



## Translation within EMMC

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## Translation activities within EMMC-CSA

- EMMC-CSA workshop in Vienna, April 2017
- EMMC-CSA Expert meeting on Translation, June 2017, Eindhoven
- Translator Case and Industrial User Case Surveys, April-August 2017
- EC Translation workshop, September 2017, Brussels
- Translation sessions in Warsaw (2017) and Glasgow (2018)
- Translation workshop, December 2019, Eindhoven
- Translation presentations at conferences/events

### Translation documents

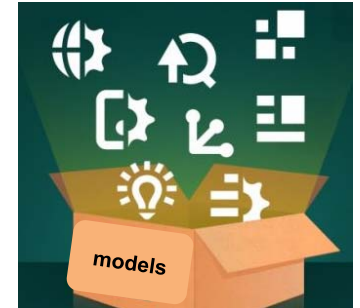
- Translators Charter
  - Translators Guide
  - Methodologies for translators
  - Translation cases
  - Translation presentations
- 
- EMMC Road Map



# Translation = bridging the gap between modellers and industry

## Industrial world:

- Often not aware of the full potential of modelling or/and
- Often needs guidelines in selecting the suitable modelling workflow(s) for their problem



## Academic modelling world:

- Often not fully aware of the nature of the industrial problems

## Translators:

- ✓ Understand both worlds and speak both languages!





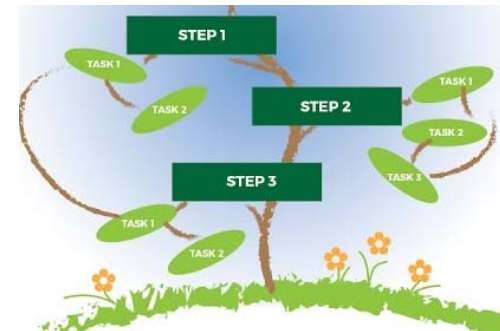
# Translation process

Analysis of the industrial problem



Translation into parts that can be simulated

Building modelling workflows





# Tasks of the Translator

**Understands the business case**

**Understands the industrial case**

**Analyse the experimental (and modelling) data available within the client**

**Translate to (possibly more than one) modelling workflows**

**Propose to the client modelling executor(s) and strategy for model validation**

**Translate the modelling results to information that is understandable, reliable and usable by the client**



## The Translation process

### Good understanding of the business case:

- *Impact (e.g. profit, jobs, ...)*
- *Risks*
- *Timeline of the client*
- *Expected by the client outcomes (soft and hard)*

### Good understanding of the industrial case:

- *Where and what exactly is the problem: material or processing related or other*
- *Factors that have an effect e.g. technical specifications.*

### Analysis of the experimental data available within the client:

- *This data is needed for model input and validation.*
- *The quality and accuracy/uncertainty of this data must be well understood.*
- *If needed, the Translator can propose “dedicated experiments”*



## The Translation process

**Translation to (possibly more than one) modelling workflows, considering:**

- *The specifications of different potentially useful models/software tools:*
  - *Availability*
  - *Suitability,*
  - *Efficiency,*
  - *Level of maturity (user friendliness, especially for SMEs),*
  - *Accuracy*
- *Client's experience and preferences*
- *Costs: investments in person months and hardware, simulation time*
- *Return of investment / benefit*
- *Validation of the model: available experimental data and generation of new data*
- *Give good/objective argumentation for the proposed modelling workflows*



## The Translation process

**Proposition to the client with the most suitable modelling executor(s) and strategy for model validation**

- *Give good/objective argumentation for the proposed executors*
- *Based on executor's expertise, experience, availability and client's preference (if any)*
- *Follow the project execution and represents the client interests*

**Translation of the modelling results to information that is understandable, reliable and usable by the client**

- *A follow-up, evaluation of the process, interpretation and recommendations are desirable but not always required*





## Skills of the Translators

- ❑ **Industrial background**
- ❑ **Deep and broad knowledge of modelling and software tools**, including their limitations. Large network of modellers, EU-network
- ❑ **Broad understanding of different experimental techniques and data analysis** (suitability, quality)
- ❑ **Knowledge of economic impact:** Balance between investments and expected return; use/define measurable benefits from the modelling
- ❑ **Softs and analytical skills:** communication, explanation, listening, reporting, organisation, flexibility, multi-tasking, quick learning
- ❑ **Being neutral: find the best expert and the most suitable modelling tools, with objective argumentation on the selected models/software/executors**
- ❑ **Expected to show a proven “track record” of expertise on translation**, including success stories and on modelling if being also the modelling executor
- ❑ **Managing data confidentiality**

*The Translator is often not an individual person but a role which is usually best fulfilled by a team of people with the required skills!*



## Industrial view on materials modelling

- ❑ The companies expect from the materials modelling:
  - Measurable business benefits
  - Good and tailored (specified and quantified) accuracy
  - To be application-oriented (not only material oriented)
  - Improved predictability, validation, time efficiency and focus on solving specific industrial problem rather than to providing general trend or variety of possibilities
  - Combination of physics-based and data-based models
  - Fast (even if less accurate) solutions
  
- ❑ Hindering factors for modelling implementation in industry.
  - The costs of modelling: relatively large investment (which needs to be quantified) vs. often unknown return on investment.
  - The long simulation time
  - The often unclear reliability of modelling
  - The lack of understanding from the modellers on the business benefits of modelling for the industry



## Industrial user experienced in modelling would still need translators

- For better/faster in-depth expert solutions
- To bridge the gap between simulation scales
- As a sparring partner, a team of experts with overcritical size
- To increase the potential for success via accessing state of the art modelling and simulation tools
- Due to limited time for prove all options
- For sensitivity analysis



## Industrial users (not experienced in modelling) would often need to be convinced on the use of modelling

### Some arguments to convince clients of modelling benefits:

- Modelling is used:
  - ✓ To avoid numerous and unnecessary experiments, avoid trials and errors
  - ✓ For Understanding of phenomena
  - ✓ For exploration of new or unusual ideas
  - ✓ To give directions/trends
  - ✓ When no experiments are possible and only modelling can give answers
  - ✓ To probe the accuracy of an approach currently used in the company
  - ✓ To accelerate the development time
  - ✓ To reduce materials and manufacturing costs and time
  - ✓ To improve materials performance, reliability and safety
  
- Show the economic impact from the use of modelling
- Demonstrate other successful modelling cases
- Verify the modelling method by comparing with experimental data
- Perform preliminary feasibility studies
- All the others are doing it



## How to relate the specific industrial problem to the specific modelling approach?

- Evaluate the **suitability, availability and reliability** of different modelling approach/software tools to study the specific physical phenomenon.
- Map the most suitable models onto the whole industrial problem, and not other way around (which can often be the case)
- Consider linking/coupling of models when analysis on different length and time scales of key phenomena is required
- Perform analysis of the available input data and the desired output data
- Consider the preference of the client for specific/familiar software tools and procedures
- Chose mature models when there is need to produce reliable results in short time
- Chose advanced models when high accuracy is needed and there are less time restrictions
- Consider a "robust" cost-effect ratio
- Have in mind that commercial software is not always able to provide desired solutions: need for flexible, tailor-made/in-house build modelling tools

**Give a solution to the client, not a simulation result!**



## Translation for SMEs

- ❑ “Universal” translation process: independent on the size of the industrial client but allowing for flexibility
  
- ❑ Translation challenges related to SMEs:
  - The people in SMEs usually have hands full with their normal daily work and have little time for research (also true for companies of all sizes)
  - SMEs are generally less organized for R&D and require more complete support
  - SMEs cannot take risks related to present modelling capabilities
  - SMEs problem tend to be more specific
  - SMEs often do not have the required expertise
  - It is not always possible for SMEs to take very challenging projects
  - SMEs usually cannot afford it: financially and commercially not possible/feasible
  - Clarify whether translators should help SMEs to do modelling themselves or offer them the pure translation service?
  - The SMEs often prefer to talk rather with a domestic Translator in their own language. Therefore it is important to build local Translators network in each country.



## Translation for big companies: Internal and External Translation

### Internal and external translation

- Internal translation: translation performed by employees of industrial end user for their own company (or/and for company's clients)
- External translation: translation performed by external (independent on the client) translator



## Benefits and drawback of internal translation

### **Benefits of internal translation:**

- ❑ Short times of the translation and implementation of modelling results/ solutions due to better knowledge/understanding of the client's (own company) industrial and business cases and the economic impact of modelling
- ❑ Allows for a close interaction with customers. Having the knowledge in-house is added value on top of the product that is sold, connecting customers to the company
- ❑ Allows a company to connect to research institutes and universities closely, which is beneficial attracting young people for jobs in the company.
- ❑ Higher motivation and drive for successful translation and its outcome
- ❑ Allows for better overview of new industrial topics or strategic changes
- ❑ The trust of the client is already gained which makes the translation more powerful and efficient (e.g. in acquiring cooperation from client's management)
- ❑ Can propose more independently the suitable modelling executors (unless those are available in-house which often are then preferred)

### **Drawbacks of internal translation:**

- ❑ A company needs to be of a critical size in order to have the necessary translator's skills/expertise in-house.
- ❑ Expensive and large staff needed. Training curve is steep





## External translation

### **Benefits:**

- It is a more popular type of translation with more extensive practice. This can contribute to a wider and updated knowledge on the available modelling tools and possible alternative approaches
- Large number of external translators available
- External translators have wider network of modelling experts and other translators
- Can offer deep expertise in a business areas that are currently unexplored by the client
- Often a team of experts is involved, with an updated knowledge on the current state of art in modelling

### **Drawbacks:**

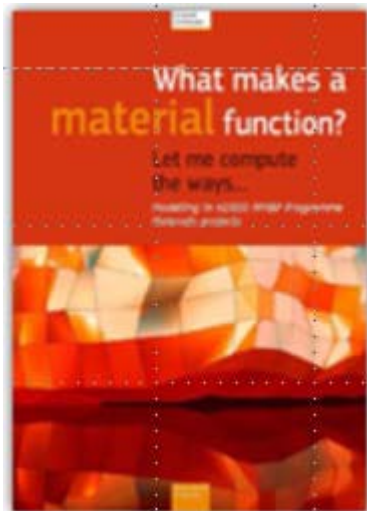
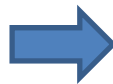
- More scepticism from the industrial client (at least in the beginning)
- Confidentiality agreements need to be put in place (concern for data and information security)
- More difficult or takes longer to understand well the industrial and the business case
- More difficult to estimate the investment and return (benefits/economic impact)
- Administration and costs may be (too) high
- Difficult to stay independent from its own institution policy/loyalty for modelling execution choices, unless the external translator is independent (consultancy-type) translator
- Implementation of the outcome from the modelling project may be less straightforward:



# Modelling terminology and standardization

The industrial problems often require **multi-scale modelling solutions: interactions** between different models and materials data

Each community has its own terminology!



Review of Materials Modelling VI **RoMM**

## MODA (MOdelling DAta)

is a **template** for the **standardised description** of **materials models** (<https://emmc.info/moda-workflow-templates/>)

The **MODA** is meant to **guide users** towards a complete **high-level documentation** of material models, starting from the **end-user case** via the **computational details** to the **results**.

It provides all necessary aspects for: **description, reproducibility, curation** and **interfacing** with other models and databases.

CEN agreement CWA 17284 “Materials modelling – terminology, classification and metadata”

Endorsed by >15EU organizations

<https://www.cen.eu/news/workshops/Pages/WS-2017-012.aspx>

European Materials Modelling Ontology (EMMO)

<https://bookshop.europa.eu/en/what-makes-a-material-function--pbKI0616197/>



## EMMC Translation case

- To use it as a reference for your expertise and experience as translator
- To share it with other translators
- To document (keep a track on) your own activity and external relations

### **How to prepare your translation case?**

- 1) Read the Translators Guide and review the Translation cases on the EMMC open/restricted site
- 2) Download the translation case template from EMMC website
- 3) Document your case, guided by the template. Discuss in advance with the client if/what information from the case can be publicly shared
- 4) Send your case to the Translators WG leaders



# Translation case template



## EMMC Translation Case

### Title of the Translation Case

- Please fill-in the title of your Translation Case

### Introduction

#### Translator

- Name, affiliation and contact details
- What type of Translator is your institution: TTI (Technology Transfer Institute), Academic group, Software Company, Manufacturing Industry, Other (Consultancy, etc.).
- What is your field of translation expertise: specify type of material or type of models according to RoMM (please see [Review of Materials Modelling](#)).

#### Client

- Who is the client? Is the client a large company, SME or a consortium thereof?
- Which value chain segment (e.g. material producer, convertor, end-user) it is positioned?
- Did you have existing collaboration with the client?

### Industrial/Business Case

- Describe briefly the industrial problem.
- Indicate involved budget or preferred time to solution (duration).
- Indicate what was the expected outcome of the translation process.

### Translation to modelling solution

- What type of model(s) did you use propose and use?
- Explain arguments and criteria used to propose and choose a specific modelling approach and modelling executor for the specific industrial problem. **If you proposed your own (institution) model and modelling executor, explain why you thought that this was the best solution for the client's problem.**
  - Include inventory and data quality assessment. Was it necessary to realize dedicated experiments prior to simulation? Describe the required validation steps.
  - Were model accuracy and necessary investments discussed? If so - please describe.
  - Who made the final choice for the model and for the modelling executor? Based on which criteria?
  - Explain the involvement of the client in the case.

### Evaluation of the translation case

- Indicate eventual bottlenecks encountered in the translation process or any suggestion for improvement of the process.



## EMMC Translation Case

### Client's benefits from the modelling

- How did the client use the modelling results?
- What were the benefits for the client of using modelling?

### Economic impact of the modelling project

- When possible, estimate the **Total Client Investment (TCI)** in this modelling project as the sum of all Direct Costs. Direct Costs are, for example: Software cost/ licenses, Hardware cost, IT support, Labour / Material cost, Training, Staff cost, Computing cost.

Direct Costs	EUR
<b>Total Client Investment (TCI)</b>	<b>EUR</b>

- Estimate the **Total Client Benefit (TCB)** from this modelling project. Please consider certain KPIs (e.g. costs for saved number of experiments, cost for saved materials, costs for personnel saved for experimental work, improved processing etc. For more information please look in the attached document on KPIs or at [Economic Impact of Materials Modelling](#)).

Client Benefits (e.g. based on certain KPIs)	EUR
<b>Total Client Benefit (TCB)</b>	<b>EUR</b>

### Return on investment (ROI)

- Calculate the ROI as a ratio of the Total Client Benefit (TCB) and the Total Client Investment (TCI):  
ROI= TCB/ TCI

ROI	
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# Translation on the materials modelling Market Places

The Translators would make use of the materials modelling market places that will be established within:



## VIMMP

**Project ID:** 760907

**Funded under:**

[H2020-EU.2.1.3. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials](#)

### Virtual Materials Market Place (VIMMP)

From 2018-01-01 to 2021-12-31, ongoing project



## MarketPlace

**Project ID:** 760173

**Funded under:**

[H2020-EU.2.1.3. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Advanced materials](#)

### Materials Modelling Marketplace for Increased Industrial Innovation

From 2018-01-01 to 2022-12-31, ongoing project



## The next step: Open Translation Environment (OTE)

**Open Translation Environment** - a platform with:

- ✓ Search possibilities for all necessary information
- ✓ Decision mechanism on when to use simulations
- ✓ Tools to link models and databases in the search for the most suitable modelling software
- ✓ Tools to link Translators with modellers and with industry
- ✓ Tools to share among Translators (non-confidential) best and worst practices

**Features of the OTE:**

- ✓ Can accommodate commercial, closed source as well as freely available open tools
- ✓ Considers managing of IP rights, data openness and interoperability
- ✓ Makes use of the Translators Database and Modelling Market Place
- ✓ Create a toolbox (e.g. data repositories etc.) to be able to evaluate the applicability /accuracy of certain models and to compare different models, to estimate ROI
- ✓ **OTE is *not* the actual code executing the simulation**



## Upcoming 2019 Outlook

- EMMC report on translation methodologies

[www.emmc.info](http://www.emmc.info)

2<sup>nd</sup> EMMC International Workshop  
**February 25-27, 2019**  
*Vienna/Austria*



EMMC Translation Expert Meeting  
**March 27, 2019**  
*Hamburg/Germany*

- Training for Translators
- Rules for Trainers

Venue: ***Hotel Hafen Hamburg***





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