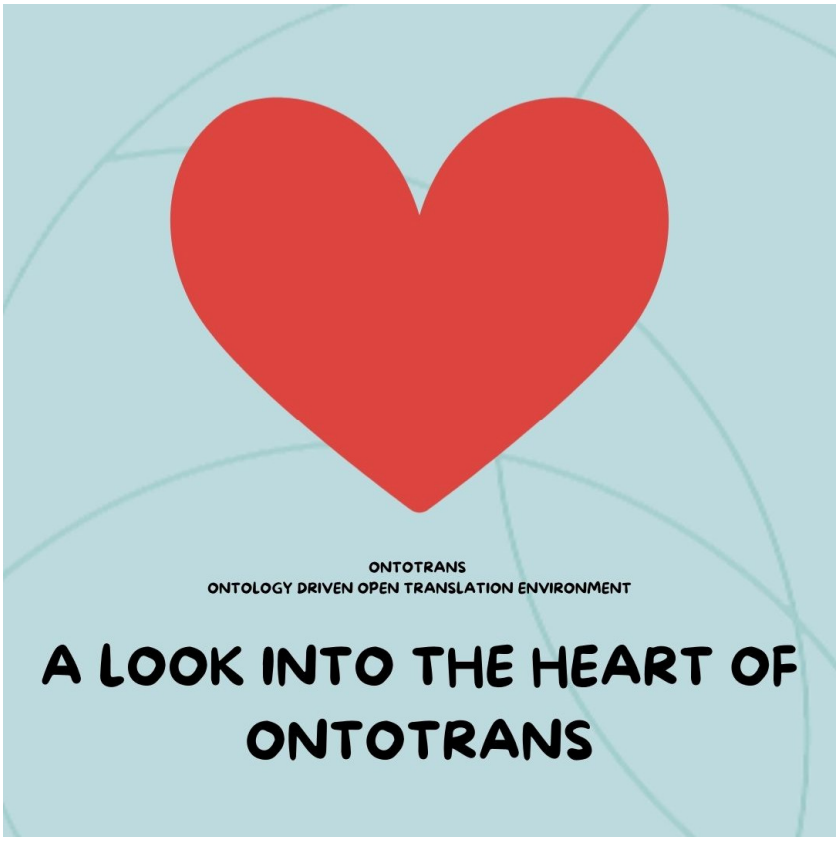

FOR EXAMPLE, I WANT TO LEARN MORE ABOUT STANLEY KUBRICK...
Oh, he did movies ...
He also wrote books- I did not know that ...
He does have quite the CV ...
New!
You learned something new!

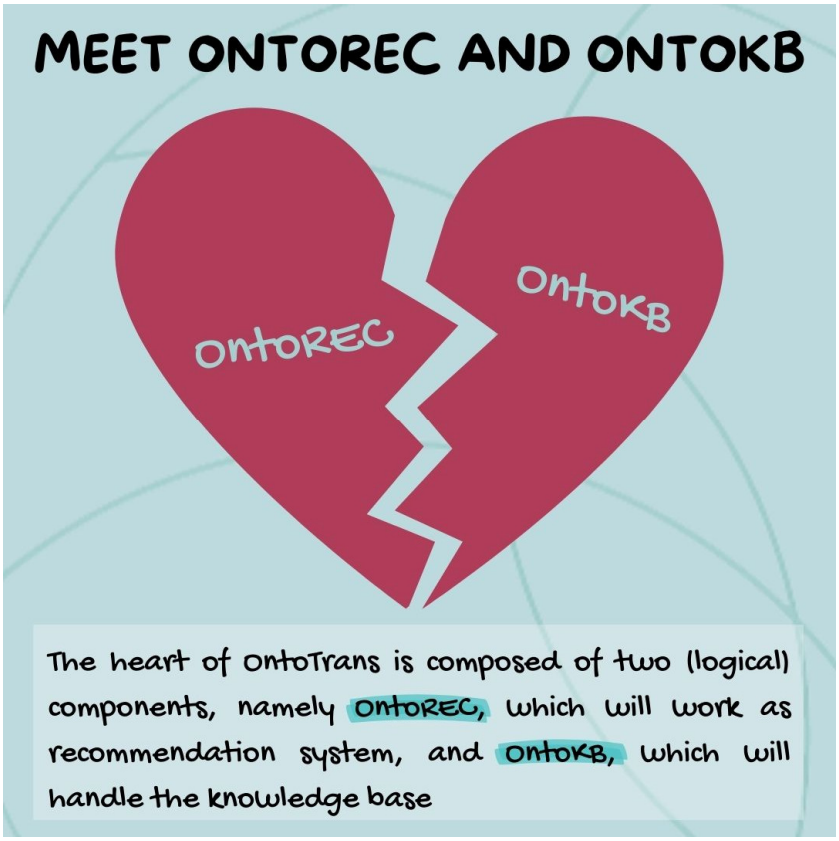

WE DO NEED AN ESS FOR
ONTOTRANS
we want to give our translators the opportunity to
explore knowledge
translators can access all knowledge about processes and learn easier, reliably look for information customised for materials engineers, share knowledge easier and connect topics
the goal of the ESS is to think outside the box, connect topics and to discover new knowledge

3.3. A Look into the Heart of OntoTrans

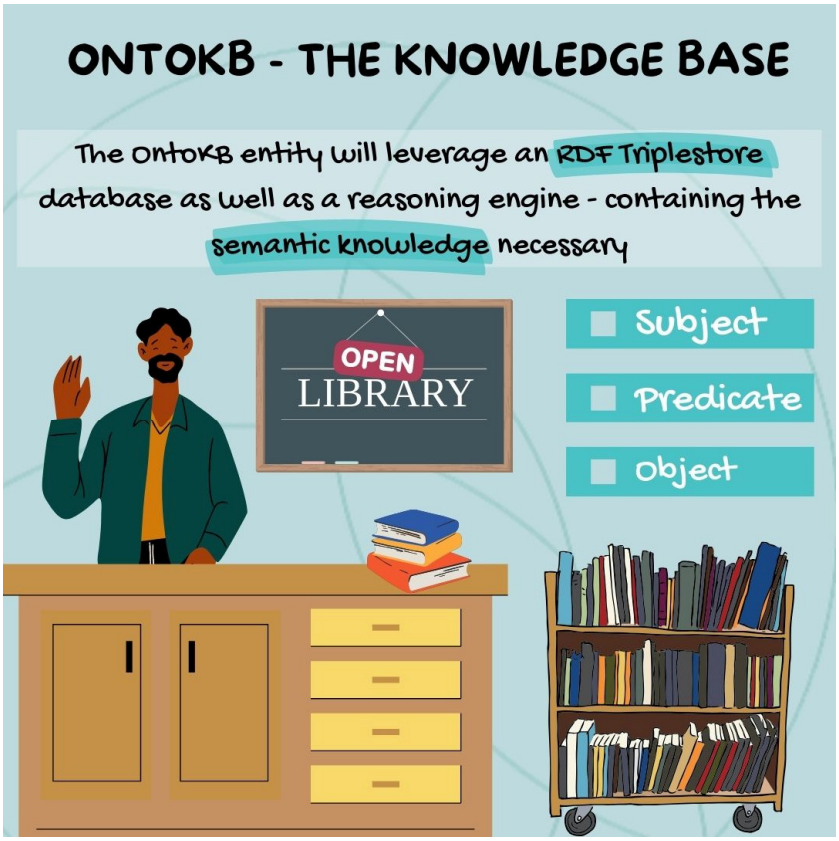
Published on 14th August 2023

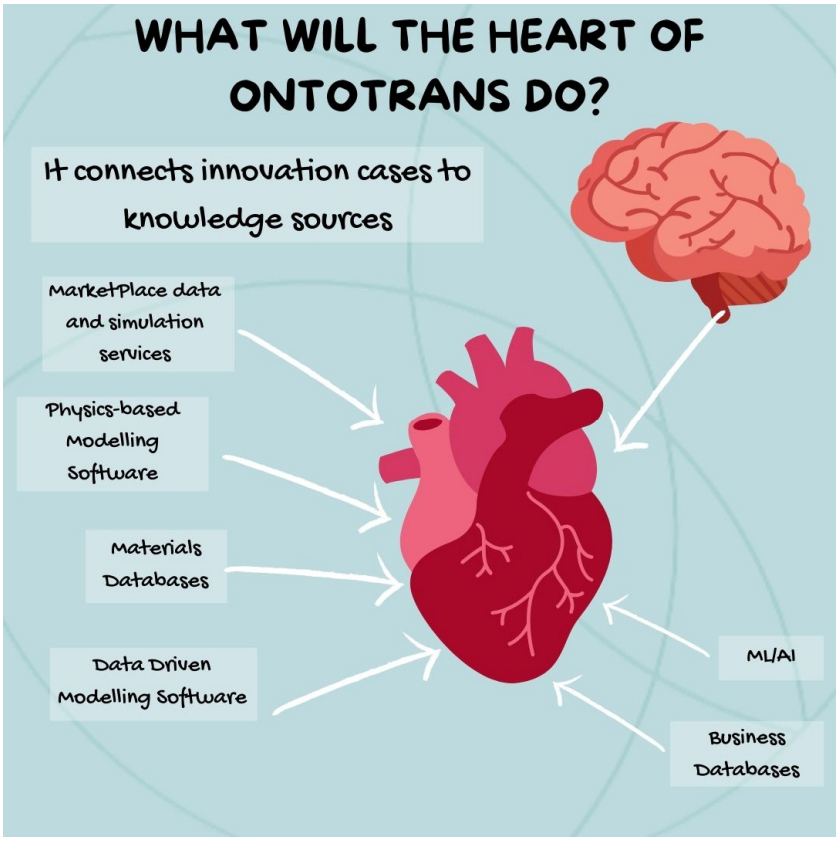
Artworks by Canva Creative Studio, Clker-Free-Vector-Images from pixabay, Fusion Books, HtcHnm from pixabay, Popular Logos, sketchify, Sketchify Education, sparklestroke, and Trendify.




MEET ONTOREC AND ONTOKB
OntoREC
OntoKB
The heart of OntoTrans is composed of two (logical) components, namely OntoREC, which will work as recommendation system, and OntoKB, which will handle the knowledge base


ONTOREC - THE ONTOTRANS RECOMMENDATION SYSTEM
The OntoREC entity is meant to facilitate and to standardize (as well as to control) the access to the knowledge base by providing a set of Application Programming Interfaces (APIs). The OntoRec entity will provide the main way to interact with OntoKB.

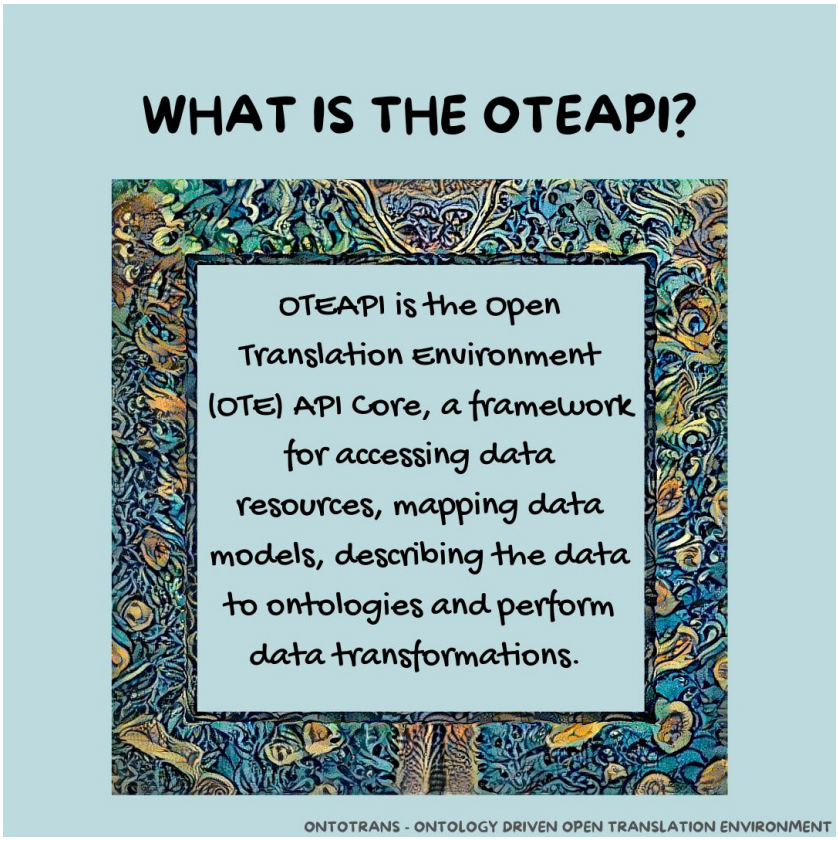

ONTOKB - THE KNOWLEDGE BASE
The OntoKB entity will leverage an RDF Triplestore database as well as a reasoning engine - containing the semantic knowledge necessary
OPEN
LIBRARY
Subject
Predicate
Object

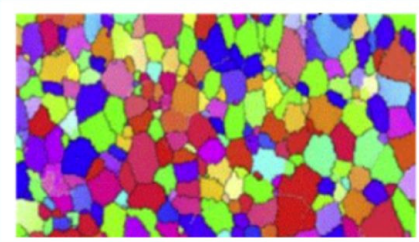

WHAT WILL THE HEART OF ONTOTRANS DO?
It connects innovation cases to knowledge sources
MarketPlace data and simulation services
Physics-based Modelling Software
Materials Databases
Data Driven Modelling Software
ML/AI
Business Databases

3.4. What is the OTEAPI?

Published on 21st May 2024

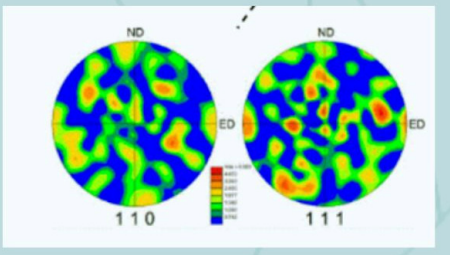
Artworks by carnicerofilms from pixabay and SINTEF.





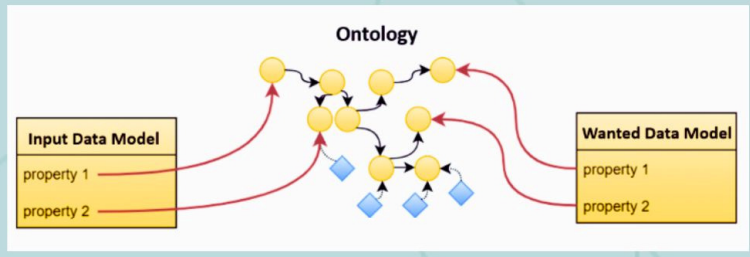
This is the experimental grain orientation of an aluminium alloy

This is what an end-user wants: the grain distribution as a polefigure, i.e., the graphical representation of the orientation of grains in space



ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

The OTEAPI will access the original data and parse them into an instance of the input data model



We harness our EMMO to take the input data model and associate it with ontological concepts

the OTEAPI can then generate the wanted data format

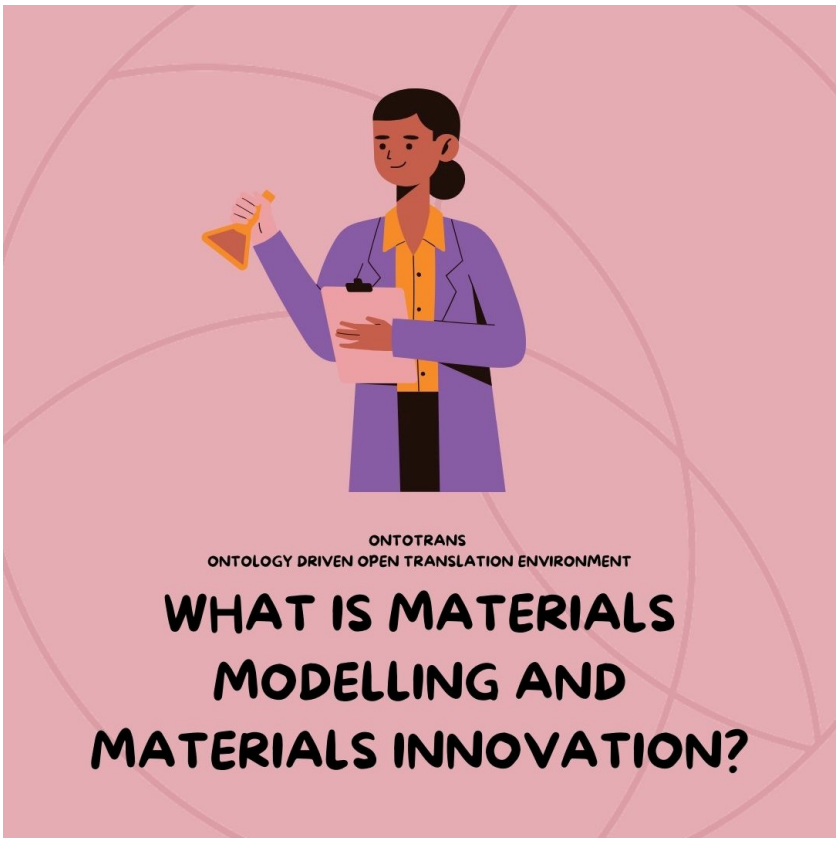
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

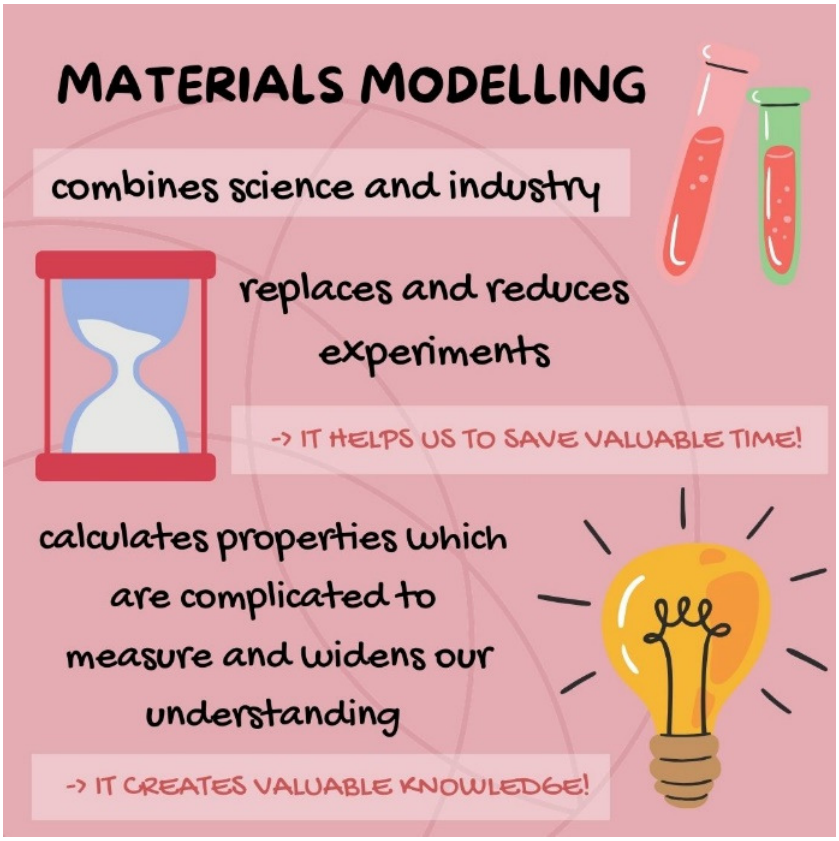
4. Posts about Topics related to OntoTrans

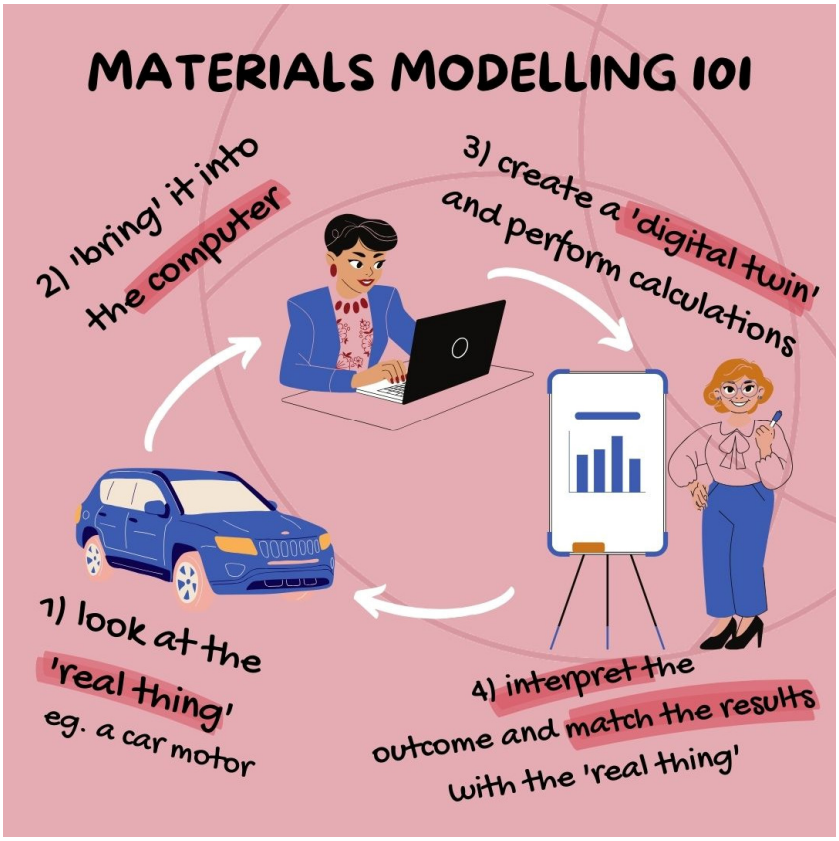
4.1. What is Materials Modelling and Materials Innovation?

Published on 17th June 2022

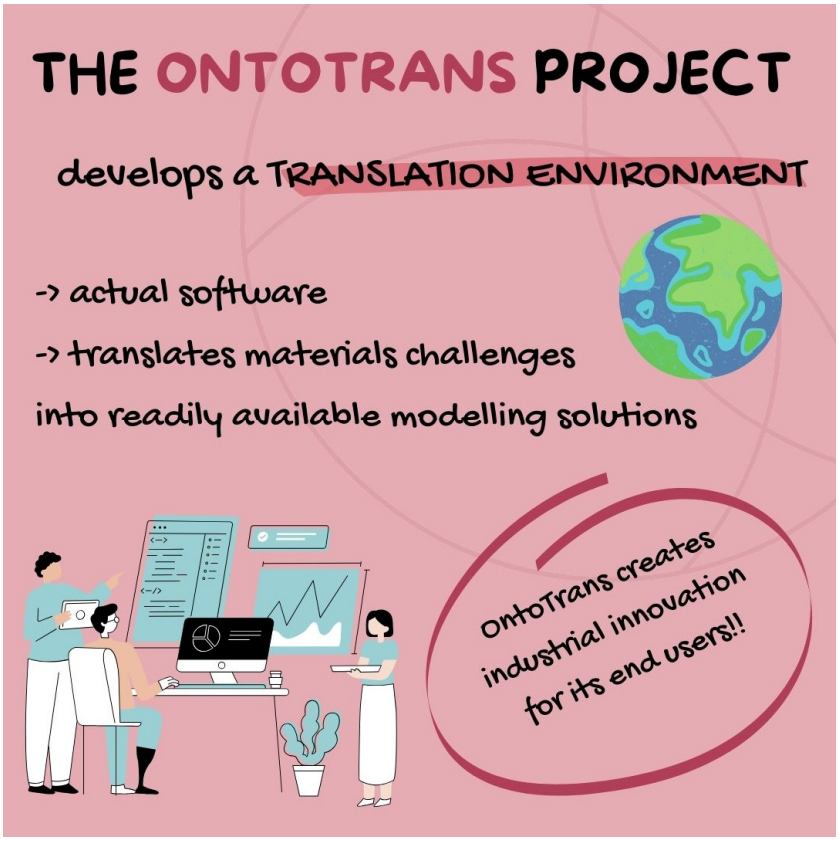
Artworks by Drawcee, iconsy, sketchify, and sparklestroke.




MATERIALS MODELLING
combines science and industry
replaces and reduces experiments
-> IT HELPS US TO SAVE VALUABLE TIME!
calculates properties which are complicated to measure and widens our understanding
-> IT CREATES VALUABLE KNOWLEDGE!


MATERIALS MODELLING 101
2) 'bring' it into the computer
3) create a 'digital twin' and perform calculations
1) look at the 'real thing' eg. a car motor
4) interpret the outcome and match the results with the 'real thing'

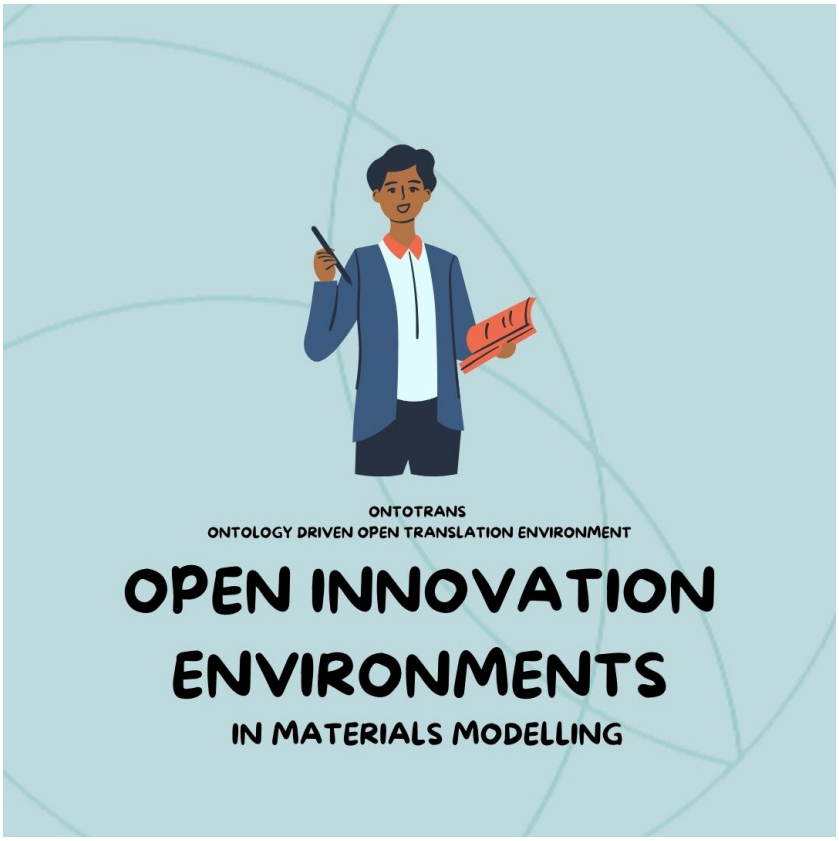

WE NEED INNOVATION IN MATERIALS SCIENCE
to create longer lasting materials
to replace rare materials
to increase recyclability
to tackle climate change


THE ONTOTRANS PROJECT
develops a TRANSLATION ENVIRONMENT
-> actual software
-> translates materials challenges
into readily available modelling solutions
OntoTrans creates industrial innovation for its end users!!

4.2. Open Innovation Environments

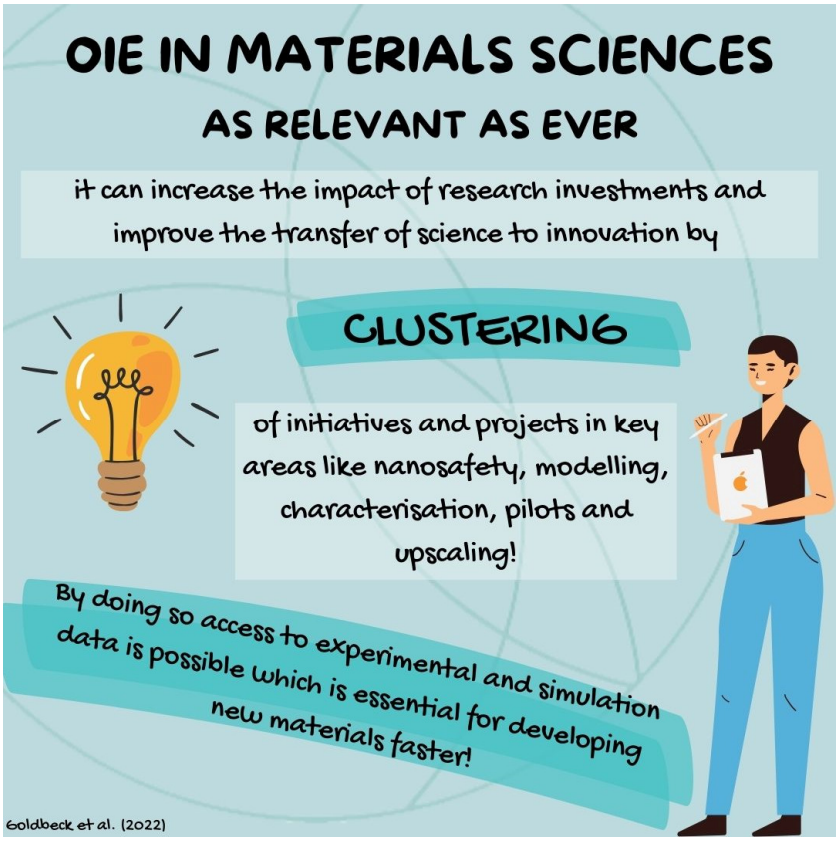
Published on 22nd June 2022

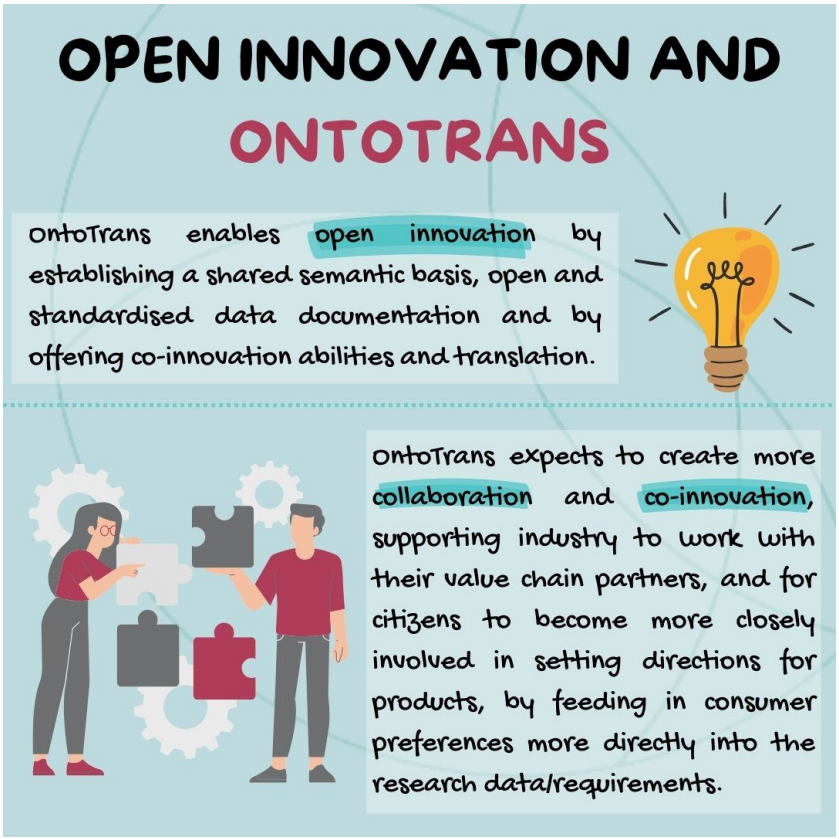
Artworks by 09910190, ArtsyBeeKids, Fusion Books, sketchify, and sparklestroke.




OPEN INNOVATION ENVIRONMENTS
useful for science and industry
in an OIE organisation internal ideas are combined with external ideas
Thus, the goal of an OIE is the creation of eco-system centric and cross-organisational innovation based on integrated collaboration and co-created shared value!
-> OPEN INNOVATION 2.0
Goldbeck et al. (2022)


OPEN INNOVATION IN HISTORY
The Romans used Open Innovation by offering citizenship to skilled people in return for their labour and know-how.
In the salons of Vienna, Austria Open Innovation was formed in the 1900s. Since women often weren't able to attend universities they created their own space for knowledge exchange in the multicultural environment of Vienna.
In London, United Kingdom, the Expos starting in 1851 were Open Innovation Environments for technological innovation. There, the brightest people of various nations could discuss developments and new trends in their fields of expertise.
Goldbeck et al. (2022)


OIE IN MATERIALS SCIENCES
AS RELEVANT AS EVER
it can increase the impact of research investments and improve the transfer of science to innovation by
CLUSTERING
of initiatives and projects in key areas like nanosafety, modelling, characterisation, pilots and upscaling!
By doing so access to experimental and simulation data is possible which is essential for developing new materials faster!
Goldbeck et al. (2022)


OPEN INNOVATION AND
ONTOTRANS
OntoTrans enables open innovation by establishing a shared semantic basis, open and standardised data documentation and by offering co-innovation abilities and translation.
OntoTrans expects to create more collaboration and co-innovation, supporting industry to work with their value chain partners, and for citizens to become more closely involved in setting directions for products, by feeding in consumer preferences more directly into the research data/requirements.

4.3. Digital Marketplaces

Published on 8th August 2022

Artworks by iconsy, ShariJo from pixabay, sketchify, Sketchify Mexico, and Trendify.

DIGITAL MARKETPLACES

are online platforms where transactions between buyers and sellers of products can be supported and streamlined

THEY HELP US TO

-> create collaboration between two parties
-> build an overarching business environment to harmonise business models of different providers
-> enable the creation of new services and products
-> match buyers with suitable sellers and vice versa

Goldbeck, Gerhard, Simperler, Alexandra, & Mogni, Gabriele. (2022).

DIGITAL MARKETPLACES IN R&D AND INDUSTRY

RESEARCH AND DEVELOPMENT (R&D)

The first developed marketplaces were platforms for experts and information (eg patents). The wide use of outsourcing in the Pharmaceutical and Life Sciences sector was also another driving factor for growth.

INDUSTRY AND MANUFACTURING

Marketplaces have formed around choosing materials based on their properties. In additive manufacturing and engineering providers often use simulation to service customers requiring specific parts more efficiently.

Goldbeck, Gerhard, Simperler, Alexandra, & Mogni, Gabriele. (2022).

THE BENEFITS OF DIGITAL MARKETPLACES

digital marketplaces can create more innovation in materials modelling by offering the work of experts, software, hardware, data and especially knowledge in one place

Marketplaces for materials modelling are currently still developing and therefore often referred to as 'forums'.

Digital marketplaces build communities in MM through fostering interactions between stakeholders, easing the access to use and bringing various actors together.

Goldbeck, Gerhard, Simperler, Alexandra, & Mogni, Gabriele. (2022).

DIGITAL MARKETPLACES AND ONTOTRANS

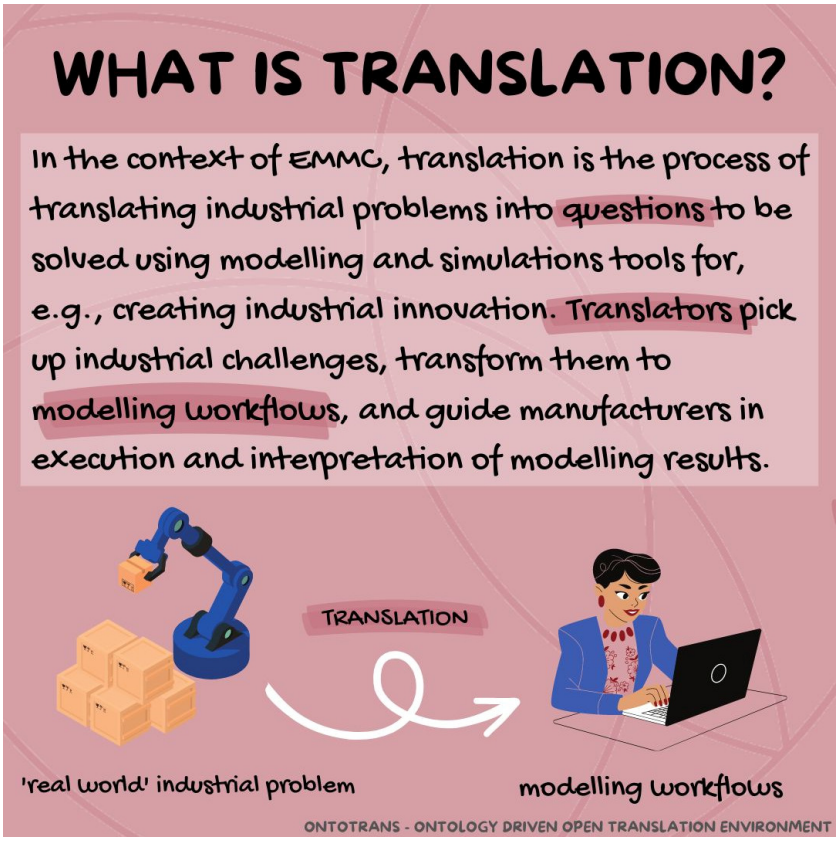
The European material modelling marketplace projects environments (VIMMP, MarketPlace) are to connect Ontotrans with an environment aimed to host most of the relevant stakeholders in the field of materials modelling and to enable the access to OntoTrans through their interfaces

For further information you can visit our related projects' homepages:
https://vimmp.eu/
https://the-marketplace.eu/

4.4. What is Translation?

Published on 28th October 2022

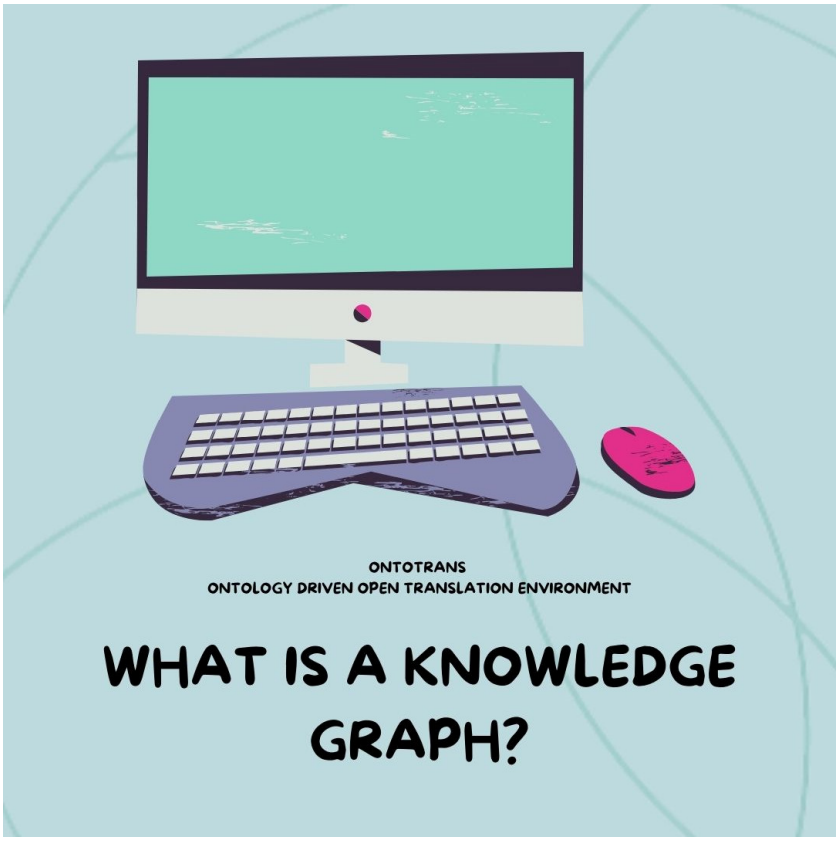
Artworks by ivandesign and sketchify.



4.5. What is a Knowledge Graph?

Published on 6th December 2022

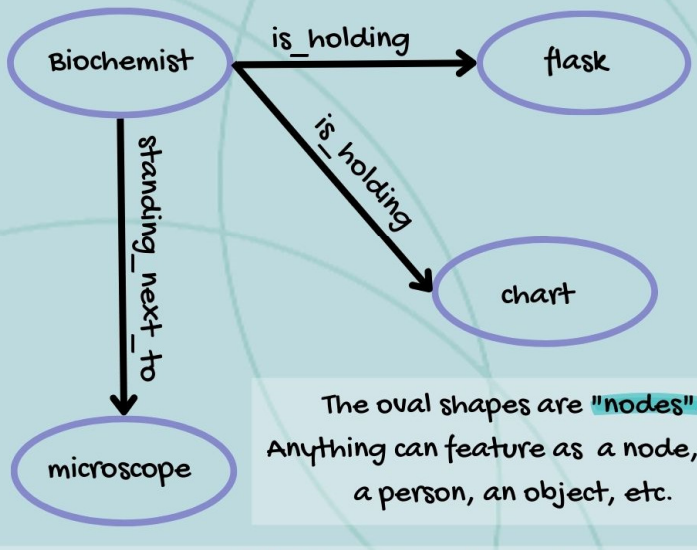
Artworks by Greenflash, iconsy, OpenClipart-Vectors from pixabay, sketchify, and Twemoji.



LET'S OBSERVE A SITUATION!

The Biochemist is holding a flask and a chart and is standing next to a microscope

LET'S BUILD A SIMPLE KNOWLEDGE GRAPH FROM THAT SITUATION!



The oval shapes are "nodes". Anything can feature as a node, e.g. a person, an object, etc.

The arrows are "edges" and their labels capture the relationship of interest between the nodes

WHAT ARE KNOWLEDGE GRAPHS FOR?

- to structure knowledge
- to integrate information extracted from multiple data sources
- to represent the information extracted using natural language processing
- to use as input into machine learning/databased models

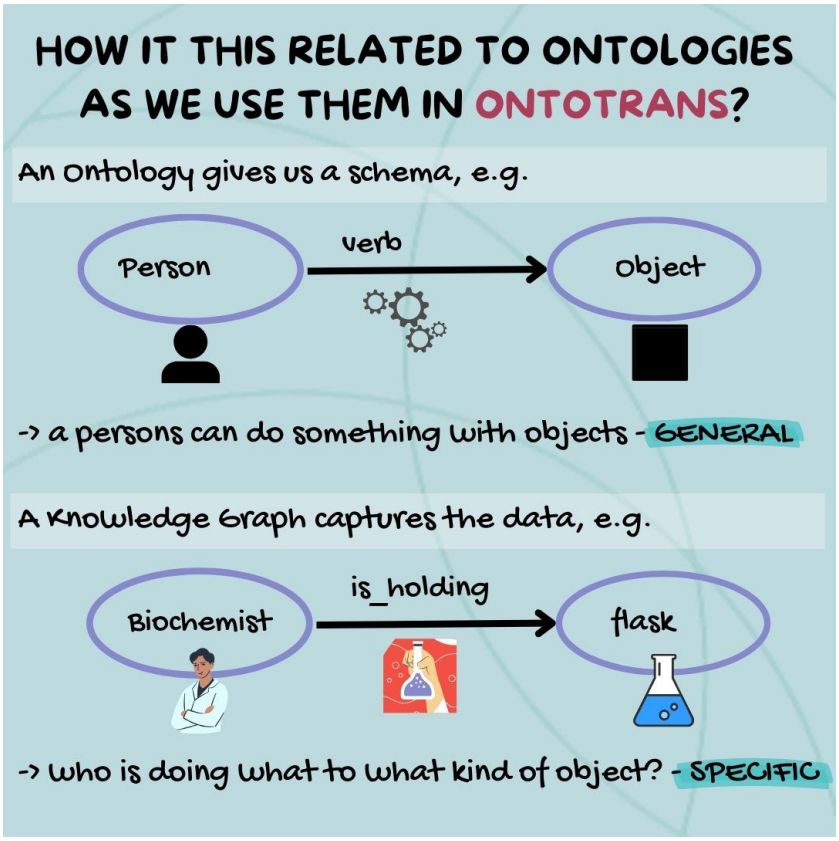
HOW DO WE MAKE KNOWLEDGE GRAPHS MACHINE READABLE?

-> code needs to be written!

For example, using the extensible Markup Language (XML - surface syntax for the whole internet, was designed to carry data)

PLUS

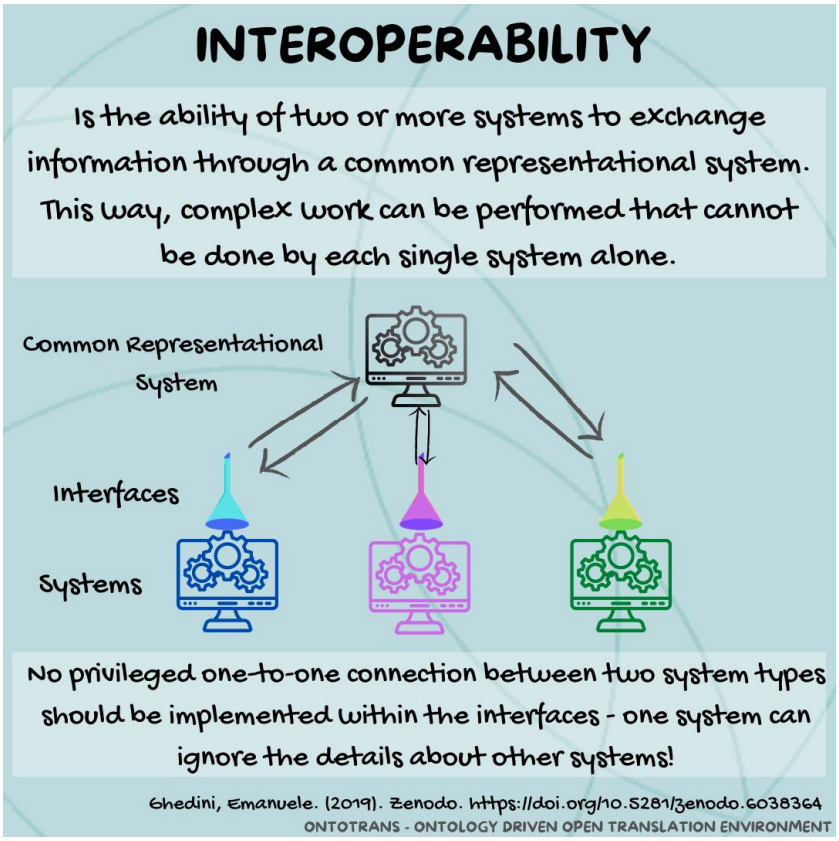
Resource Description Framework (RDF) (semantics framework for metadata conveniently, RDF is a graph data model)


HOW IT THIS RELATED TO ONTOLOGIES AS WE USE THEM IN ONTOTRANS?
An ontology gives us a schema, e.g.
Person
verb
Object
-> a persons can do something with objects - GENERAL
A Knowledge Graph captures the data, e.g.
Biochemist
is_holding
flask
-> who is doing what to what kind of object? - SPECIFIC

4.6. Interoperability

Published on 27th February 2023

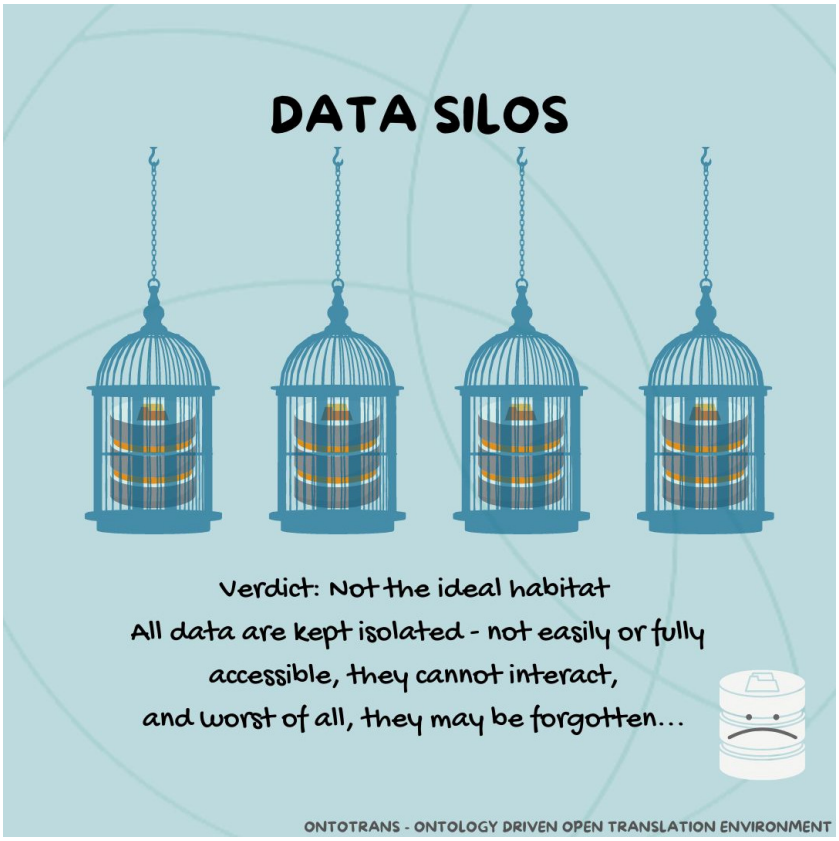
Artworks by SatawatFoto and sketchify.

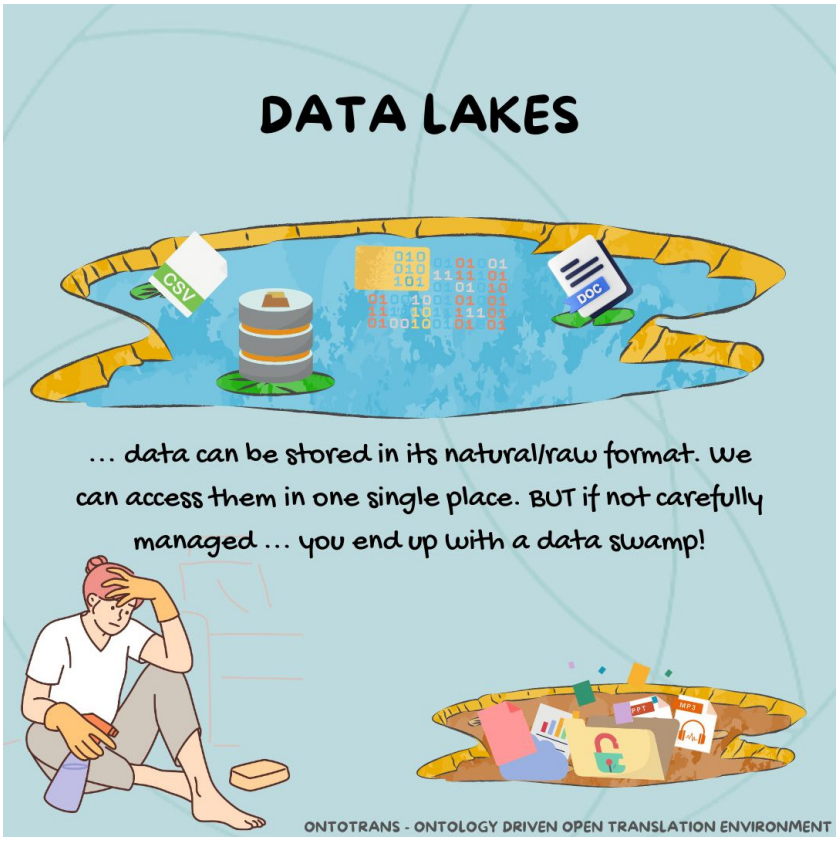


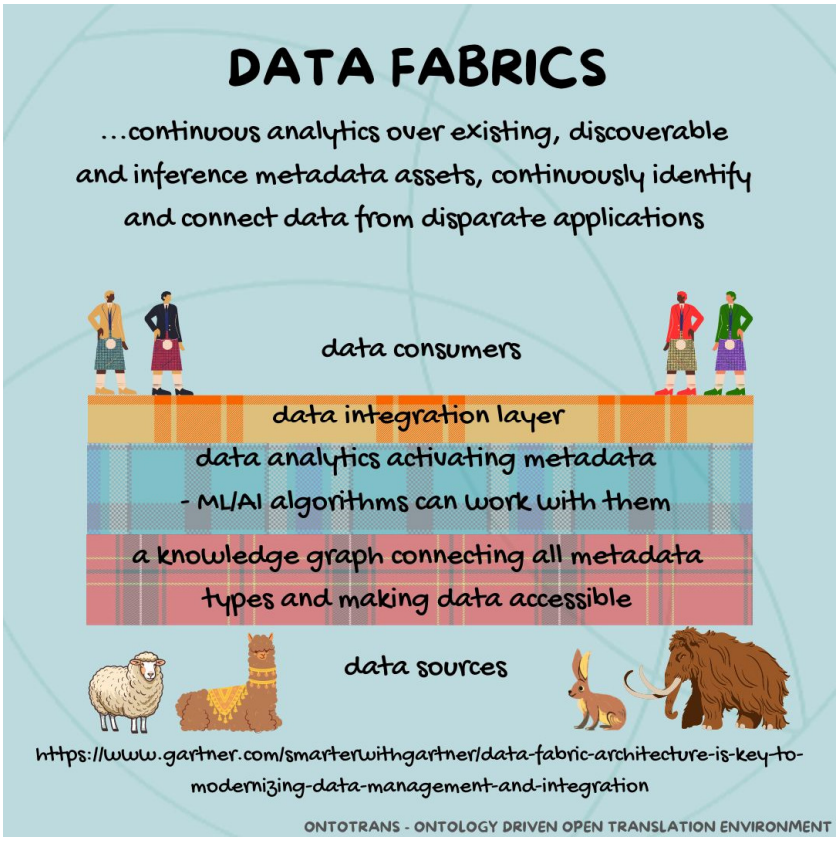
4.7. Where do Data ‘live’?

Published on 11th December 2023

Artworks by Alphavector, amethyststudio, Clker-Free-Vector-Images from pixabay, inspire-studio from pixabay, LiteraSign, OpenClipart-Vectors from pixabay, Plaid4You, Rizki Ahmad Fauzi, sketchify, Sketchify Education, sparklestroke, TheDigitalArtist from pixabay, Trendify, Triyo Design, and Unfold X.


DATA SILOS
Verdict: Not the ideal habitat
All data are kept isolated - not easily or fully accessible, they cannot interact, and worst of all, they may be forgotten...
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

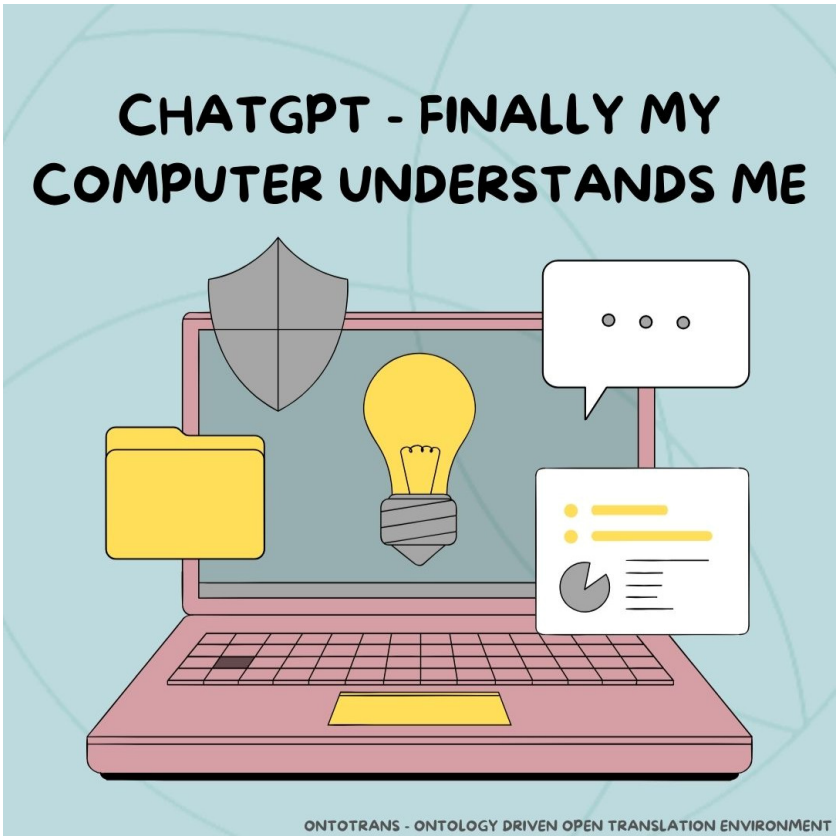

DATA LAKES
CSV
DOC
... data can be stored in its natural/raw format. We can access them in one single place. BUT if not carefully managed ... you end up with a data swamp!
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

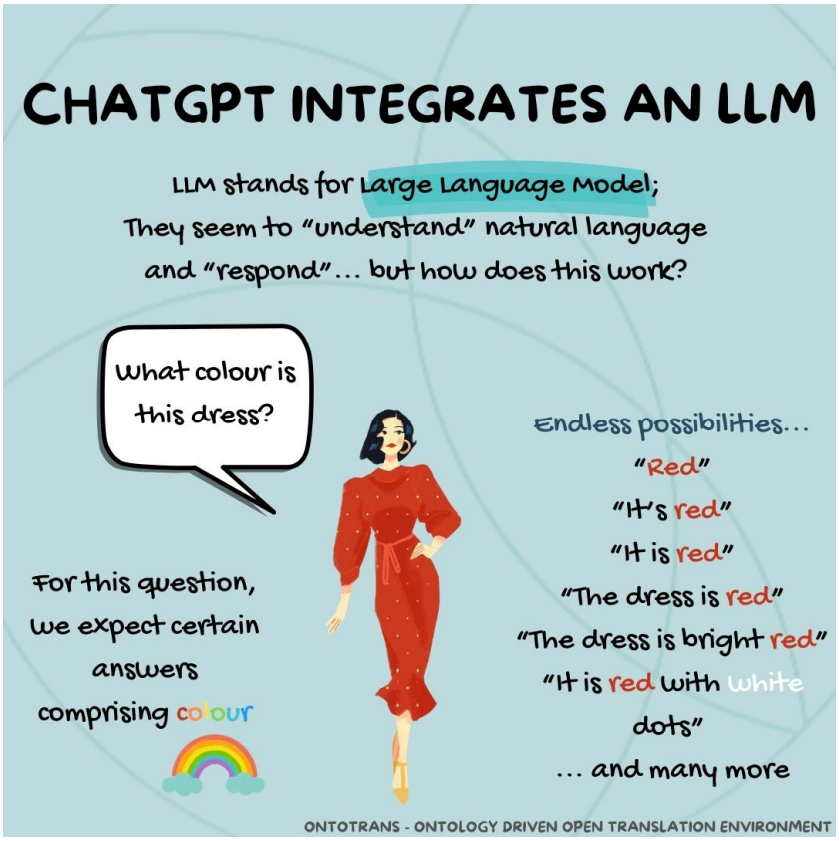

DATA FABRICS
...continuous analytics over existing, discoverable and inference metadata assets, continuously identify and connect data from disparate applications
data consumers
data integration layer
data analytics activating metadata
- ML/AI algorithms can work with them
a knowledge graph connecting all metadata types and making data accessible
data sources
https://www.gartner.com/smarterwithgartner/data-fabric-architecture-is-key-to-modernizing-data-management-and-integration
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

4.8. ChatGPT - finally my Computer understands me

Published on 12th January 2024

Artworks by Aliaksandr Huseu, amethyststudio, Joanna Rzońca, Juno, Shutterstock, sketchify, Sketchify Education, Sketchify Philippines, and Sparklestroke.




CHATGPT INTEGRATES AN LLM
LLM stands for Large Language Model;
They seem to "understand" natural language
and "respond"... but how does this work?
What colour is this dress?
For this question, we expect certain answers comprising colour
Endless possibilities...
"Red"
"It's red"
"It is red"
"The dress is red"
"The dress is bright red"
"It is red with white dots"
... and many more
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT


WHAT DO WE KNOW ABOUT LANGUAGES?
• There are words in current use (170,000 in English)
• We stitch words together (syntax)
• Words have a meaning (semantics)
• Questions trigger answers (right or wrong)
What colours do apples have?
"Blue with white dots" is grammatically correct but not the right answer
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

HOW DOES CHATGPT GIVE NEW ANSWERS?

GPT stands for Generative pre-trained transformers. GPTs are multi-layered neuronal networks (NNs) that realise an LLM.

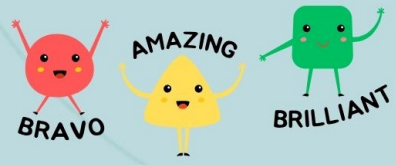
The LLM will take your input request, analyze its tokens and start stitching up an answer, word by word, or phrase by phrase, each word or phrase selected using the patterns it learned before and taking into account your input.

ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

HOW DO WE CREATE AN LLM FOR ENGLISH?

1. We write a programme that lets an LLM build itself!
2. We give it mountains of digitised text and
3. Let the LLM detect patterns and rules in it,

Repeatedly giving feedback until satisfied with LLM's output quality



ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

4.9. Fantastic FAIR

Published on 29th January 2024

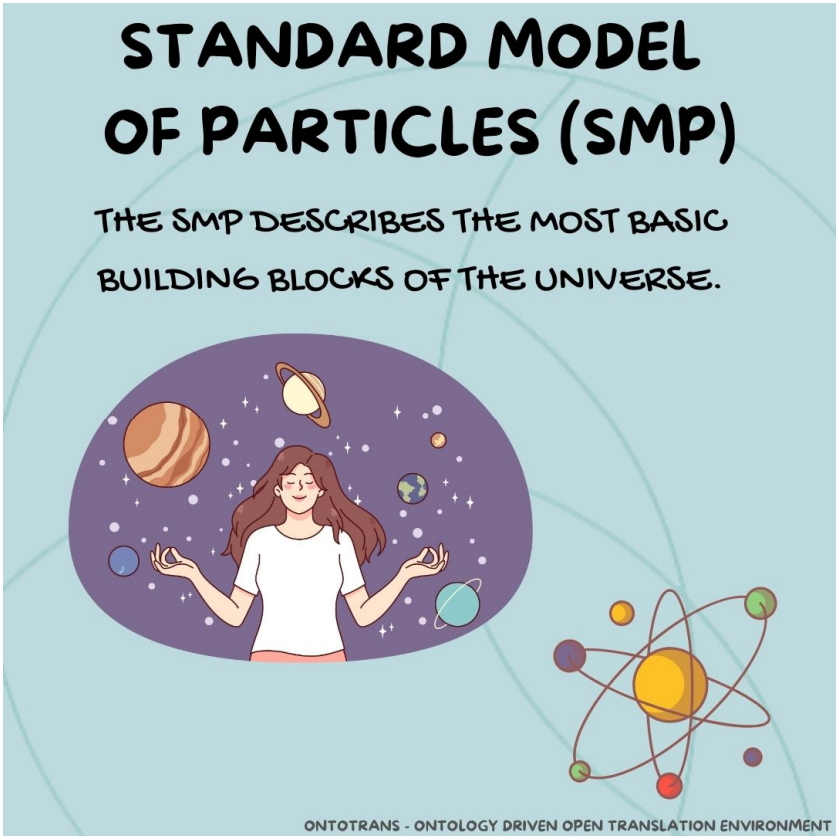
Artworks from Królestwo_Nauki from pixabay, sketchify, sparklestroke, studio, and Twemoji.

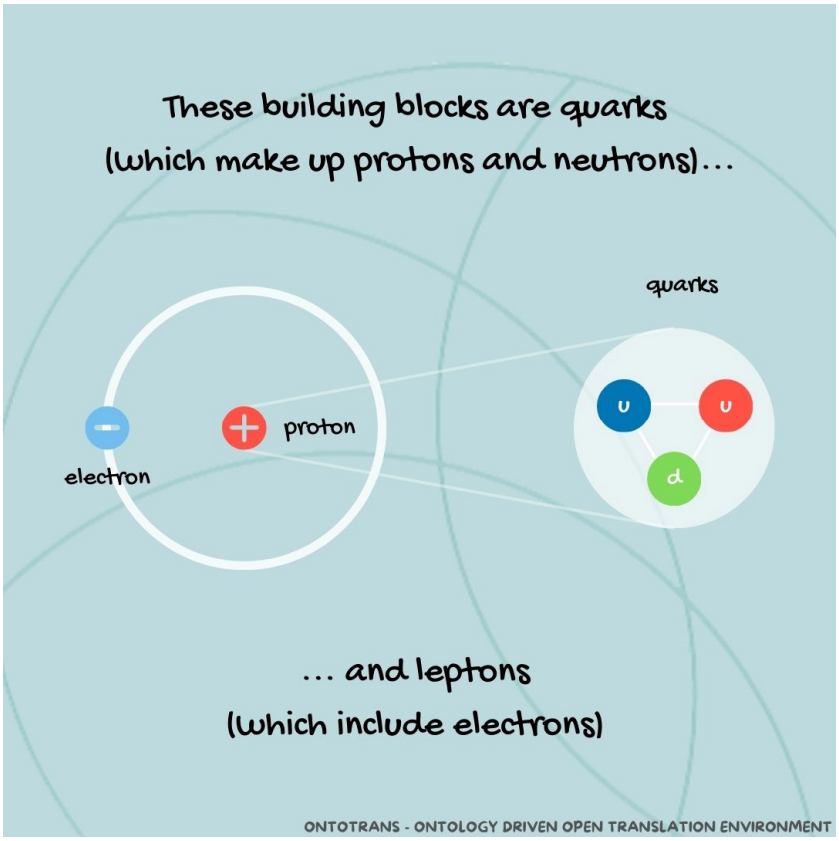

F for Findable
A for Accessible
I for Interoperable
R for Reusable
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

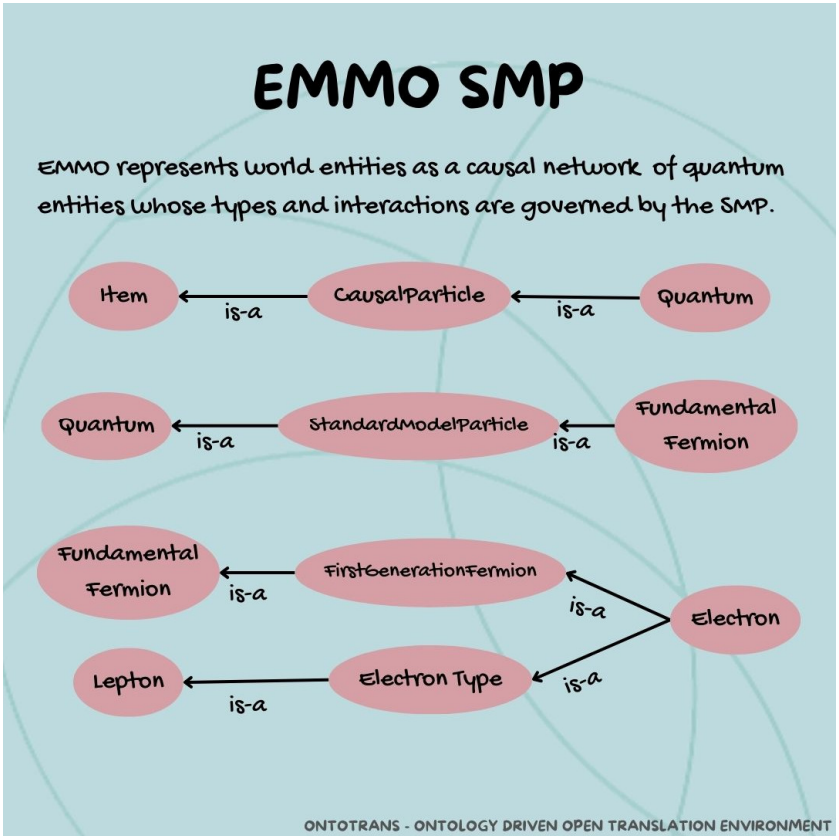
4.10. Standard Model of Particles (SMP)

Published on 4th March 2024

Artworks by Drawlab19, imagineHarry from Trendify, sparklestroke




These building blocks are quarks
(which make up protons and neutrons)...
quarks
proton
electron
u
u
d
... and leptons
(which include electrons)
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

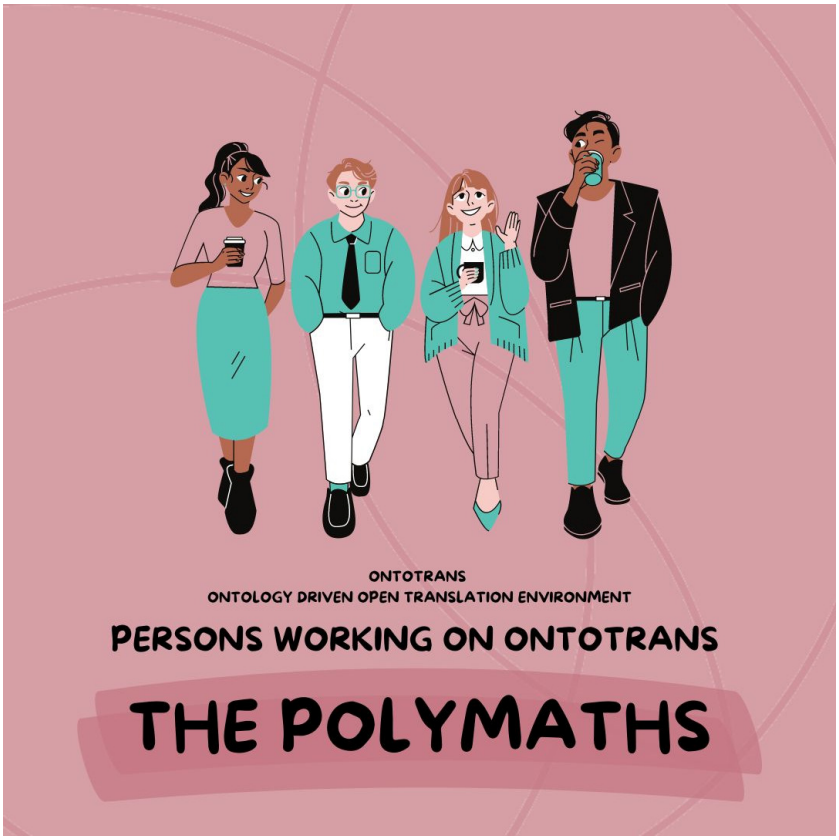

EMMO SMP
EMMO represents world entities as a causal network of quantum entities whose types and interactions are governed by the SMP.
Item
is-a
CausalParticle
is-a
Quantum
Quantum
is-a
StandardModelParticle
is-a
Fundamental Fermion
Fundamental Fermion
is-a
FirstGenerationFermion
is-a
Electron
Lepton
is-a
Electron Type
is-a
ONTOTRANS - ONTOLOGY DRIVEN OPEN TRANSLATION ENVIRONMENT

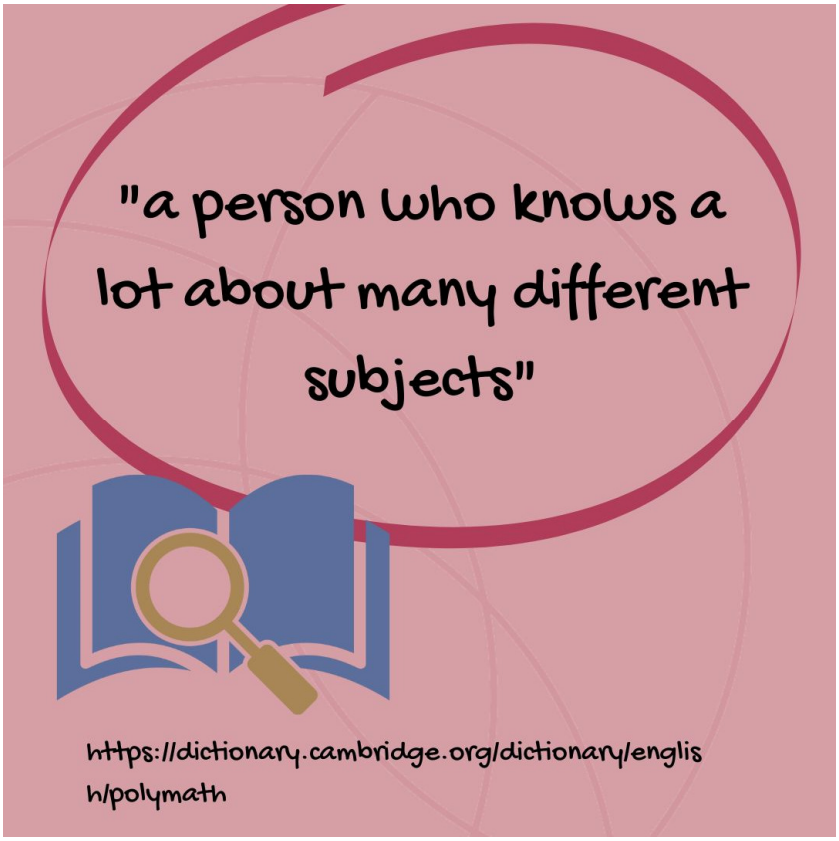
5. Posts about Persons Working on OntoTrans

5.1. The Polymaths

Published on 27th June 2022

Artworks by olahgaris, OpenClipart-Vectors from pixabay, sketchify, sparklestroke, and videoplasty.




"a person who knows a lot about many different subjects"
https://dictionary.cambridge.org/dictionary/english/polymath


... SOMETIMES MISUNDERSTOOD
... you know too much!
... concentrate on one subject!
... how many domains can one person cross?
... where are you going with this?

... BUT THEY ARE CURIOUS AND READY FOR ADVENTURES

semantics, ontologies and the wardrobe
-> if there are open doors they just cannot resist

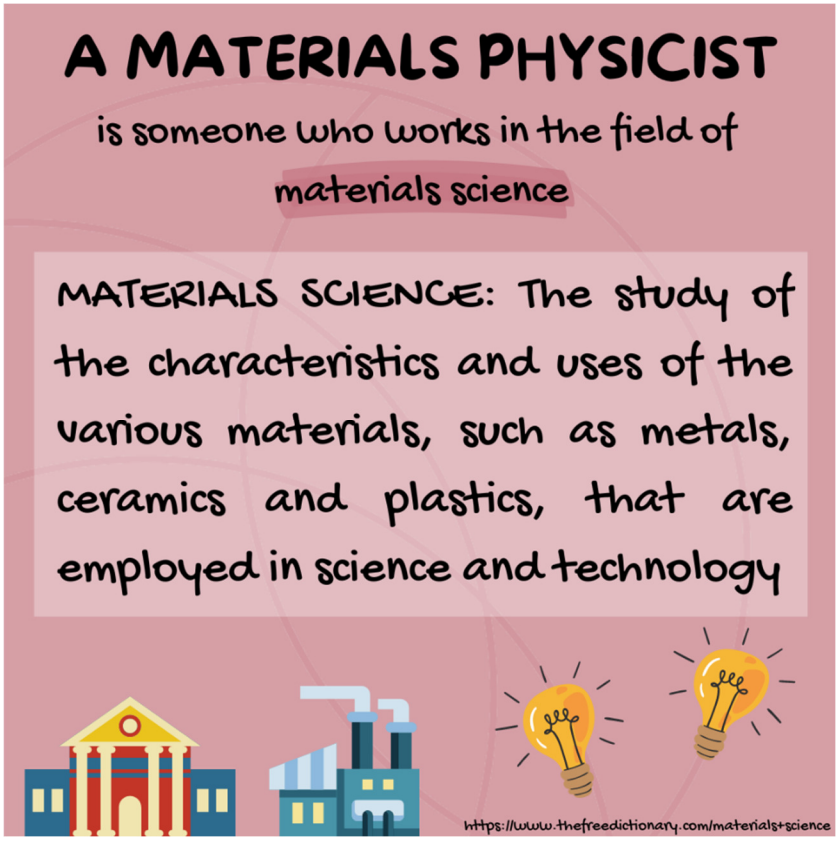
WORKING WITH ONTOTRANS REQUIRES POLYMATHS

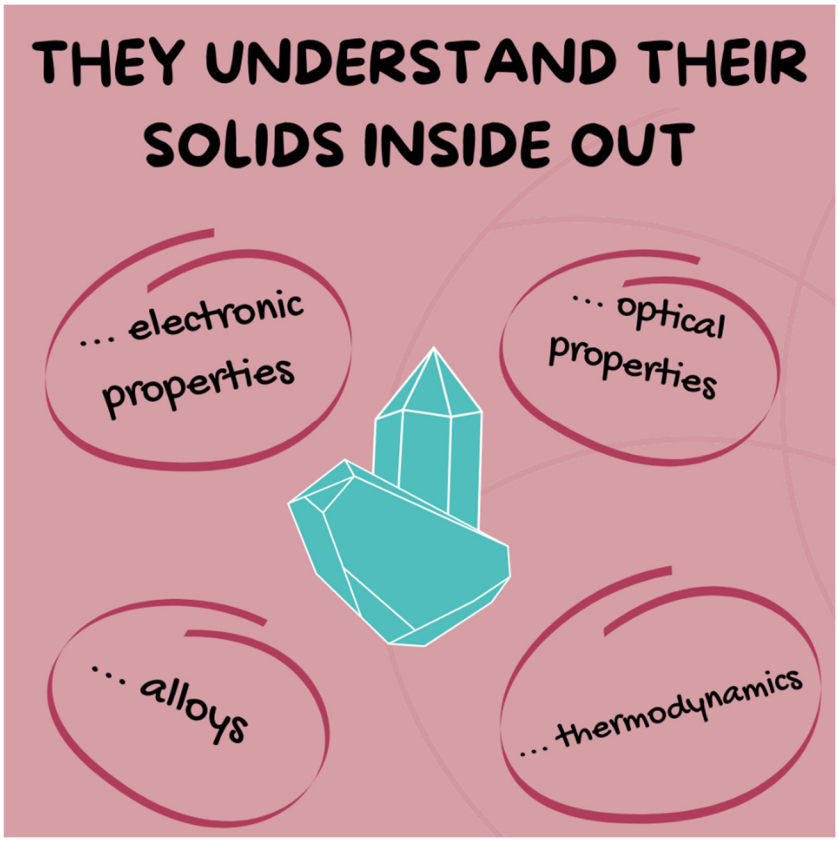
we want many people with many boxes to think outside of them

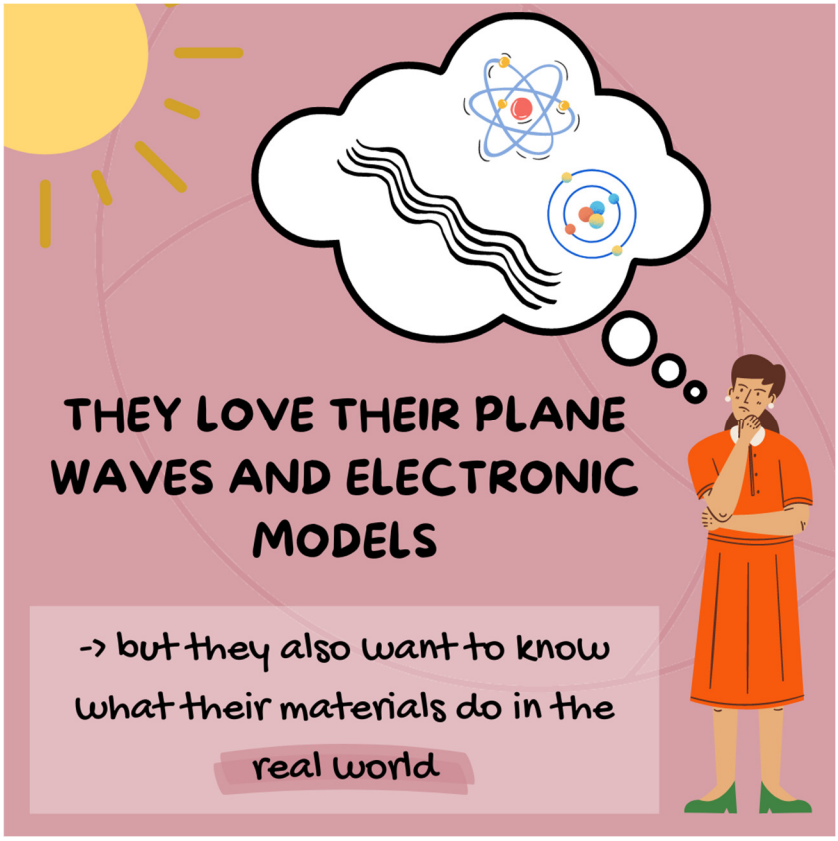
5.2. The Materials Physicists

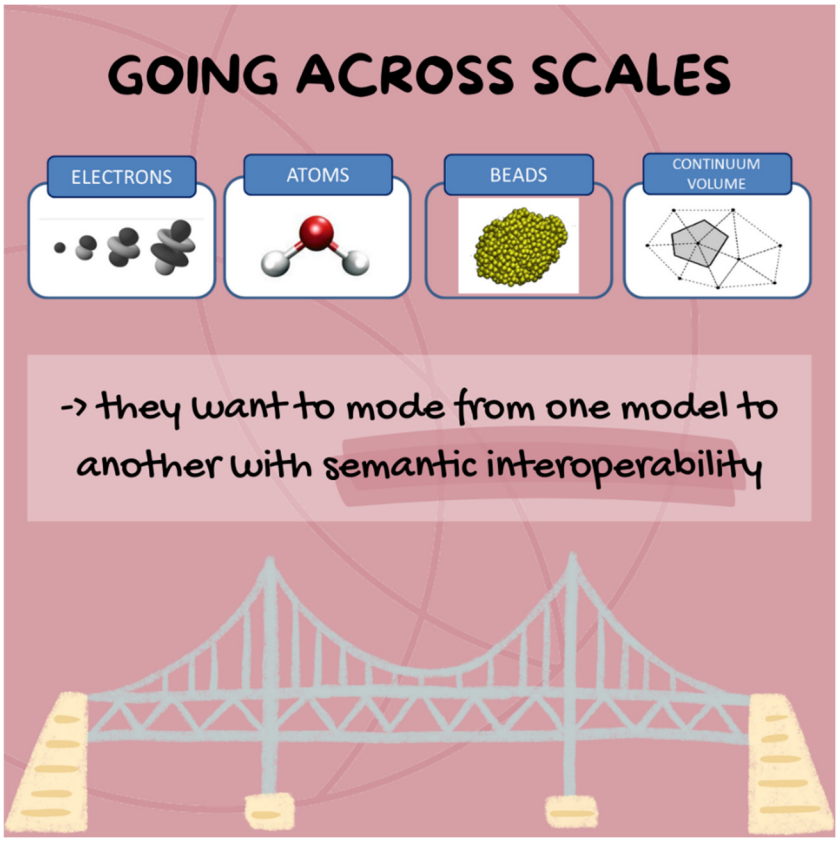
Published on 18th July 2022

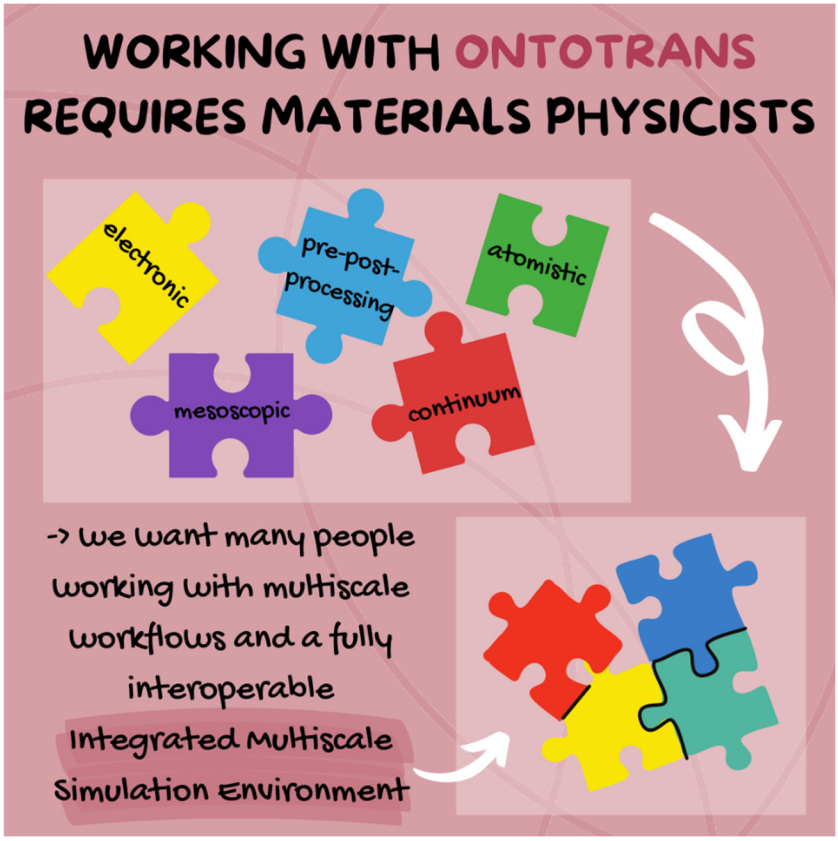
Artworks by Canva Creative Studio, OpenClipart-Vectors from pixabay, pongsakornjun, sketchify, Sketchify Korea, sparklestroke, Sparklestroke Global, and Statement Goods.


A MATERIALS PHYSICIST
is someone who works in the field of
materials science
MATERIALS SCIENCE: The study of the characteristics and uses of the various materials, such as metals, ceramics and plastics, that are employed in science and technology
https://www.thefreedictionary.com/materials+science


THEY UNDERSTAND THEIR SOLIDS INSIDE OUT
... electronic properties
... optical properties
... alloys
... thermodynamics


THEY LOVE THEIR PLANE WAVES AND ELECTRONIC MODELS
-> but they also want to know what their materials do in the real world


GOING ACROSS SCALES
ELECTRONS
ATOMS
BEADS
CONTINUUM VOLUME
-> they want to mode from one model to another with semantic interoperability


WORKING WITH ONTOTRANS
REQUIRES MATERIALS PHYSICISTS
electronic
pre-post-processing
atomistic
mesoscopic
continuum
-> we want many people working with multiscale workflows and a fully interoperable Integrated Multiscale Simulation Environment

5.3. The Materials Modelling Consultants

Published on 5th September 2022

Artworks by Canva Creative Studio, iconsy, OpenClipart-Vectors from pixabay, ShariJo by pixabay, sketchify, Sketchify Philippines, sparklestroke, Sparklestroke Global, viktoriiaablohina, and videoplasty.


CONSULTANT
= a person who gives professional or expert advice
https://www.thefreedictionary.com/consultants


ONTOTRANS
OUR CONSULTANTS ARE SPECIALISED IN MATERIALS AND MATERIALS MODELLING


THEIR CUSTOMERS WANT TO GET OUT MORE OF THEIR DATA
What does my data really mean?
Does a machine understand this?
How can I gain more knowledge about my data?


WHEN THERE IS A REAL CHAOS OF...
conventions
vocabulary
taxonomy
standards

... CONSULTANTS FACILITATE THE USE OF MODA AND THE EMMO

MODA

"Materials modelling - terminology, classification and metadata", several stakeholders formally agreed on the terminology used to describe materials modelling
-> https://emmc.eu/moda/

EMMO

Elementary Multiperspective Material Ontology, a semantic framework for the applied science
-> https://github.com/emmo-repo/EMMO

WORKING WITH ONTOTRANS REQUIRES CONSULTANTS

They hover like eagles over our project, find new trends and keep a watchful eye that our team follows established standards.

They also facilitate and support our project members in bringing in new ideas and getting creative.

5.4. The Communication Team

Published on 3rd October 2022

Artworks by Clker-Free-Vector-Images from pixabay, logosandbrands, M.Wallflower by Trendify, Nevinity, OpenClipart-Vectors from pixabay, Popular Logos, sketchify, and Sketchify Education.


OUR COMMUNICATION TEAM MEMBERS ARE DIVERSE!
They all have different skill sets and bring them in. We have humanists, educators, musicians, etc. on board who love to create content and in true EU spirit broadcast to the citizens of the wolrd!


THEY LEARNED A LOT ABOUT ONTOLOGIES
and want to share their gained knowledge with the world and connect!


THEY USE SOCIAL MEDIA
...to tell you all about ontologies, materials modelling and materials physics, project updates, events and more!

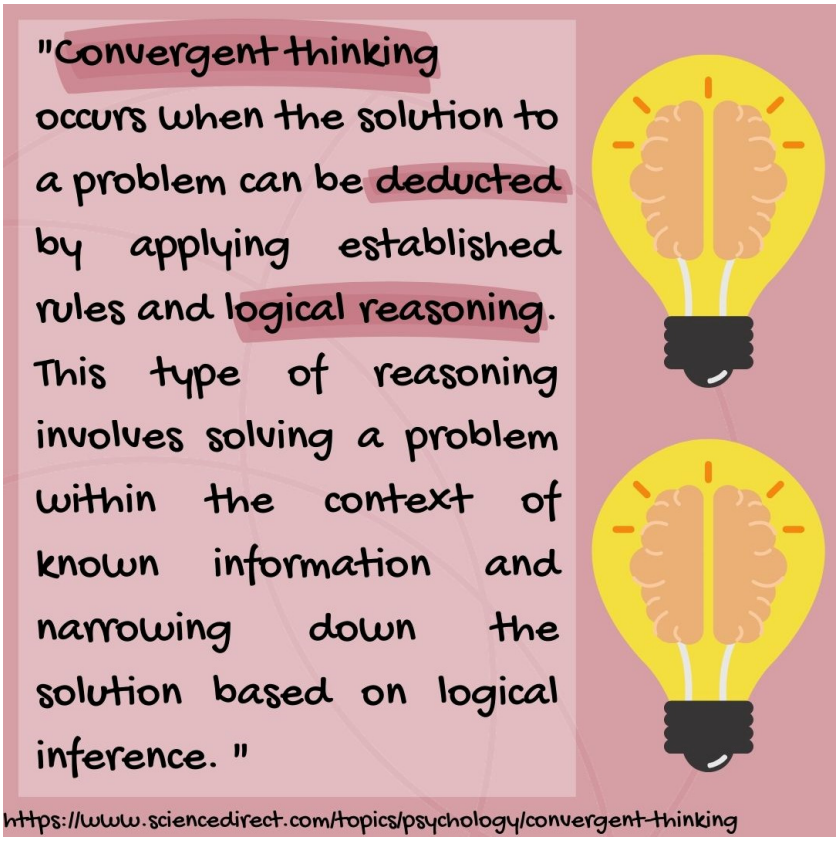

OUR COMMUNICATION TEAM
-> creates content for a broad range of persons
-> distributes findings and share our colleagues' orignal research work with you
-> wants you to get the ontology bug, too!


WE ARE CREATING AN ENVIRONMENT AROUND
ONTOTRANS
You can learn with us, try stuff, and use ontotrans for your work at some point!
we want all of you to turn into ontocommunicators!

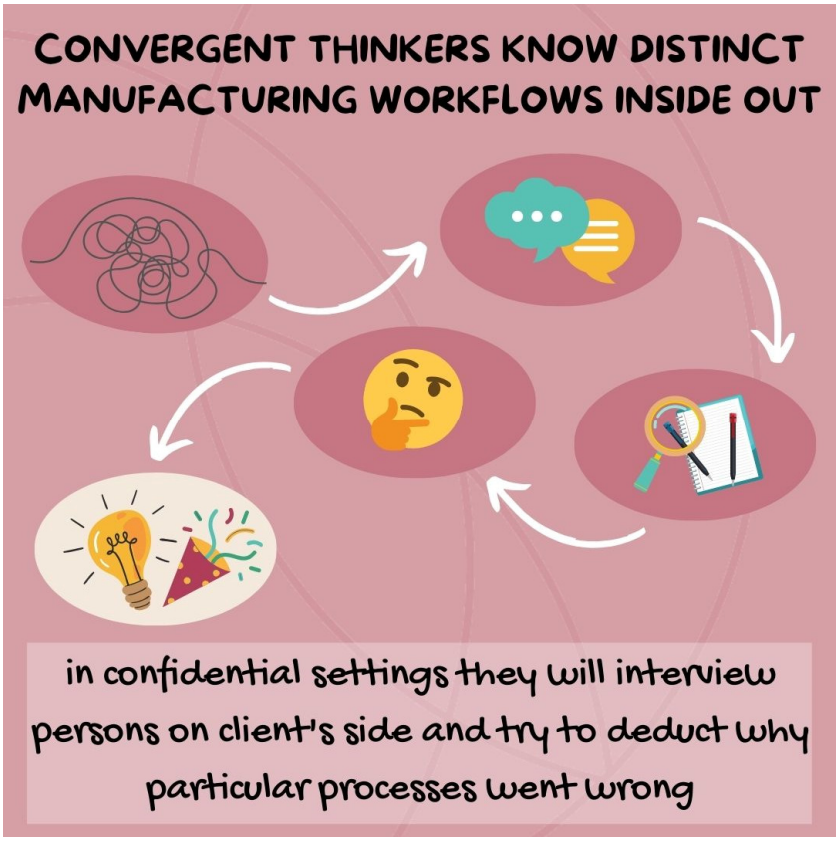
5.5. The Convergent Thinkers

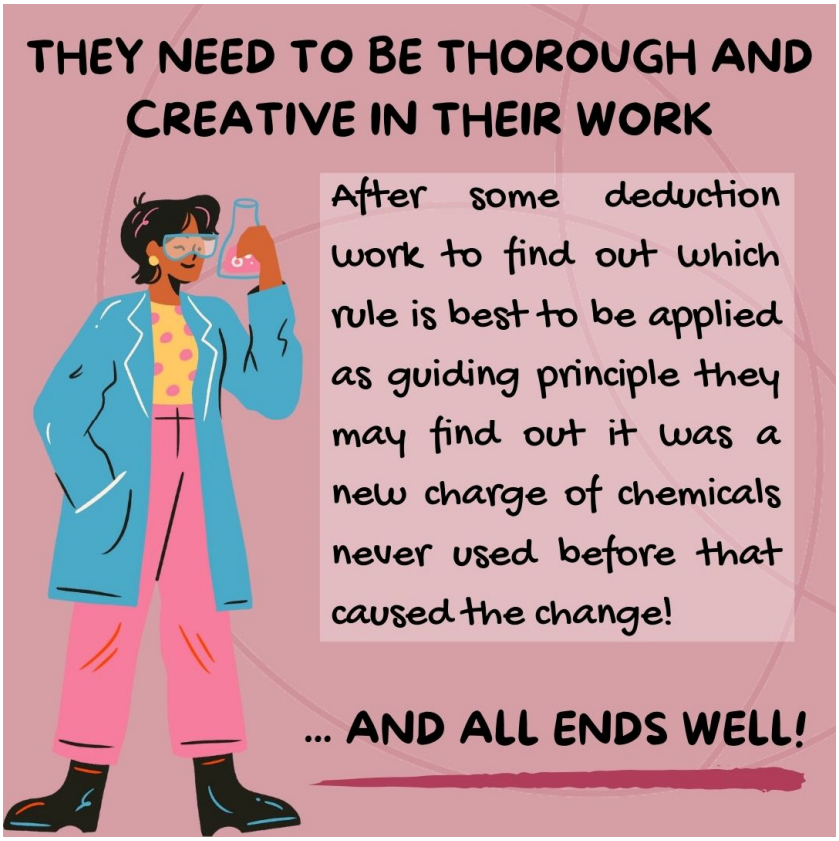
Published on 28th November 2022

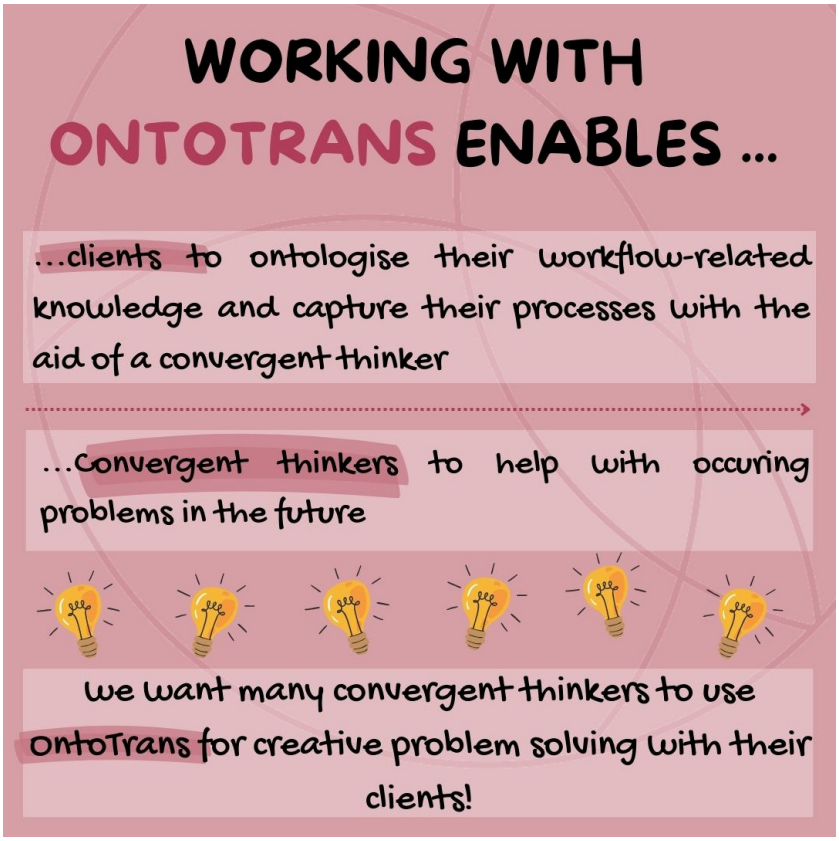
Artworks by iconsy, sketchify, sparklestroke, studio,Twemoji, and viktoriiaablohina.


"Convergent thinking occurs when the solution to a problem can be deducted by applying established rules and logical reasoning. This type of reasoning involves solving a problem within the context of known information and narrowing down the solution based on logical inference. "
https://www.sciencedirect.com/topics/psychology/convergent-thinking


THEIR CLIENTS SEEK THEM, BECAUSE SOMETHING IS NOT RIGHT


CONVERGENT THINKERS KNOW DISTINCT MANUFACTURING WORKFLOWS INSIDE OUT
in confidential settings they will interview persons on client's side and try to deduct why particular processes went wrong


THEY NEED TO BE THOROUGH AND CREATIVE IN THEIR WORK
After some deduction work to find out which rule is best to be applied as guiding principle they may find out it was a new charge of chemicals never used before that caused the change!
... AND ALL ENDS WELL!


WORKING WITH
ONTOTRANS ENABLES ...
...clients to ontologise their workflow-related knowledge and capture their processes with the aid of a convergent thinker
...convergent thinkers to help with occuring problems in the future
we want many convergent thinkers to use OntoTrans for creative problem solving with their clients!

5.6. The PhD Students

Published on 20th February 2023

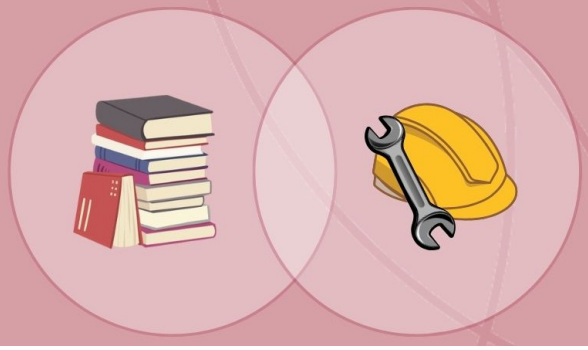
Artworks by amethyststudio, Clker-Free-Vector-Images from pixabay, HtcHnm from pixabay, Image Free Download, pongsakornjun, ShariJo from pixabay, sketchify, Sketchify Japan, sparklestroke, Trendify, and Twemoji.

PHD STUDENTS

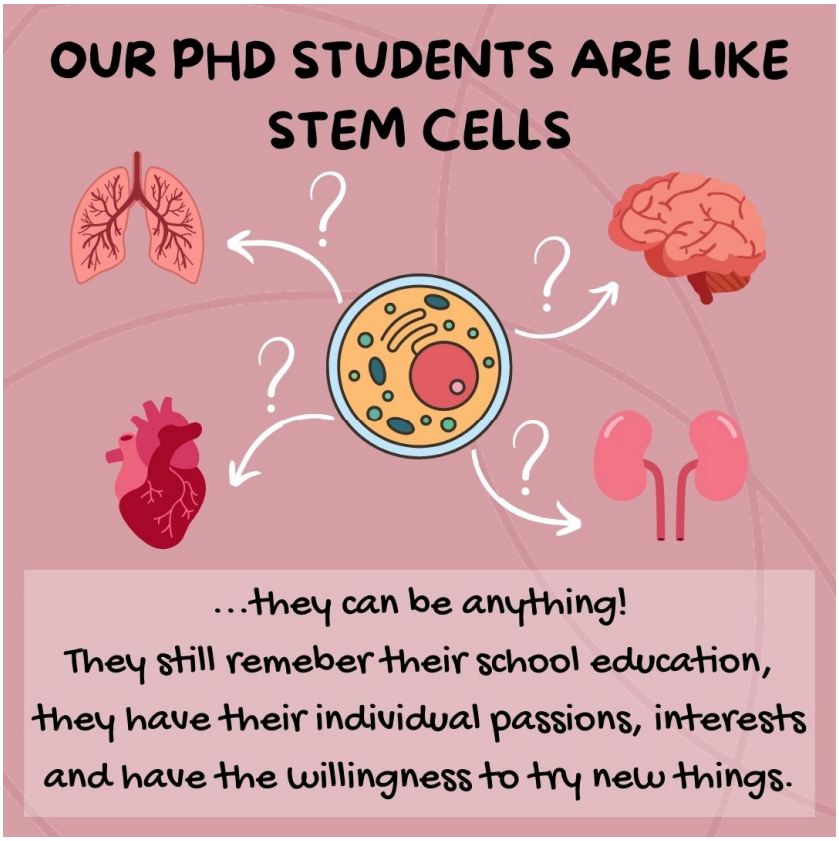
are working towards a Doctor Title and undertake research work affiliated with a university

WHAT ATTRACTS THEM TO ONTOTRANS IS

the connection between both philosophy and applied science. With OntoTrans you can be an engineer and a philosopher. Our PhD students can open a dialogue between the two disciplines and start the flow from theory formalisation to practice needs and vice versa.




WE ALSO OFFER
...a direct link between the research world and the industrial world
...a group of multidisciplinary researchers and experts

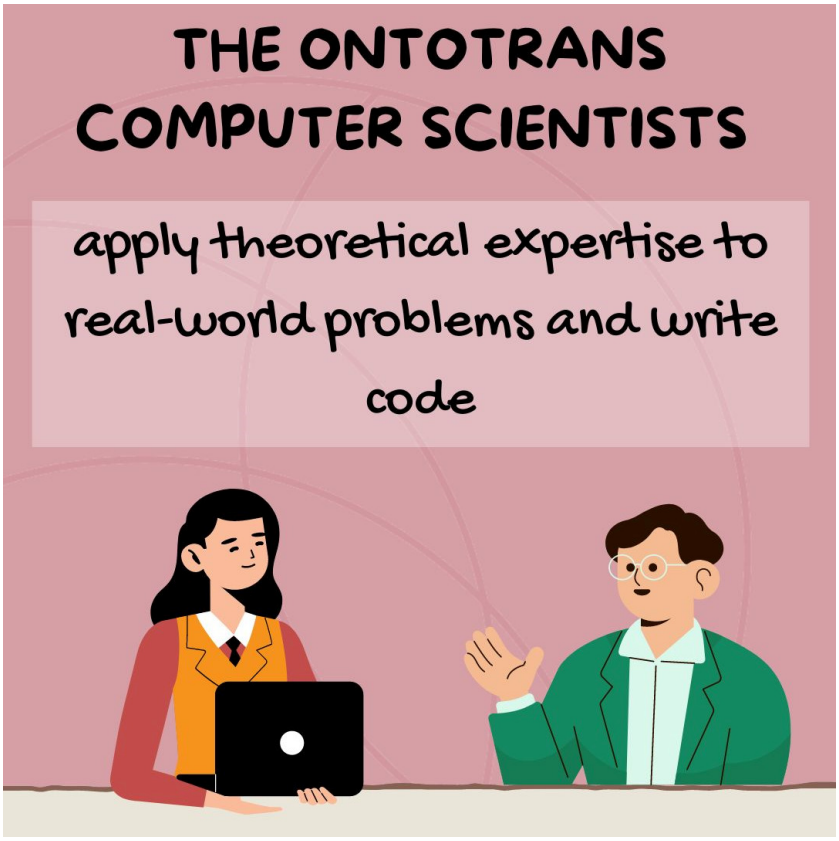

OUR PHD STUDENTS ARE LIKE STEM CELLS
...they can be anything!
They still remeber their school education, they have their individual passions, interests and have the willingness to try new things.

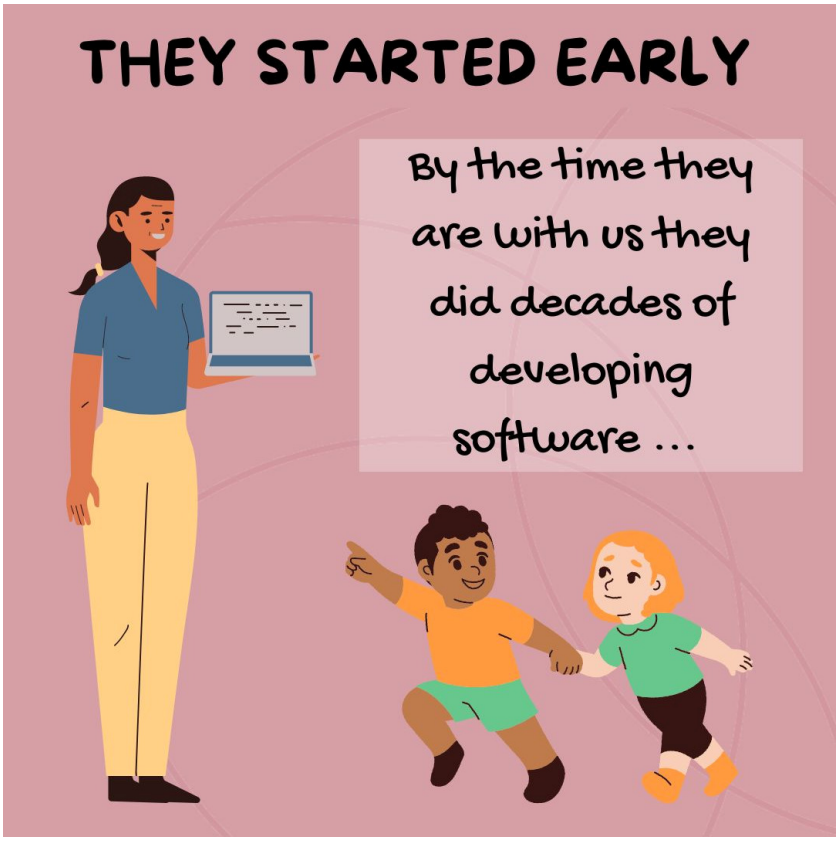

WHILE WORKING ON
ONTOTRANS THEY CAN
-> apply and further explore their talents!
-> infect all partners and stakeholders with their fascination about new research
-> help all researchers see OntoTrans through a person's eyes who is in their early career stages
-> gain insights into European research and innovation projects and transnational academic and industrial collaboration

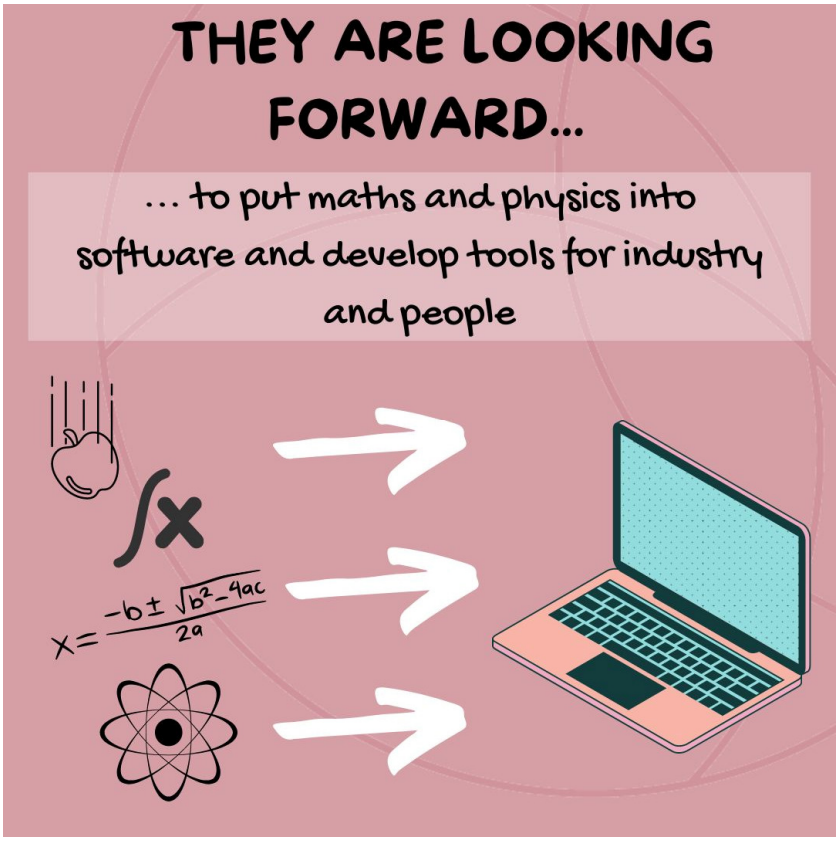
5.7. The Computer Scientists

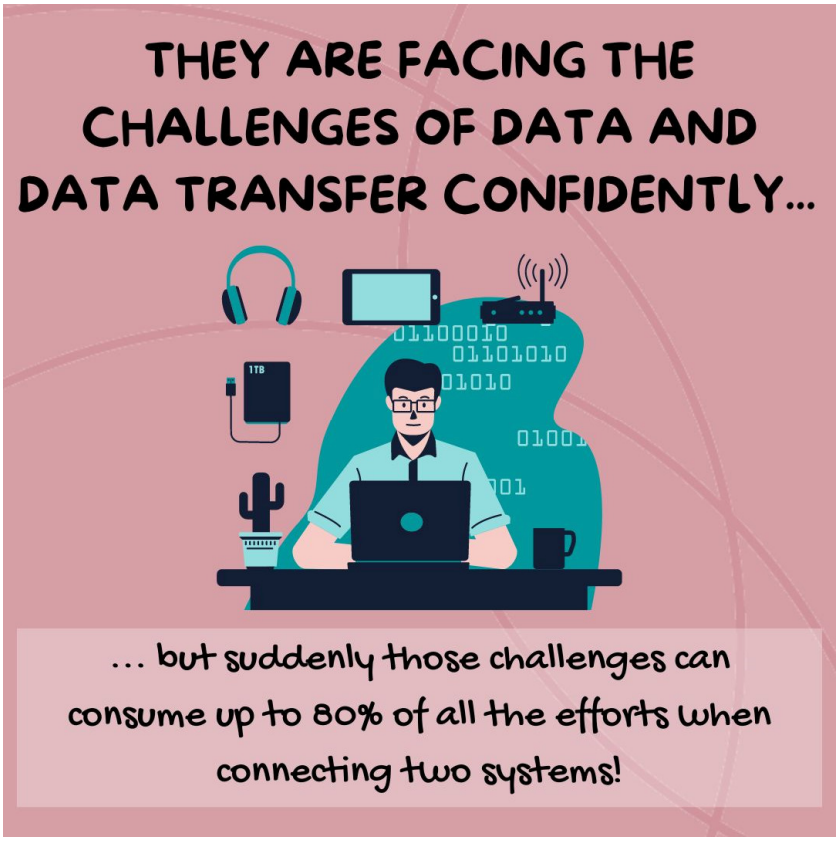
22nd March 2023

Artworks by amethyststudio, Clker-Free-Vector-Images from pixabay, Drawcee, sketchify, Sketchify Education, Sketchify Japan, and sparklestroke.


THE ONTOTRANS COMPUTER SCIENTISTS
apply theoretical expertise to real-world problems and write code


THEY STARTED EARLY
By the time they are with us they did decades of developing software ...


THEY ARE LOOKING FORWARD...
... to put maths and physics into software and develop tools for industry and people
$\int x$
$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$


THEY ARE FACING THE CHALLENGES OF DATA AND DATA TRANSFER CONFIDENTLY...
1TB
... but suddenly those challenges can consume up to 80% of all the efforts when connecting two systems!

OUR ONTOTRANS COMPUTER SCIENTIST FIXED THESE DATA TRANSFER ISSUES ...

...and created a clever system that delivers data just as their code/developed simulation tool needs it. No more fuzz!

WORKING WITH ONTOTRANS REQUIRES COMPUTER SCIENTISTS

... our simulation tools can now just "ask" for data how they need them

... out teams write one reader and parser at a time which can be reused

-> we work data model driven using meta data and ontological concepts