ONTO/TRANS NEWSLETTER

Issue 4 July 2022

Contents

ArcelorMittal Innovation Case Video

OntoTrans published its second Innovation Case Video. In the video we present the ArcelorMittal Innovation Case for a Steel Section Mill.

Steel is currently one of the world's only completely reuseable and reclyclable materials and has various different areas of use. When combined with the benefits of artificial intelligence and advanced automation it will help build the circular economy of the future.

OntoTrans provides a general-purpose ontology-based Open Translation Environment to support ArcelorMittal in streamlining the management of processes and properties and achieve the ability to determine the process parameters for a given set of required mechanical properties of a target future product. By using OntoTrans the competitive advantage of a variety of commercial steel products can be increased.

OntoTrans | ArcelorMittal

Click on the picture to watch the full video!

OntoTrans

**Ontology driven
Open Translation Environment**

H2020-NMBP-TO-IND-2019

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Project acronym

OntoTrans

EC-Grant agreement

862136

### Start / End

01.04.2020 - 31.03.2024

Web

https://ontotrans.eu

OntoTrans First Open Workshop

March 15-16, 2022 / virtual Event

In the first open workshop of our project, we introduced our participants to the concept of OntoTrans, an ontology-based Open Translation Environment (OTE), and how this can enable them to represent manufacturing process challenges in a standard ontological form. In 3 sessions (Introduction, Collaboration, Demonstration) the Translator and the OTE, certain functionalities of OntoTrans and the work of related projects were introduced.
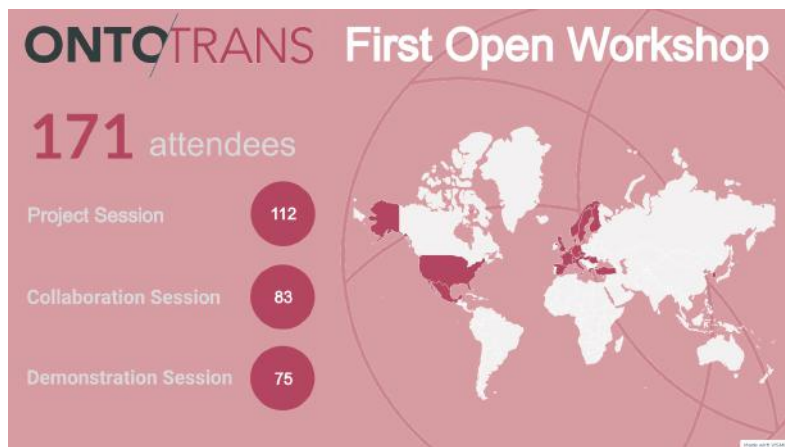
Presentations and Session Recordings are available online!
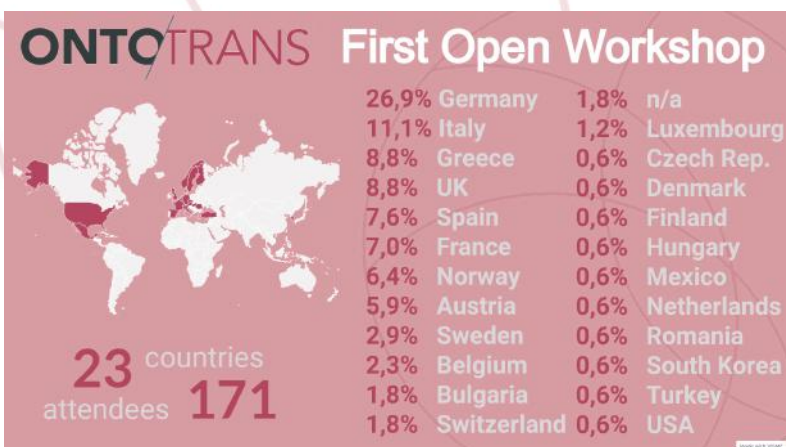
We are very happy to report that the workshop was a great success with 171 people attending from 23 countries in Europe, North and South America and Asia. Although the workshop had to be organised in an online format the engagement was high and interesting discussions were sparked. Our First Open Workshop laid the groundwork for future collaboration between related projects and the engagement of European and international stakeholders.

OntoTrans Application Dependent Interfaces

OntoTrans has developed the OTEAPI framework for the purposes of two-way communication between the applications in OntoTrans and specific external resources. OTEAPI (1) is an open state-of-art Python framework for connecting data consumers to data resources via pipelines consisting of filters connected by pipes to download, parse, map, filter, convert and process data from a source. The filters are small modular components that can be reused and combined into new pipelines for other data resources or needs. The pipelines themselves are also reusable and can at a next level be combined into workflows. For this to work, OTEAPI relies on an underlying interoperability framework. By itself OTEAPI is agnostic to the choice of interoperability framework, but it has been used with the SOFT/DLite , which is a lightweight interoperability framework based on simplistic data models. DLite achieves full semantic interoperability by mapping properties in the data models to ontological concepts. The combination of OTEAPI and SOFT/DLite lowers the threshold of onboarding new data resources by a clear separation of data models that are easy for data engineers to work with, and ontological mappings expressed as simple RDF triples. The use of ontologies provides very powerful transparent conversion between data models as well as semantic data discovery.

(1) https://github.com/EMMC-ASBL/oteapi-core; (2) https://github.com/SINTEF/dlite: concepts and tools to efficiently describe and work with scientific data.
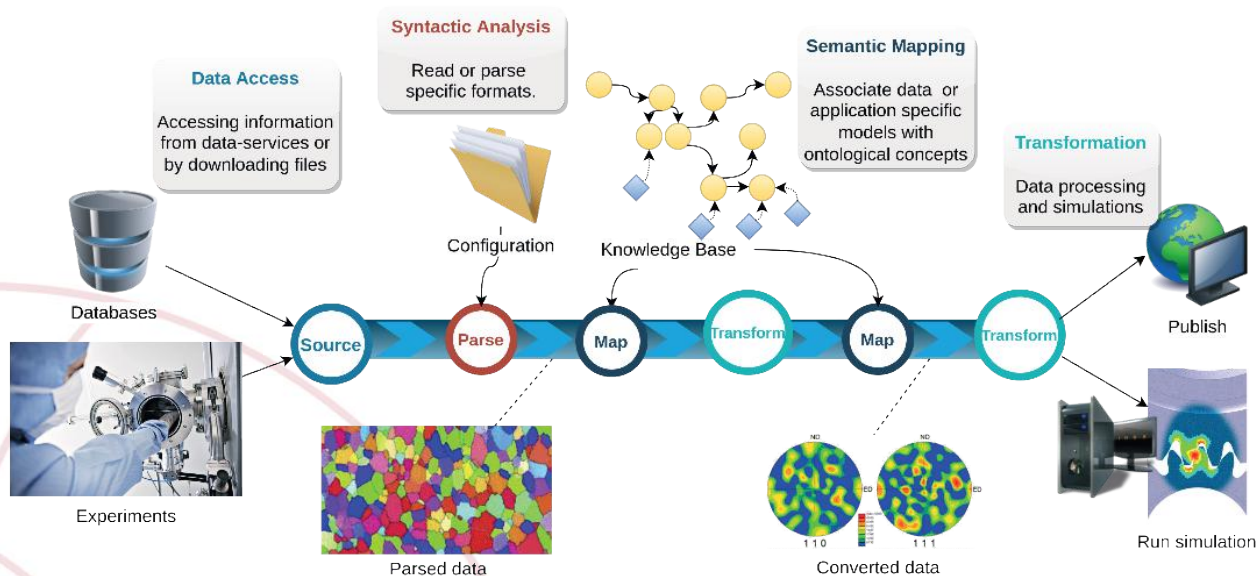
Example of an OTEAPI pipeline connecting an experimental data source to a data consumer. The user only needs to deal with what data source(s) should be connected to the data consumer, while OTEAPI under the hood makes sure that the data is converted to the form expected by the data consumer.

OntoTrans Data Sources Interfaces

OntoTrans will provide access to a range of materials databases from the Open Translation Environment (OTE). This is achieved via an interface to the OPTIMADE API. The OPTIMADE API is an open-source REST API specification for materials data providers on how to present and query their repository data. The OPTIMADE API specification is written and maintained by several major materials database providers such as Crystallography Open Database (COD), Materials Cloud, the Materials Project, NOMAD, OQMD, AFLOW, and more. The specification focuses on materials structures and is currently quite sparse concerning unified fields and the expected available information. However, the specification is being continuously updated, as is the associated Python tools package to easily interact with OPTIMADE APIs via Python.

More information about OPTIMADE can be found at their website, *optimade.org*, as well as the organization's GitHub page, *github.com/Materials-Consortia*. The OPTIMADE Python tools2 will be used to effectively handle and parse responses from an OPTIMADE REST API, the source code can be found on GitHub at *github.com/Materials-Consortia/optimade-python-tools.*

OntoTrans European Materials Modelling Marketplace (EMMM) Interface

OntoTrans has developed the application-independent interfaces which aim to connect existing external resources to the OntoTrans OTE. The specific objective is to provide interfaces between the ongoing European Materials Modelling Marketplace EMMM initiatives (MarketPlace and VIMMP), and the OTE components. In the case of MarketPlace, the connection to the OTE is based on OSP Core technology. For VIMMP, the connection is achieved by accessing the VIMMP-service via its REST (Representational State Transfer) web-technology and implementing a DataResource plugin for the OntoTrans core components. As major outcome of this work, the VIMMP Plugin Interface has been released on GitLab.

OntoTrans OSP Interface

OntoTrans has worked on the implementation of a plugin for the OTE-API, in order to interface the OSP (open simulation platform)-core facilitated by SimPhoNy, which is a semantic interoperability framework written in Python. One of the major applications of SimPhoNy is the MarketPlace, which is offering the opportunity to model material properties with open-source software and to interconnect those applications by the means of knowledge graphs.

The implementation is based on the structure of pipelines orchestrating the developed microservices, which can create CUDS-objects (Common Universial Data Structure) for the semantically based third-party tool interaction in the OTE (Open Translation Environment).

This SimPhoNy-plugin for the OTE-API is able to create CUDS-objects from a specific DLite Entity, to apply an ontological mapping between them, to send the CUDS to any remote OSP-server through a generic client and to retrieve the result in the form of CUDS back from the server, once the simulation is finished.

The DLite Entity has to be written specifically for any use-case, which is featuring individual properties and dimensions. The same also applies for the ontological mapping between DLite and the ontology to which the CUDS is related, since they have to be done by the hands of an ontologist, whom is aware of EMMO and the representation in the models of both technologies. Nevertheless, the semantic mapping is done only once either in the definition of the CUDS or the Entity mapping. The OSP-client in the plugin can be configured generically to any external OSP-server, which is exposing an individual REST API and based on SimPhoNy.

Overall, the user is able to generate its own data model with individual properties, to describe them ontologically, to use it as an input for any externally running simulation service and generate new properties as output from this service.
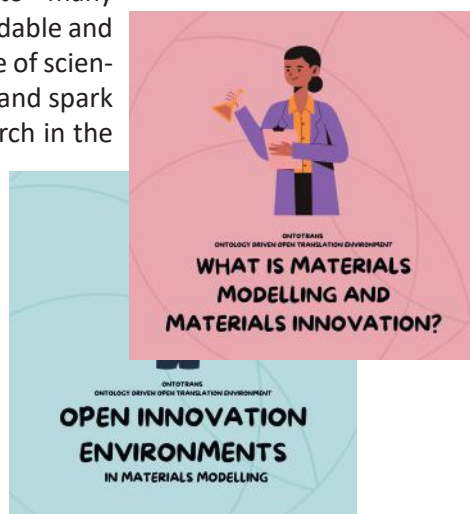
CMCL Interface

OntoTrans works on the implementation of a generic CMCL MoDS interface in order to integrate it with the OTE platform. To support wider exploitation, this interface is implemented via the SimPhoNy-OSP, which will make it possible to use MoDS from any SimPhoNy-based OSP as well as via the MarketPlace platform. Integration of this interface into the OntoTrans platform (which uses OTEAPI internally) is achieved by combining it with the CUDS-OTEAPI interface.

OntoTrans on Instagram

WHAT ARE ONTOLOGIES?

WHY DO WE USE ONTOLOGIES?

ontotrans_h2020

In May 2022 OntoTrans started a Science Communication Initiative on Instagram. The goal of the Instagram presence is to make our scientific knowledge accessible to many people in an easily understandable and fun way, show the importance of science and OntoTrans for society and spark interest for our field of research in the next generation of students and scientists. We chose Instagram as a means of communication as it is one of the most used social media platforms worldwide with 90% of its users being under 35 years old (1). Content is published once a week and made up of infographics, fast facts and project updates. The posts give insight into different relevant topics for our work, OntoTrans in general and also the different kinds of personas working on our project.

WHAT IS MATERIALS MODELLING AND MATERIALS INNOVATION?

OPEN INNOVATION ENVIRONMENTS
IN MATERIALS MODELLING

(1) https://info.lse.ac.uk/staff/divisions/communications-division/digital-communications-team/assets/documents/guides/A-Guide-To-Social-Media-Platforms-and-Demographics.pdf

OntoTrans @ EMMC Webinar

OntoTrans and the European Materials Modelling Council (EMMC) organised a joint webinar on *Tackling Materials and Manufacturing Innovation Challenges with Digitalised Translation - from conceptualisation to ontology.* 3 speakers from the OntoTrans Consortium held presentations and showed how translation can be formalised and digitalised. The presentations and the recording of the webinar are available on the OntoTrans Website.

OntoTrans Consortium Meetings

M01 Kick Off Meeting / Online / April 21-22 & 24, 2020

M06 Consortium Meeting / Online / October 07-08, 2020

M12 Consortium Meeting / Online / May 05 & 07, 20212

M18 Consortium Meeting / Online / September 9-10, 2021

M18 Review Meeting / Online / September 29, 2021

M24 Consortium Meeting / Online / April 6-7, 2022

OntoTrans Consortium