



What is expected from a Translator in a large company – examples, learnings and training

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Focus of this talk

Which aspects a modelling translator needs to address when introducing modeling into a project and what skills are needed

The Modelling Translator in a large company is the person/team which develops and proposes/shows the value of a modeling route to support projects

Material modelling can play a role in:

1. Solving customer problems
2. Development and commercialization of new material.
3. Introduction of commercialized materials at Customers.

Background on Dow

MATERIALS SCIENCE DIVISION: INNOVATION THAT DRIVES COMMERCIAL VALUE

BUILDING BLOCKS

Advanced Back-Integration

Ethylene



Propylene



Silicones



CAPABILITIES

World-Class Science and Engineering Capabilities



High-Throughput Research



Catalyst Discovery & Ligand Synthesis



Polymer Science



Materials Science



Formulation Expertise



Process Engineering



High-Performance Computer Modeling



Application Development



Product Safety

SOLUTIONS

Narrower, Deeper End-Market Presence



PACKAGING



INDUSTRIAL & INFRASTRUCTURE



CONSUMER

Modeling capabilities

Range of material modeling expertise/resources within R&D:

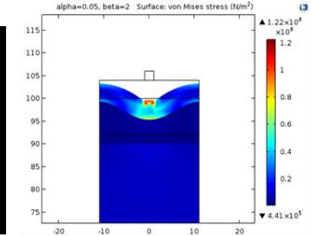
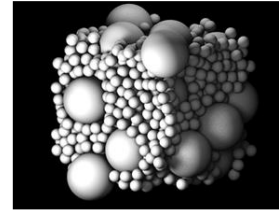
- Continuum modeling / FEA
- Material constitutive modeling
- CFD
- Structure-property modeling
- Discrete modeling

Leveraged from Corporate Research
to the various business units

Globally connected Modeling Infrastructure: HPC, Software



Where material modeling is used

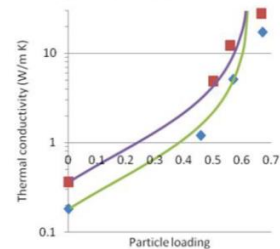


BEZRUKOV A. et al.: Spatial statistics for simulated packings of spheres. 2001

Support solving customers problems

Development new materials/formulations

Support Introduction Existing Materials



Types of Modeling – Types of Problems

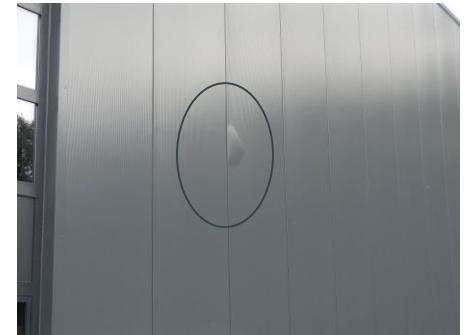
Customer Problems	New Material Dev.	Support Introduction Existing Materials
One-off type of modeling effort	One-off type of modeling effort	
	Digitalized Workflows	
		Customer Apps

Support solving customer / internal clients problems:

Many possible root causes
- Not solved through experimentation alone

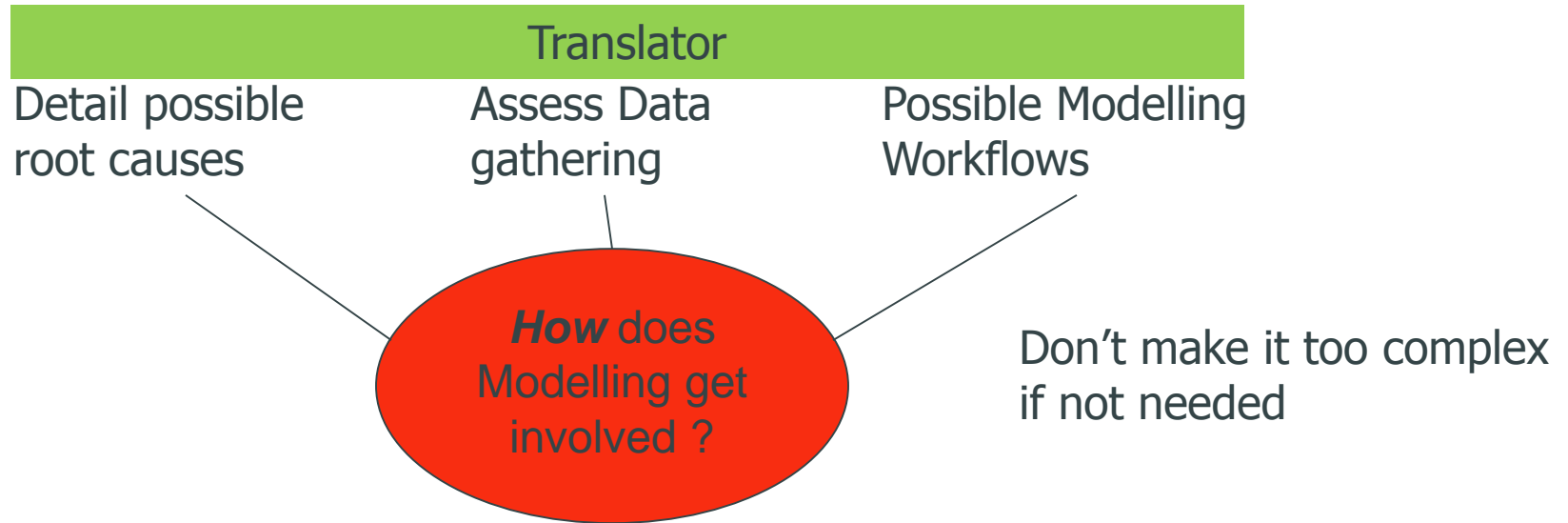
High \$ at stake

When does Modelling get involved ?



Blistering of lightweight sandwich panels

Support solving customer / internal clients problems:

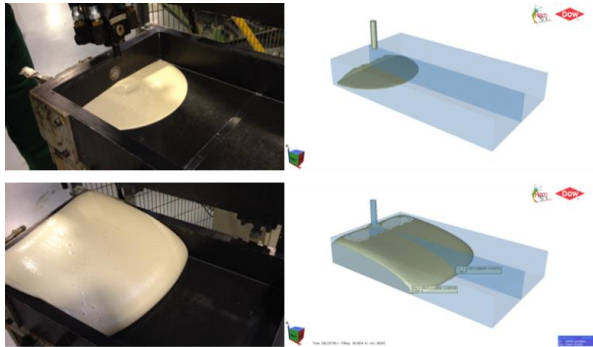


- Define a modeling scope/plan with milestones and risks, resources, timing
- Communicate the risks and limitations of the modeling approaches
- Cost of the modeling work assessed by the business versus the value it can/will bring

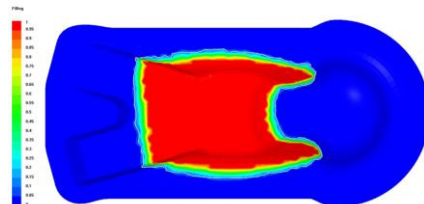
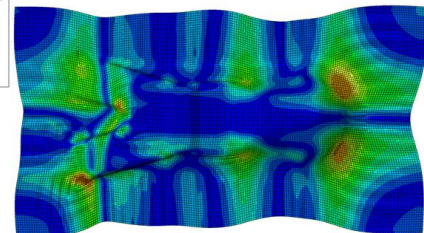
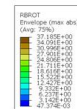
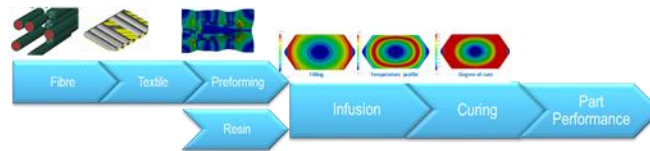
Development new materials/formulations

Material Modeling can be used for different aspects:

- Structure-Property modeling of new material/formulation
- How a new material/formulation can be processed by customers
- How the material performs in an application



Development new materials/formulations



Internal translator needs to be able to communicate what modeling can bring

Quantify Performance in end-application

How Material Process

Obtain digitalized workflow

Gain Insights (IP)

Typically not so easy to obtain performance/advantage through experimentation alone:

- Want to do early developments without customer data in order to develop and protect technology (IP)
- Complex fabrication steps. Dow material is often only part of complex system

Development new materials/formulations



Translator “Economic” Skills needed: Assess the value

Assess the Dow Technology vs Next Best Alternative:

- Quantify the advantages (e.g. vs benchmark).
- Understand the value chain.
 - Advantages to Formulator/Convertor/Tier 1 (e.g. processing advantages)
 - OEM benefits e.g. reduced weight, longer life,
 - End-User benefits (e.g. recyclability, fuel economy)
 - Closely work with marketing. Also understand how potential value to be captured
- Support the value proposition/ value capture of Technology
- Cost modeling -> support with data from modeling (e.g. cycle time)

Development new materials/formulations



Translator “Economic” Skills needed:

- Assess the advantages in time-to-market: How can modeling help accelerate new developments/formulations:
 - Dow / Customer much faster to the right solution = time-to-market = \$
 - Need to be able to go through the different scenario's and work closely/integral with the product development team

Reduced cost for experiments (less trial and error) is important but more important how much more program/projects with same resources

Development new materials/formulations



Translator needs to be able to

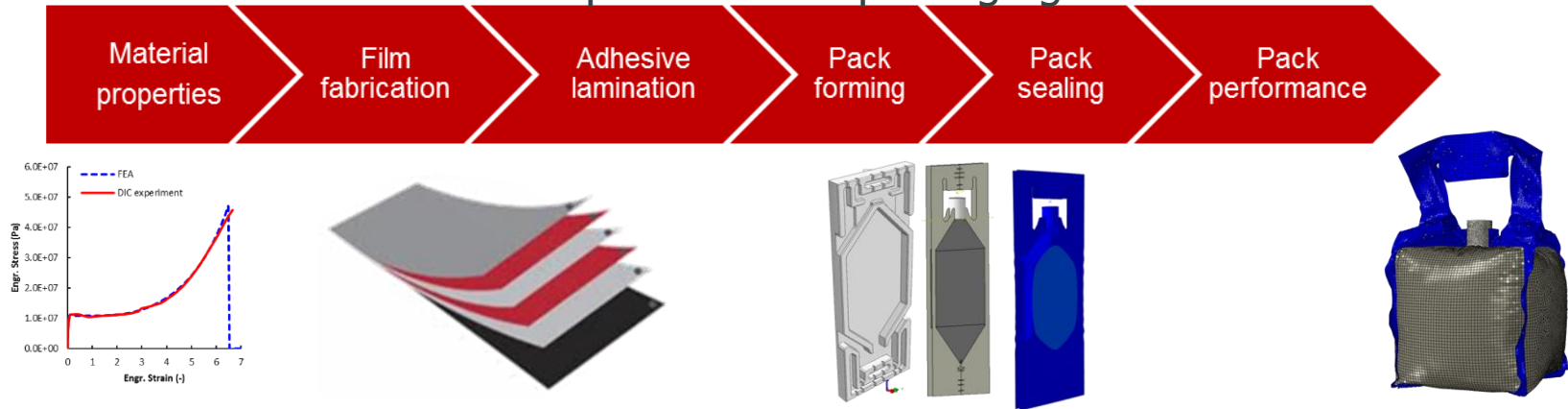
- Define a modeling scope/plan with milestones and risks, resources, timing
- Also communicate the risks and limitations of the modeling approaches -> don't oversell what modeling can bring.
- Cost of the modeling work assessed by the business versus the value it can/will bring

Specially the development of digitalized workflow is a capability build with high investments

Support Introduction Existing Materials

Building digitalized workflows to connect materials/material selection to end-customer part performance

Example : Flexible packaging

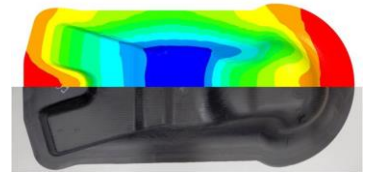


Translator need to define what is needed to build/run such capability.

Support Introduction Existing Materials

Modeling provides the opportunity to be faster/less testing/trials vs. not using modeling

- Development of specific material modeling driven apps for customers to obtain answers on material characteristics
- Modeling to guide material selection and optimum use of Dow material in processing and in end-application



Some examples – high level

E.g. developing a very fast cure epoxy formulation for high volume composites application:

Develop the material models which predict rheo-kinetics and use these models to predict the processing & performance of (typical/targeted) customer applications: these will be used for overall benefits of the technology and value of the material to the customers/market.

- Cycle time benefits -> Investment/cost benefits at customer
- Performance benefits (e.g. lower weight of a part)
- Other benefits (e.g. ability to integrate more parts = cost benefit)

Some examples – high level

E.g. developing a new foam formulation for acoustic/thermal insulation of appliances:

Foam modeling (both process modeling and structure-property modeling) followed by acoustic and thermal modeling of the foam in the (customer) application: Obtain through this modeling the benefits in terms of:

- Material usage needed to reach target performance
- Performance benefits (e.g. acoustic – reduced dB)
- Cycle-time benefits -> costs/investments
- Other benefits: e.g. improved EH&S, reduced packaging space (design freedom),.....

Some additional aspects for a Translator to consider

Modelling to steer experimental work / DOE's

Develop IP from the insights gained

Novel modelling methodology/approach protected as a trade secret.
Deliver material models to customers with non-analysis clause in encrypted in black-box.

In some markets: ability to model your technology is a requirement in order to sell, e.g. automotive (cost of doing business)



Finally some skills/traits for a Translator

- ✓ Well networked across different disciplines and functions
- ✓ Broad understanding of different experimental and/or modeling technologies and methodologies
- ✓ Good communication, negotiation and influencing skills, and ability to convey complex topics to a broader audience
- ✓ Ability to connect fundamental research with application development
- ✓ Basic financial acumen (value proposition concept, costing, NPV)
- ✓ More experienced (following most of the above)



How do we develop those skills needed?

Technical Skills:

- On the job training, Software specific training by the vendors – sometimes organized internally if enough critical mass
- Develop as an SME on modelling techniques and in specific application area (e.g. composites, packaging, PU foam applications,....) – on the job plus internal trainings

Other Skills – internal training plus on-the-job training/expectations setting

- project management, networking within company, presentation skills
- Market Blue-Printing, Six-Sigma, financial-basics

 Thank you!

