Report D1.14
"Industry Commons Translator resources (Profile, Best Practice, Directory) and report on cooperation for furthering the role of the Industry Commons Translator v1"

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Report D1.14
"Industry Commons Translator resources (Profile, Best Practice, Directory) and report on cooperation for furthering the role of the Industry Commons Translator v1"

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Glossary of terms

Item	Description
AI	Artificial Intelligence
CEP	Capability Enhancement Programme
CoP	Community of Practise
CPD	Continuous Professional Development
EMMC	European Materials Modelling Council
H2M	Human-to-Machine
ICT	Information and Communication Technologies
KE	Knowledge Engineering
KG	Knowledge Graph
M2H	Machine-2-Human
ML	Machine Learning
OCES	Ontology Commons EcoSystem
R&D	Research and Development
RDA	Research Data Alliance

SCF	Skills and Competency Framework

Keywords

Knowledge Management Translator – Role – Skills – Continuous Professional Development – Best Practices - Cooperation

Disclaimer

Executive Summary

In this deliverable we report our preliminary findings regarding the Industry Commons Translator resources (Profile, Best Practice, Directory). The content of this deliverable is based on stakeholder consultations and involvement of experts in bilateral exchanges, a Translator Session in the first OntoCommons global workshop and a dedicated expert meeting on the Translator role and profile.

Resulting from the discussions, the preliminary name used in the OntoCommons DoA (Industry Commons Translator) has been changed to Knowledge Management Translator (for Industry Commons), to both limit the role to a more manageable scope (focussed on ontology-based data documentation) and to make it easier to understand for communities less familiar with the Industry Commons concept.

It is recognised that the skillset of a Knowledge Management Translator is extensive and that there would be very few people today that could fill such a role. Bridging many fields, the profile involves familiarity with all parts of the OntoCommons EcoSystem (OCES), i.e., Top-, Middle- and Domain ontologies as well as the OCES toolkit, i.e., familiarity (if not at a high technical level) with what is by some described as Knowledge Engineering, as well as relevant domain knowledge and business awareness, all combined with excellent communication and team working skills. Given that the required skill set is extensive, it is likely that in practical terms the role will be fulfilled by a team of Translators working on a case rather than a "Jack-of-all-Trades".

Best practises have been suggested by adapting those elaborated for the Materials Modelling Translators.

In addition to this Deliverable, OntoCommons beneficiaries and external experts are cooperating on a White Paper which will elaborate the profile and best practises in depth, establish the role with authority, support wider dissemination and stimulate further discussion as a basis for the second Translator Workshop and final Deliverable in this Task.

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1.Translator "Job Title"

Given the wide-ranging importance of the Translator in facilitating the uptake of ontology-based data documentation based, a widely understood and clear name for the role is important. The name for the role should also reflect what the Translators will be doing.

The preliminary name given in the OntoCommons project was Industry Commons Translator. However, the name may not be familiar to many and also Industry Commons is very wide and includes more aspects than covered here[1]. Primarily the Translators will support industry adoption of ontologies for data documentation and knowledge management. Hence, we arrived to the conclusion that the most appropriate term to describe our newly suggested role will be **Knowledge Management Translator**, who will inspire and lead organisations towards Industry Commons.

2.Profile of a Knowledge Management Translator

A key role of the Knowledge Management Translator will be to support industry adoption utilising the Ontology Commons EcoSystem (OCES) Toolkit. The OCES is intended to provide a specification for both methodology and tool support for industry-oriented ontology development, maintenance, and usage tools and recommendations for maximum impact. OCES can be seen as the key enabler for data sharing and Industry Commons[1], while the Translator is a role that facilitate the enabling changes in organisations that are needed to reap the benefits.

Their competence will enable them to advise on the benefits of applying ontologies, selection of existing ontologies to employ, to develop tailored domain ontologies, and to translate business challenges into (potential or actual) solutions based on ontologies and related systems. As solving superordinate business challenges in this way encompasses the configuration of numerous business cases, networked translators are pivotal for successful data-driven business.

We aim for a clear definition of the role(s) of Knowledge Management Translators to achieve a wide agreement regarding the skills and tasks performed by this Translator (or team of translators). Two OntoCommons workshops [2,3] have been crucial in uncovering how the community envisages the role, the skills and the education needed for a Knowledge Management Translator. Based on this input, we will elaborate on the ideal translator persona in more detail.

[1] Michela Magas & Dimitris Kiritsis (2021): Industry Commons: an ecosystem approach to horizontal enablers for sustainable cross-domain industrial innovation (a positioning paper), International Journal of Production Research, DOI: 10.1080/00207543.2021.1989514

[2] OntoCommons (2021). Industry Commons Translator. In: OntoCommons. Global Workshop: Ontology Commons addressing challenges of the Industry 5.0 transition. Online Horizontal Workshop, 02.-05.11.2021. https://www.youtube.com/watch?v=vQrmnsLjVRM&list=PL-cwgiwYXckPOatW5dGBK_wDr0ZoP72L3&index=16

[3] OntoCommons (2022). The Industry Commons Translator - 1st Expert Meeting. Online. Focussed Workshop, 21.2.2022 https://www.ontocommons.eu/news-events/events/industry-commons-translator-1st-expert-meeting

2.1 Role

2.1.1 Who are they?

The Knowledge Management Translator is a role that aims to advise companies on the adoption, use and benefits of ontology-based data and knowledge management. These Translators help companies to bridge skills and capabilities gaps in the application of such technologies. Their aim is to remove key obstacles for industrial beneficiaries and utilising such technologies. In particular, a Knowledge Management Translator is an "ontologist" translator and coach with expertise spanning across digital (including data science, semantic web and ontology engineering) and science/engineering domains.

They are expected to give high quality and reliable advice on ontology-based knowledge management/engineering to interested organisations. The latter do have appetite to advance their data and knowledge management and having information more easily and readily available for improving information exchange with internal and external parties. However, they often lack the awareness and knowledge of the benefits of ontology-based approaches how these can be realised.

By their very nature, ontologies are about the management of complex knowledge. The related data and information often reside within different groups in organisations (or even across organisations) and the benefits rely on these working together. A Knowledge Management Translator therefore needs to be able to communicate well with different groups and to be able to overcome any barriers in collaborating towards a common goal following compliance, especially when these groups represent different scientific disciplines with conflicting R&D philosophies and scientific "language" barriers. The ability to gain and maintain support from management by demonstrating that the Translator understands business priorities will be crucial for success.

To motivate companies to adopt semantic technologies, the Translators may want to survey stakeholders across industry to identify the "matter" and associated business - and use-cases that demonstrate and quantify business values of semantic knowledge management. The Translators may wish to detect and collect also failure cases and understand why they failed.

2.1.2 With whom they will work

Ideally, the Knowledge Management Translator enters the company as a consultant but does feature in their management process as a person and not as a service. Their manager would be the head of R&D, or the manager of "Data Management" or "Data Analytics" or, most preferably, "Data Engineering" if this exists.

The "data modeller" is the closest colleague a Knowledge Management Translator will find in an organisation. They also need to be able to work with the business team to map out the business case on the one hand and with materials and manufacturing domain experts on the other. Translators are hence located at the intersection between materials/manufacturing R&D, data engineering (data, ontology engineering) and business management. Most likely, therefore, a Translator will either enter an organisation as a team or assemble a team since a terminological curation has to be done (by a domain expert) as well as logical modelling (by a logic expert).

The Translator will not develop the semantic solutions themselves but work together with a Semantic Engineering Team.[4] It is important that internal biases towards particular solutions are avoided as much as possible. The Translator needs to ensure that the use cases for the ontology are well reflected in the development, following the OCES specifications.

2.1.3 Their Entry Points to success

Not all organisations are open as yet to work with a Knowledge Management Translator; as a minimum requirement, becoming a data-driven organisations or ideally an "AI-driven enterprise"[5] must be a strategic objective. It will be up to the Knowledge Management Translators to seek these organisations and find an entrance point. Thus, they will have to approach Business Process Automation where they can offer time to knowledge workers to do intelligent things, Data Governance where they can offer to ensure correct application of data and analytics, and R&D departments driven by innovation where they can offer to ensure future competitiveness and a shorter time to market.

They can offer to explain the organisations' relevant data, help to discover and understand their meaningand what the difference between data and knowledge is. They should take time to explain how Ontologies can help, where they fit in straight away, and what is it a business should be using them for.

The Knowledge Management Translators should not make the mistake to define ontologies, schemas, workflows, etc. upfront but rather take the more natural middle approach of "define a little bit", then apply, then define some more. (Agile Development) The latter approach lets the clients follow up how the imposed changes can actually bring benefits to their organisation. The Translator should also be honest and tell a business when not to invest. Investing in semantic technologies blindly is the biggest reason why one can fail to ensure sustained industry interest. The technology stack needed is expensive, and once a project fails (which it inevitably will without a proper translator), a client may likely shy away from investing again and tell their peers how bad ontologies are.

2.1.4 The challenges of the role of the work, current gaps and possible solutions to support the role of a Knowledge Management Translator

These are some questions the Translators will face when working with clients and we shall provide some solutions we are elaborate on within this consortium.

Why to invest in Ontologies at all?

Organisations will have to carry the costs but will need good incentives why to do this; the Translator will need to convince managers and show the added value. The OntoCommons Demonstrators will be useful to show to clients. However, building and maintaining ontologies is expensive, hence show cases with high impact will be important.

[4] https://oboacademy.github.io/obook/getting-started/#the-different-roles-of-obo-semantic-engineering
[5] Seth Earley, The AI-Powered Enterprise: Harness the Power of Ontologies to Make Your Business Smarter, Faster and More Profitable, LifeTree Media, 2020, ISBN-10 : 1928055508

We as an SME cannot afford to take part, can we?

Translators will need a wider system including infrastructures and digital marketplaces (e.g., DOME 4.0) to 'drive' the ontology-based data documentation and support SMEs to take part.

What is your CV like, and can you really help us?

There is no certified Knowledge Management Translator, hence, OntoCommons needs to collate existing Training Materials/resources from distinguished sources and to provide a training portfolio.

How long will you take?

Large ontologies can take years of development. The Translator may want to take 2-3 weeks to capture data, check if the organisation does have some governance and some data maturity. Instead of developing an ontology from scratch Translators will check the landscape for similar ontologies and use the OntoCommons resources including the OCES toolkit. The best way forward is to start with small pilot projects with simple ontologies or existing ones to deliver tangible results quickly.

Do you have all tools you need?

OCES will collate all existing tools which will include excellent Translator resources. We expect the Translator to have a good understanding of the OCES toolkit.

Are our data OK?

Semantics requires proper data and for AI, e.g., this necessitates high (human) effort to produce and curate which is expensive. So, the Translator will have to be driven by the quality of the existing data and start with an appropriate semantic solution. Also, the Translator team needs experts in the domain, to understand thoroughly what data are needed.

How shall we finance this big team you need and why?

The Translator may start with a small pilot project, such as bringing ontology in as part of some more generic data science/machine learning/AI effort.

2.2 Skills

There are only a few people around the globe that possess both semantic and domain knowledge and thus master the skills needed. Hence, more experts are required and there is the need to create the Knowledge Management Translator role and related education. A Knowledge Management Translator, as envisaged by OntoCommons, requires a complex range of skills based on expertise spanning across the Information and Communication Technologies (ICT), analytical philosophy, logic and science/engineering domains.

Identifying bottlenecks in the use of information that can be addressed with ontologies is key to demonstrating success. The Translator will need to be able to carry out audits to understand the "matter" and assess and define the "context" and clearly pinpoint information flow problems and how they impact the performance of an organisation.

On the other hand, it will be pertinent for them to prevent managers of organisations from misinformed decisions and letting them use ontologies only when they have thoroughly understood their framework. The Translator, thus, also needs to advise on business benefits of semantic technologies (including ontologies). The Translators need to objectively analyse the data maturity of

an organisation before consulting on the application of a particular semantic technology. The Translators may want to consider an organisation's aptitude with several semantic technologies, like Knowledge Graphs (KGs), machine learning (ML) and artificial intelligence (AI). Sometimes, an organisation just may want to perform exploratory searches through their data to gain new knowledge or add new data, e.g., the pharma industry uses ontologies to better leverage biological assay results to support drug discovery. It is advisable to follow the quote by J. A. Hendler [6]: "A Little Semantics Goes a Long Way" and not overwhelm a marginally digitised organisation with all the newest ontologies and tools and triple stores etc. Even in SMEs with a wide product portfolio awareness may be risen that in the long term a capable ICT infrastructure complemented by taking on competitive data technologies is an enabler for innovation.

A Knowledge Management Translator needs a thorough understanding of knowledge engineering and should be familiar with, but not necessarily an expert in:

- the landscape of tools, incl. maturity levels, in particular the upcoming OCES including the Top Reference and Middle Level Ontologies, ontology development and maintenance methodologies, ontology repositories etc.
- FAIR semantics, re-use and collaborative workflows
- knowledge representation formalisms and their semantics
- various reasoning approaches, implementations and algorithms
- trade-offs of using certain technology stacks, including semantic trade-offs and costs
- API development (providing semantic data for downstream use)

As a result of an ongoing harmonisation and the integration of more and more industrial sectors and domains into a FAIR data and semantics ecosystem, it may be anticipated that both the tools and the procedures applying them are constantly developed further. This requires Translators to keep their technical skills up to date and makes their expertise highly topical. It is foreseen that readiness both to provide and to accept regular advanced training is a key aspect of the respective personas' skill-based facet and allows for implementing enhanced comprehensive knowledge about translation into specific translation tasks ("top-down" conceptualisation).

The aim of the Knowledge Management Translator in the framework of the OntoCommons project is to support data sharing among materials and manufacturing companies and communities. They should be able to map science and engineering aspects to a wide range of semantic technologies and knowledge/data. Specific translation tasks require insight in specific science and engineering domains. Hence the Translator role involves working with the respective domain experts in "bottom-up" conceptualisation and the organisation of knowledge which requires at least an appreciation and, in some cases, a good understanding of the respective materials and manufacturing domains, i.e., the "matter" in this case.

In carrying out translation and overseeing a project, a Translator needs to ensure that technical and business objectives are met in the project of building Knowledge Engineering (KE) solutions. The translator may have particular areas of knowledge and preferred choices but always needs to build awareness of their own as well as internal organisational technology biases.

[6] James Alexander Hendler (* April 2, 1957) is an artificial intelligence researcher at Rensselaer Polytechnic Institute (USA) and one of the originators of the Semantic Web

Projects often involve working with science and engineering teams, data scientists/ontologists as well as business managers to ensure that the right KE approach is applied to the right business problem. In order to ensure success, the Translator also needs to support building a Knowledge Engineering culture in the organisation, as further discussed in the following section.

The ideal Knowledge Management Translator is able to clearly communicate and promote the benefits of using an ontology-based data documentation to go from pure data management to sense making based on ontologies, in order to support more efficient operations and decision taking. Ideally, the Translator has specific experience in applications in the materials and manufacturing sectors.

In a nutshell, we are aware that translation is predicated on communication and, thus, on dynamic dialogue comprising several dimensions. Harmonised translation procedures facilitating teamwork both among translators and between translators and their industry clients will greatly be promoted by digital tools relying on machine-readable and ontology-based FAIR guidance and documentation. In this way, persona performing as Knowledge Management Translator are predestined to promote Industry 5.0 impulses in industrial materials innovation.

Their competence will enable them to advise on:

- the benefits of applying ontologies
- the selection of existing ontologies to employ
- developing tailored domain ontologies
- translating business challenges into solutions based on ontologies and related systems.

Therefore, a Knowledge Management Translator is expected to be:

- A strong advocate of ontology-based solutions and an excellent communicator
- A good 'auditor' and benefits advisor
- Skilled in ontologies and knowledge engineering
- Knowledgeable in the industrial domain they are working for
- An unbiased project manager

2.3 Education

There are no colleges or universities offering courses to become a Knowledge Management Translator. Hence, we suggest upskilling of either technical staff with semantic knowledge or the other way round, profiting from human-readable and machine-readable approaches, respectively. Both directions "H2M" (human-to-machine) and "M2H" (machine-to-human) are facilitated by ontologies tailored for assisting the interface between human translators and their digital tools. Both further developing tools and facilitating a continuing professional development (CPD) are pathbreaking.

In addition to these technical skills the Translator should be able to advise on business advantages of employing semantic technologies. The translator should thus acquire the "matter" in terms of:

- Keen understanding of business goals and the industry interrelationships with their providers and customers relate to business
- Deep understanding of the value processes creating value, e.g., in economic, ecologic and societal dimensions contributing to sustainability

- Knowledge on performing a hands-on conception with industry clients for relating business decisions and value generation

Personas are required to broaden their knowledge which will inevitably also flatten their specialist expertise. Hence, a Translator will require a network of experts and be able to bring in talent when required. It is unlikely that the Knowledge Management Translator role will be a permanent position within even a larger organisation just as yet. We envisage two potential constellations. Following a first outline, they may be freelance consultants or staff of consulting companies taking on the role when required by a customer. They will have to gain the trust of the established staff and be supported by the management to conduct their work. This is however an advantage for SMEs as they can hire a consultant when and if needed. Within a second approach, the expertise of a Knowledge Management Translator might be a specialisation of data analytics or R&D roles performed part-time. Eventually in larger businesses, senior technical staff can become translators as a secondary role. They often already possess the wide expertise profile required, understand the business goals of the organisation, work closely with managers, and have extensive networks of internal and external experts. Their ability to assess a wide range of projects within a larger business is ideal for developing interdisciplinary collaborations and spotting opportunities to employ semantic technologies.

Our efforts over the next period of this project will be focused on developing a curriculum comprising literature, training, forums, etc., to provide self-training. We will initiate those relevant policies, programmes, training courses and supporting infrastructure to upskill capabilities across the industry will be developed, too. We will need Education and Continuous Professional Development (CPD) programmes that support establishing data and knowledge sharing via connected digital twins of the built environment provide a useful guide as to what is required also for Knowledge Management Translators. They include:

- A Skills and Competency Framework (SCF)[7]
- A Capability Enhancement Programme (CEP)[8].

The SCF framework identifies priority skills and competencies required across a range of roles and can act as a baseline for industry and individual organisations in the assessment of their current capabilities to identify gaps and plan how they may be addressed. As a part of the SCF, targeted role-based training plans need to be developed. The CEP programme identifies steps necessary to bring organisations and individuals up to the level of expertise required and equip organisations with tools, guidance and materials to understand and cultivate the skills and knowledge they need. This is to provide guidance and resources to drive the development of the right skills, to the right level, to achieve the goal of enhancing industry capabilities and deliver on the objectives of Industry Commons data sharing.

Further approaches can include

- Establishing an OntoCarpentry, similar to Software Carpentry[9,10] and Data Carpentry[11] , possibly within Data Carpentry.

[7] https://www.cdbb.cam.ac.uk/files/010321cdbb_skills_capability_framework_vfinal.pdf
[8] https://www.cdbb.cam.ac.uk/files/120421_cdbb_capability_enhancement_vfinal.pdf
[9] https://software-carpentry.org/
[10] Simperler, A.; Wilson, G.; Software Carpentry get more done in less time, https://arxiv.org/abs/1506.02575
[11] https://datacarpentry.org/

- Marie Skłodowska-Curie Actions[12] that enable domain researchers to visit experts in Ontologies and Semantics and gain education, and vice versa.
- Formation of a community of practice (CoP), e.g., within RDA. In RDA, CoPs are composed of experts from that community that have an interest in the discipline/research domain and are committed to directly or indirectly enabling data sharing, exchange, and/or interoperability. CoPs serve as platforms for communication and coordination among individuals, building bridges outside and within the RDA, with shared interests.

3.Best Practises

The first Expert Meeting[3] elaborated on best practises. The outcome is presented below:

3.1 General Comments

Not all organisations are open as yet to work with a Knowledge Management Translator; as a minimum requirement they will have to have the strategic objective to become data-driven organisations who actively wish to convert data into knowledge.

The Knowledge Management Translators should not make the mistake to define ontologies, schemas, workflows, etc., upfront but rather take the more natural middle approach of "define a little bit", then apply, then define some more, i.e. use agile development. Industry needs to be informed by the translators whether and how ontologies can help and what the costs, efforts and returns on investment of different approaches would be. It is pertinent to manage the expectations industry may have as well as wrong perception they may have from past experiences with "misapplied knowledge engineering". Industry will be keen on Translators that can help them deliver early successes and an onboarding process that is fast and smooth.

We also will need to establish "Translator Tools" for the comparison of different data processing technologies. With such a tool the industry could compare knowledge graphs (and other data analytic methodologies) and ontologies. It will be important to enable companies to envisage their value streams and know why to invest. Such a tool would point out the strong points and benefits of ontologies to organisations.

3.2 The Six Steps of Knowledge Management Translation

As discussed above, the role of the translator involves a wide range of business, technical and communication tasks which may vary in practice case by case. Nevertheless, we can imagine a structured approach breaking the overall translation effort down into a sequence of steps that are performed first successively and then in cyclic iterations. Here we follow an established and expandable approach based on that of Materials Modelling Translator Process.[13,14]

Step 1: Elaborate on the benefits of adopting semantic technologies, identify innovation case

[12] https://marie-sklodowska-curie-actions.ec.europa.eu/about-marie-sklodowska-curie-actions
[13] EMMC Translators Guide: https://doi.org/10.5281/zenodo.3552260
[14] Translation in Materials Modelling – Process and Progress: https://zenodo.org/record/4729918

Defining the benefits of adopting an ontology requires the Knowledge Management Translator to "understand the business", value generation by solving/identifying "a set of innovation challenges", define a set of "B2B constellations", or "the ecosystem", etc. The benefits of adopting an ontology-based knowledge management approach should be investigated cooperatively and the Translator should spot "semantic" opportunities for a business case. This means addressing all layers of management in the company and it requires an understanding of both long-term and short-term business views spanning several product lifecycles. Without a vision for both business time-scales, the funding for a particular project may be cut before any tangible benefit is achieved due to shifting markets and business priorities. The outcome of this step should be (a) an assessment of readiness (data/availability of expertise), (b) an agreed general benefits analysis and (c) identification of a specific case where value can be demonstrated relatively short term (the 'innovation case').

Developing a seminal innovation case with a new customer may result more challenging for a Knowledge Management Translator than implementing a further innovation with an existing customer and may be supported by displaying reference innovation case approaches.

Step 2: Conceptualise the Innovation or Data-to-Knowledge Governance Case

For the agreed innovation case, the Translator needs to guide conceptualisation, i.e., work with the relevant domain experts to capture and elucidate all relevant case entities (e.g., objects, processes, properties etc.) that play a role as well as their relationships (object properties).

In this step, it can be helpful to use graphical representations and tools profiting from natural language rather than going straight to formal languages.

Furthermore, at this step, the use cases should be clearly defined and agreed upon and the ontology scope captured based on competency questions. It is advantageous and greatly promoted by ontologies to squarely face the activities both for assessing the missing conceptualisation required in the peculiar innovation case and to facilitate their potential re-use by implementing missing ontology modules for tackling future innovation cases related to the same business. In this way, knowledge-based innovation is performed.

Step 3: Determining relevant existing vocabularies, taxonomies, ontologies and standards as well as required data and sources

In this step the Translator works with the organisation to determine existing semantic assets (vocabularies, taxonomies and ontologies) that are relevant or already in use in the organisation as well as relevant external sources such as domain ontologies but also standards that include specific definitions for relevant terms (e.g., product, process, etc.) related to materials and procedures. The translator should advise on but do not develop ontologies by themselves, as this is a full-time job sometimes and would leave no time for translating business challenges anymore.

Step 4: Propose potential knowledge engineering solutions.

This step consists of recommendations for adopting an ontology-based knowledge management approach, taking steps to move existing solutions on a more fundamental, sustainable and value-generating footing. Key considerations include the use of top and middle level ontology framework and/or the OCES Top Reference Ontology which would be a longer-term investment. Similarly, domain ontologies are useful as a more general approach but to create one from scratch or adapt one would need to be carefully justified.

Also, in the application case, a balance between new application ontology developments and the use of existing ontologies and ontology design patterns needs to be discussed.

Further choices, as already mentioned in the Translator role description, include knowledge representation formalisms and their semantics, reasoning approaches, implementations and algorithm, and generally considering the trade-offs between using particular technologies in terms of effort, value and cost. The analysis will lead to a comparison of the use of different semantic technologies as a decision guide for the customer, for organising and directing the data workflow.

Step 5: Implementation work (for knowledge engineer, etc.)

Based on the final choice made between Translator and Customer in Step 4, this step involves the technical implementation of both the relevant ontologies or ontology modules and the tool-based knowledge engineering solution.

The implementation work typically requires a team of people including domain experts, data scientists and knowledge engineers. The result should be both a solution to the specific case and a contribution to moving the organisation forward to a higher maturity level of knowledge management, e.g., by implementing ontology maintenance solutions that will be key to keeping the specific solution relevant and up to date, as well as providing the opportunity for building on the initial success to other areas.

Step 6: Client adoption including training

In the final step, the Translator needs to ensure adoption, working with different stakeholders during demonstrating the functionality and potential extensibility, and supporting the organisation in training and CPD to move towards a knowledge engineering culture. The take-over by the stakeholder (adoption) means most likely that a team of people will have to be assigned to make sure the semantic technologies are then applied. The maintenance of the new framework or work style will need monitoring and fine-tuning (at best) to make sure all operates as expected.

4.Directory

A directory of experts that can provide Knowledge Management Translator services or contribute to a Translator team will be an important resource to further establish the role and facilitate services to industry. Based on the current role description, the OntoCommons Expert Database will be widened to include the Knowledge Management Translator Profile and OntoCommons will engage relevant experts to consider to adopt the role. Furthermore, we will cooperate with DOME 4.0 about including a Knowledge Management Translator register and matchmaking service in their marketplace.

5.Cooperation for furthering the role

Similar "Translation" roles have emerged in other fields, where there is also a gap between complex technology potential and industrial impact, including materials modelling [13,14]and data analytics[15,16] and this is where we seek cooperation to start with.

5.1 Cooperation with the Materials Modelling Community

The role of a translator emerged first in the Materials Modelling community since the transfer of materials modelling was lacking an expert who could translate business requirements into potential modelling solutions, in particular in small and medium sized companies. When finishing in 2019, the H2020 EMMC-CSA reached a milestone by defining this concept and supporting tools for Translation processes, which is documented in the EMMC Translators Guide.**Error! Bookmark not defined.** In continuation, an EMMC related group of scientists combined the translator concept with Business Decision Support Systems and developments of supporting ontologies.**Error! Bookmark not defined.** From this point onwards, a continuous elaboration of the Translator role in novel, contemporary context started to happen. One of these re-interpretations currently happens in the EU H2020 project OntoTrans[17], where an "OntoTransLator" was introduced who needs to know about simulation ontologies, to keep their subject matter expertise up to scratch and to research what global use a product may have. Furthermore, the EMMC is continuing this line with a Benefits Analysis and Method Comparison tool. A necessary skill will also be how a translator can interface with other roles as they will have to work with many stakeholders to make innovation FAIR on all its many facets. Hence, as this evolving is happening, we are confident that the state of the art is a superb basis to launch the "Knowledge Management Translator" as a new job role.

5.2 Cooperation with the Data Analytics Community

Similarly, in data analytics the role of an Analytics Translator is very much reminiscent of the one of a Materials Modelling Translator, as they are expected to bridge the technical expertise of data engineers and data scientists with the operational expertise of marketing, supply chain, manufacturing, risk, and other frontline managers, i.e., close the "language gap" between industrial stakeholders and data experts. AIANDUS16 praises Analytics Translators as the new sexiest jobs of the 21st century and attempts to build a community around personas who can aid with building Data Science solutions for getting business value.

In the field of ontology-based data documentation and Knowledge Engineering (KE), the current status is to aim for building the organisational structures that feed an AI system.[18] It is well understood that well-structured information is needed to make AI work correctly as intended.

[15]https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/analytics-translator
[16] https://www.aiandus.com/ats/
[17] https://cordis.europa.eu/project/id/862136, https://www.ontotrans.eu
[18] Earley, 2017, https://www.earley.com/insights/knowledge-managements-rebirth-knowledge-engineering-artificial-intelligence

Ontologies can be seen as vital knowledge representations[19] but it is still an ongoing effort to bring them to organisations and find staff to do this.[20]

5.3 Cooperation with Frameworks

- A Skills and Competency Framework (SCF)
- A Capability Enhancement Programme (CEP)
- Data Carpentry
- Marie Skłodowska-Curie Actions

5.4 Cooperation with RDA

A formation of a community of practice (CoP) within RDA 21 could be beneficial. In RDA, CoPs are composed of experts from that community that have an interest in the discipline/research domain and are committed to directly or indirectly enabling data sharing, exchange, and/or interoperability. CoPs serve as platforms for communication and coordination among individuals, building bridges outside and within the RDA, with shared interests.[22]

5.5 Cooperation with DOME 4.0

DOME 4.0 could enable to register persons and organisations who wish to offer their services as Knowledge Management Translators. DOME 4.0 is expected to launch a marketplace as a viable business and could profit from OntoCommons' definitions of these new role. Further cooperation on this will happen during work in Task 1.5.

5.6 Cooperation with Workshop Participants

We are also cooperating with the participants of the Focussed Workshop "The Industry Commons Translator - 1st Expert Meeting" and are actively working on a White Paper to shape the profile of a Knowledge Management Translator and elaborate best practices in a bottom-up approach. The participants comprise relevant members of the OntoCommons Consortium as well as Professionals from 3rd party organisations.

[19] https://info.earley.com/hubfs/EIS_Assets/ITPro-Reprint-No-AI-without-IA.pdf
[20] Earley, 2020, https://www.earley.com/insights/who-owns-business-ontology-staffing-ontology-development)
[21] https://www.rd-alliance.org/rda-announces-new-group-category-communities-practice
[22] https://www.rd-alliance.org/sites/default/files/attachment/RDA_Communities_of_Practice_Framework_v0.2_Dec2020.pdf

6.Conclusions

We found that stakeholders are deeply interested in such a role and that they had some thoughts about it prior to our engagements. This fact enables us to provide a profile with the right expectations we may have from persons taking on this role. Both the Translators and their Clients require a certain "data maturity" to embrace semantic tools as the next step forward. As "a little semantics goes a long way" we will be able to engage also with SMEs – full blown Ontologies can be the answer but don't have to be always.

We are very keen to provide this new role with a good CPD plan and materials for self-training. We also will discuss with our consortium members who have mature positions within their university to look into the Marie Skłodowska-Curie Actions. Even though it is tempting to entice mature professionals to adopt this role, we may want to consider curious post docs to widen their horizon and become a new generation of Knowledge Management Translators.

We took advise from our colleagues who elaborated on the six steps of translation for Materials Modelling Translators and established six staps as best practice guideline for the Knowledge Management Translators, too.

A directory will be established in due course and is most likely best housed in the ecosystem of DOME 4.0 as an expert database.

The next steps comprise publishing a Knowledge Management Translator White Paper, a second Expert workshop and a conclusive last deliverable, D1.15.

7.Appendix: Evidence base

The findings presented in this Deliverable are based on the following stakeholder interactions:

7.1 Industry Commons Translator Session of the First OntoCommons Global Workshop

https://ontocommons.eu/news-events/events/global-workshop-ontology-commons-addressing-challenges-industry-50-transition

Date: 2nd – 5th Nov 2021, online

Objectives:

The session heard from stakeholders involved and interested in defining the profile and role of an Industry Commons Translator and the potential steps involved in a Translation task performed by such a role.

- Learn from experience in other sectors: Materials Modelling Translator, Analytics Translator
- Discuss the need and requirements for an Industry Commons Translator
- Describe the role of the Translator/Team of Translators
- How can the Translator contribute to industry adopting ontologies into their day-to-day work?
- How can the Translator enable changes within an organisation to path the way for adopting ontologies?

Agenda of the Translator Session on 2nd Nov 2021

	Room 1		
1st break out		**Industry commons translator**	Chair: Gerhard Goldbeck (GCL)
	11:45 - 11:55	Advancing Translation in Materials Modelling	Peter Klein (Fraunhofer ITWM)
	11:55 - 12:00	Q&A	
	12:00 - 12:10	Translation of Innovation challenges	Michael Noeske (Fraunhofer IFAM)
	12:10 - 12:15	Q&A	
	12:15 - 12:25	Knowledge Engineering Translation - early experiences from the Biomedical Domain	Nicolas Matentzoglu (Independent Contractor)
	12:25 - 12:30	Q&A	
	12:30 - 13:15	Discussions	Chair: Gerhard Goldbeck (GCL)

7.2 Industry Commons Translator Expert Meeting

https://ontocommons.eu/news-events/events/industry-commons-translator-1st-expert-meeting

Date: Monday, 21st Feb 2022, online

Objectives of the 1st Expert Meeting

The experts were challenged to define the profile and role of an Industry Commons Translator and the potential steps involved in a Translation task performed by such a role.

- **Discuss the requirements** for an Industry Commons Translator
  - Describe the role of the Translator/Team of Translators
  - How can the Translator contribute to industry adopting ontologies into their day-to-day work?
  - How can the Translator enable changes within an organisation to path the way for adopting ontologies?

- **Discuss the challenges** of the role of the work of an industry commons translator in terms of existing tools, lack thereof, training, continuous professional development (CPD), the environment they will work in, who will they work with (report to, team up with), etc.

The **participants were invited to become authors of a Whitepaper** which will be published in Zenodo. The idea is to preserve the outcome of this very first meeting and capture vital ideas and be able to share these with the global community under a creative commons license.

Findings of this workshop will contribute to the **OntoCommons Road Map.**

The meeting will take place online on, in consensus with all invited participants.

Agenda

Time	Actor	Topic	Expected Outcome
09.30 – 09.45	Gerhard Goldbeck, All	Welcome and Introductions	The Participants will learn about each other's backgrounds
09.45 – 10.00	Gerhard Goldbeck	Setting the scene	The Participants will be exposed to the critical issues where their input is appreciated
10.00 -11.10	All	Discuss the Requirements: Job Description	The Participants will bring their ideas and professional knowledge in to shape the role of an Industry commons translator.
11.10 – 11.30	All	Break	

11.30 – 12.55	All	Discuss the Challenges	The Participants will raise their concern why such a role may be hampered and outline possible solutions and where to find them.
12.55 – 13.00	Gerhard Goldbeck	Closure of the meeting	

15 Participants (OntoCommons Beneficiaries are printed in blue)

Gerhard Goldbeck and Alexandra Simperler, (Goldbeck Consulting Ltd., UK)

Lucy Bull (Composites Evolution Limited, UK)

David Gao (Nanolayers Research Computing, UK)

Emanuele Ghedini (Alma Mater Studiorum - Universita di Bologna, Italy)

Mohamedhedi Karray and Arkopaul Sarkar (Ecole Nationale D'ingenieurs de Tarbes, France)

Evgeny Kharlamov (Robert Bosch GmbH, Germany)

Dimitrios Kyritsis and Arild Waaler (University of Oslo, Norway)

Jane Lomax (SciBite Limited, UK)

Nicolas Matentzoglu (Semanticly, Athens, Greece)

Michael Noeske (Fraunhofer IFAM, Germany)

Florina Piroi (Technische Universität Wien, Austria)

Katya Vladislavleva (Datastories International, Belgium)

In addition to the meeting itself, there has been feedback and collaborations with the experts on our joint draft White Paper.

7.3 OntoCommons beneficiaries' discussions, involving UiO, GCL, ENIT, ICF

These happened in ad-hoc meetings and during the biweekly WP1 meetings.