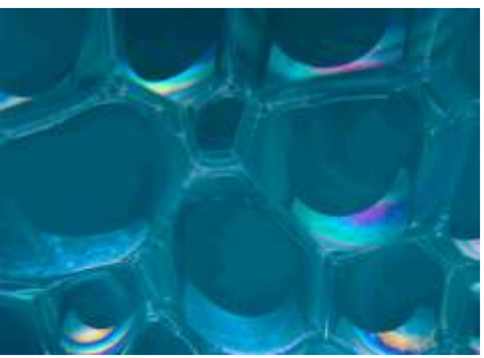
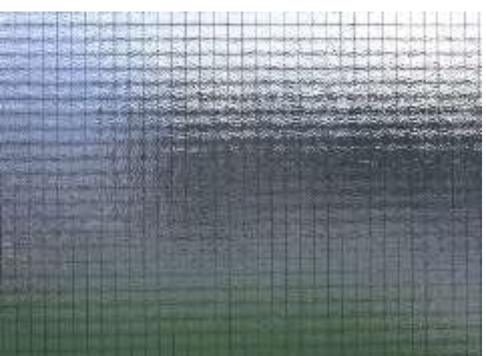


mat

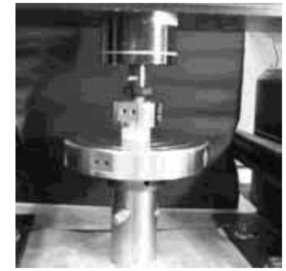
a world of materials

many products

reality

each with its own reality

material data



compressive

stress relaxation

tensile

viscosity

fatigue

conductivity

expansion

properties that describe reality

matereality

web services for material data

A collaborative MDM System that meets the needs of VPD

Hubert Lobo

Problem

Why all this?

Except for simple cases….

- Material properties are not definitive!
- Handbook values are typical, not representative
- You cannot possibly measure all the possible nuances of a materials behavior- nor would you be interested

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Problem

Material properties differ…

- Properties depend on the application
  - on test conditions:
    - temperature
    - rate
    - time
    - environmental exposure
  - the samples
  - the test specimens

Problem

What's good for selection…

- The correct material property for a particular use may not be the right one for another application
- Conversely, it is pointless developing properties outside the context of an application

can be bad for VPD!

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Example

Case 1

- Automotive- Fuel Tank
  - Material : Polyethylene (PE)
  - Deformation: large, low temp failure
  - Model: *ELASTIC/*PLASTIC
  - Data needed: stress-strain curve:
    - fuel soaked specimens
    - −40C
  - Typical data: taken on virgin resin at 23C

- Reality:
  - Data at −40C is needed
  - Much stiffer, brittle failure?

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Problem

Finding the right data

- Imagine wading through enormous swamps looking for the right data
  - Handbooks
  - Internet
  - Databases
  - File cabinets
  - Colleagues and co-workers

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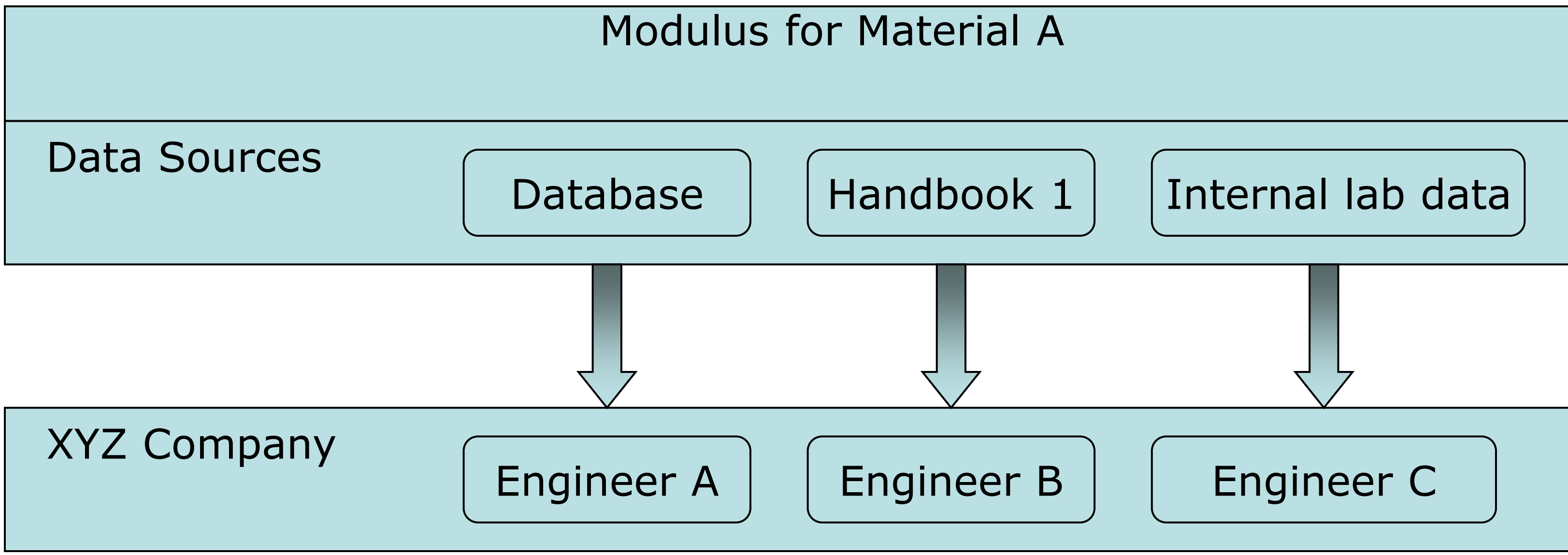
Problem

Inconsistent use of data

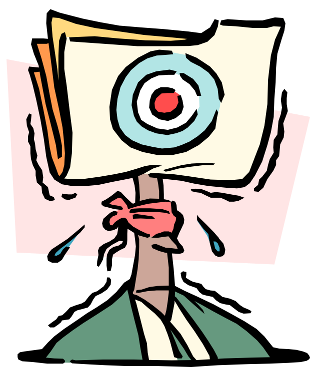


the six sigma killer…

Problem

Poor properties can be fatal

- Property no longer represents the behavior being simulated
- Can be a root cause of error in CAE
- Presents a serious credibility problem for analyst, CAE tool, and VPD



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Solution

How to avoid this?

- Understand the environment that is being simulated
- Translate the behaviors into a set of measurable property requirements
- Pay heed to the underlying assumptions
- Develop representative properties
- Use consistently across VPD platform

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Problem

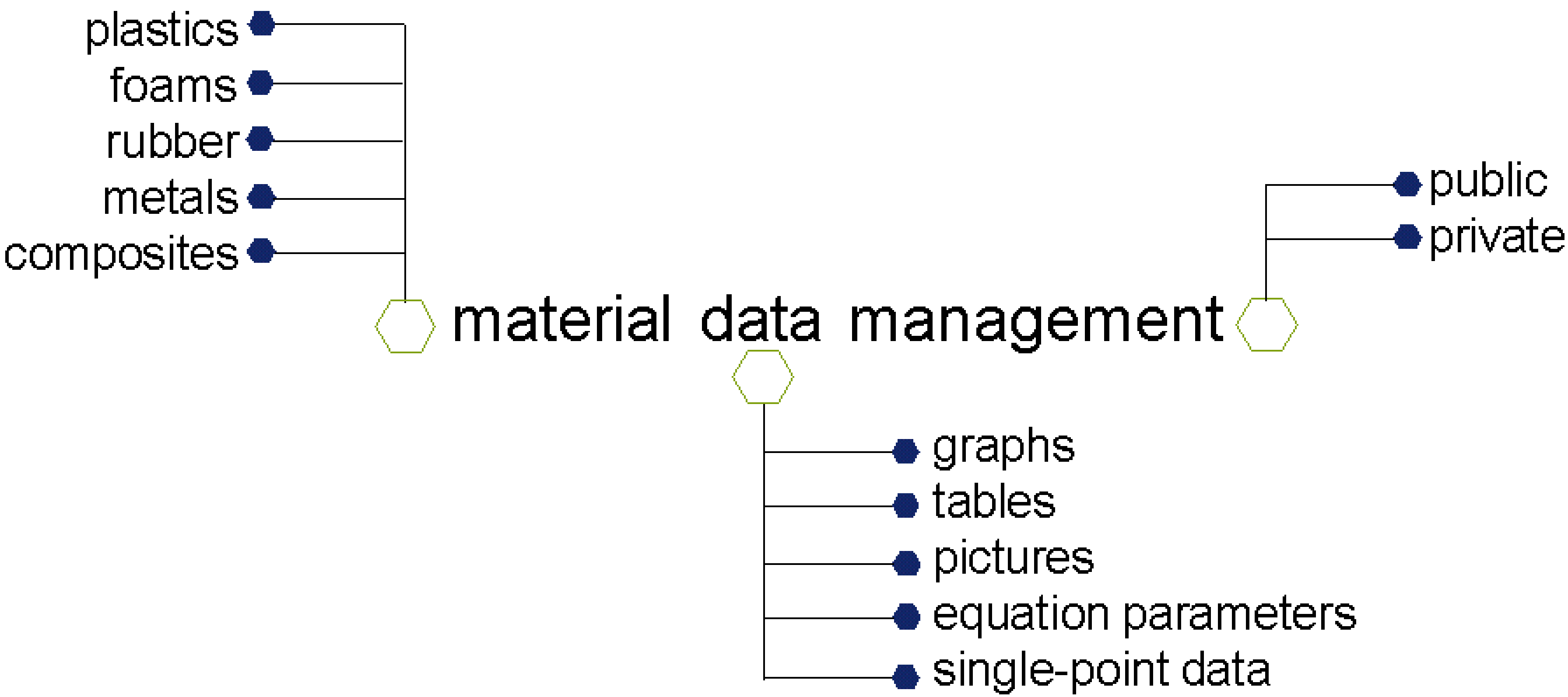
The big picture

- We need to store a multitude of varied properties
- Which depend on the end use application
- For diverse applications
- For diverse material types
- Useable in a variety of CAE solutions

a major mess…

Solution

Introducing Matereality



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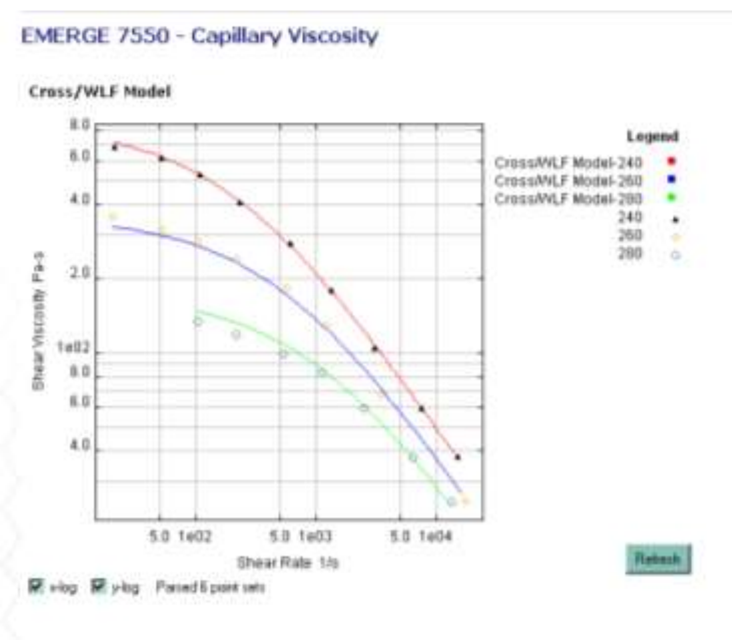
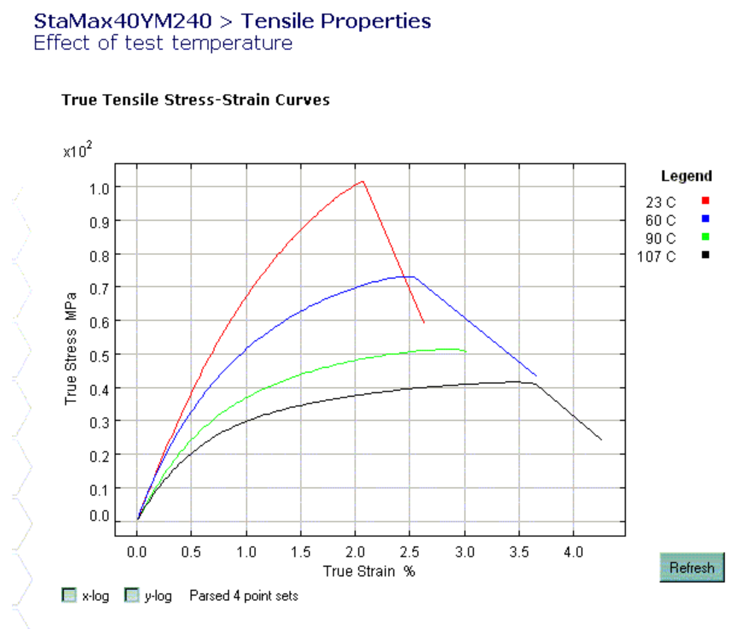
Solution

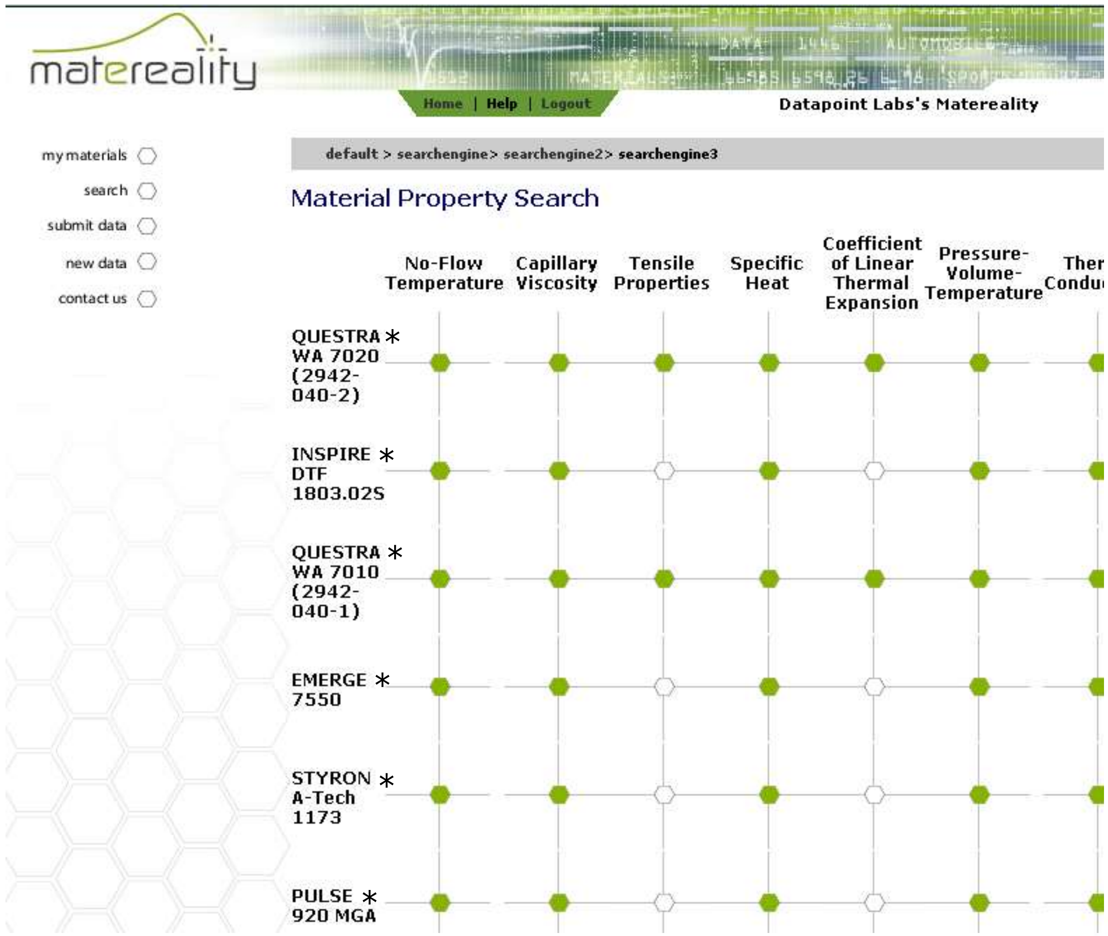
Handles data diversity





Solution

Stores pertinent data



Material names are trademark of The Dow Chemical Company

Solution

Records traceability

Datapoint Labs's Matereality

my materials
search
submit data
new data
contact us

Measurement Details for EMERGE *550 - Capillary Viscosity

Technique	standards organization	ASTM
	standard number	D3835-96
	uncertainty analysis	per standard
Sample Details	identification	5209
	source	client
Corrections	data correction	Rabinowitsch
Specimen Details	drying	none
	form	pellets
	other preparation	none
Test Parameters	barrel diameter	12 mm
	die diameter	1 mm
	die entry angle	180 deg
	die length	20 mm
	preheat time	6 min
	test temperature	240 C
	test temperature	260 C
	test temperature	280 C
Traceability	measurement date	3/4/2002
	accredited	Yes
	measurement instrument	Goettfert Rheograph 2003 Capillary Rheometer
	performed by	JA
	certified by	TB

Material names are trademark of The Dow Chemical Company

Solution

Displays variability

Tensile Modulus - Youngs

2223 MPa	1
2138 MPa	2
2229 MPa	3
2197 MPa	Average

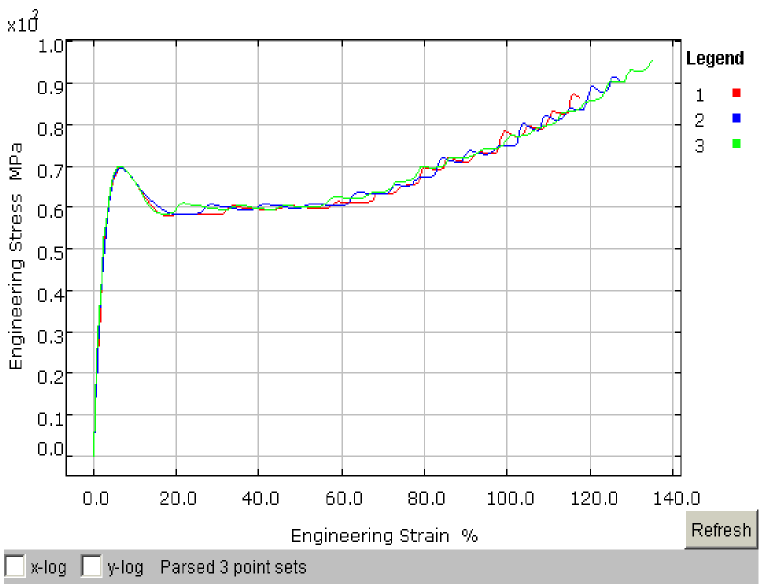
Offset Yield Stress in Tension

44.27 MPa	1
46.04 MPa	2
41.07 MPa	3
43.79 MPa	Average

Offset Yield Strain in Tension

2.12 MPa	1
2.24 MPa	2

Engineering Tensile Stress-Strain Curves



Example

Application to VPD and beyond

Part designer's matereality
- Stress-strain data
- Impact data
- Refractive index

Moldflow analyst's matereality
- Viscosity
- Thermal conductivity
- Melt density
- Specific heat
- No-flow temperature

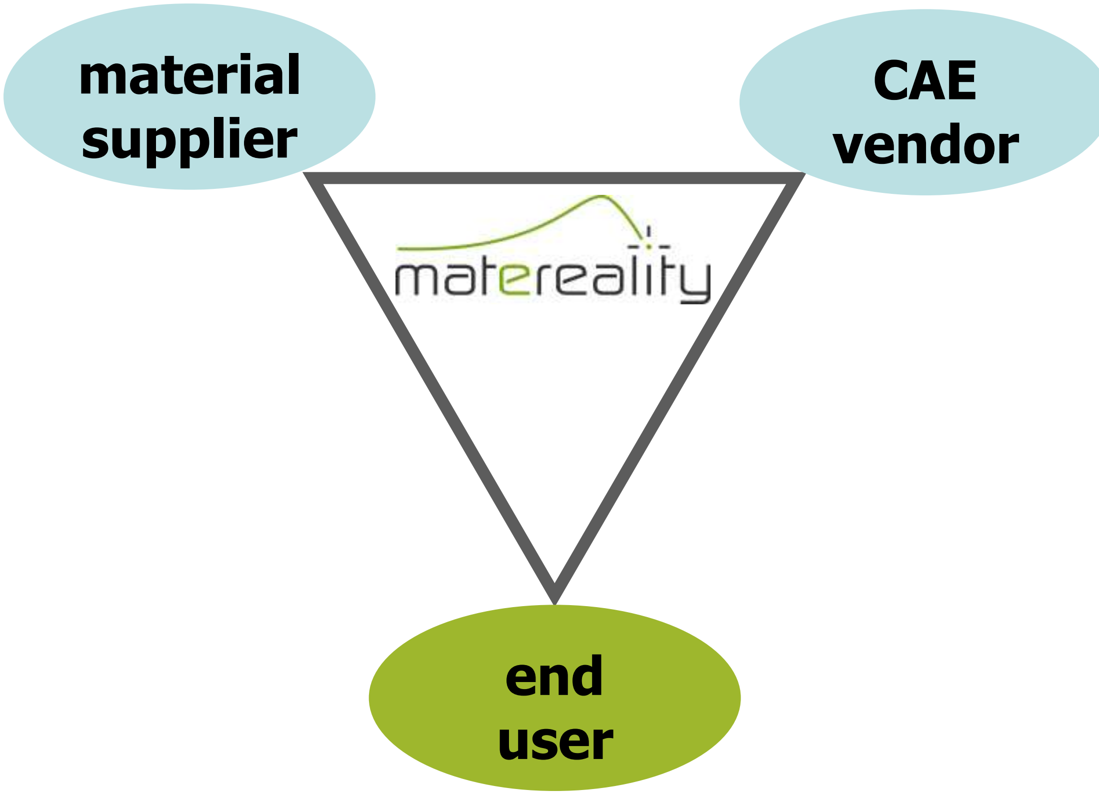
Molder's matereality
- Melt flow rate
- Izod strength

Product: safety glasses

Material: polycarbonate

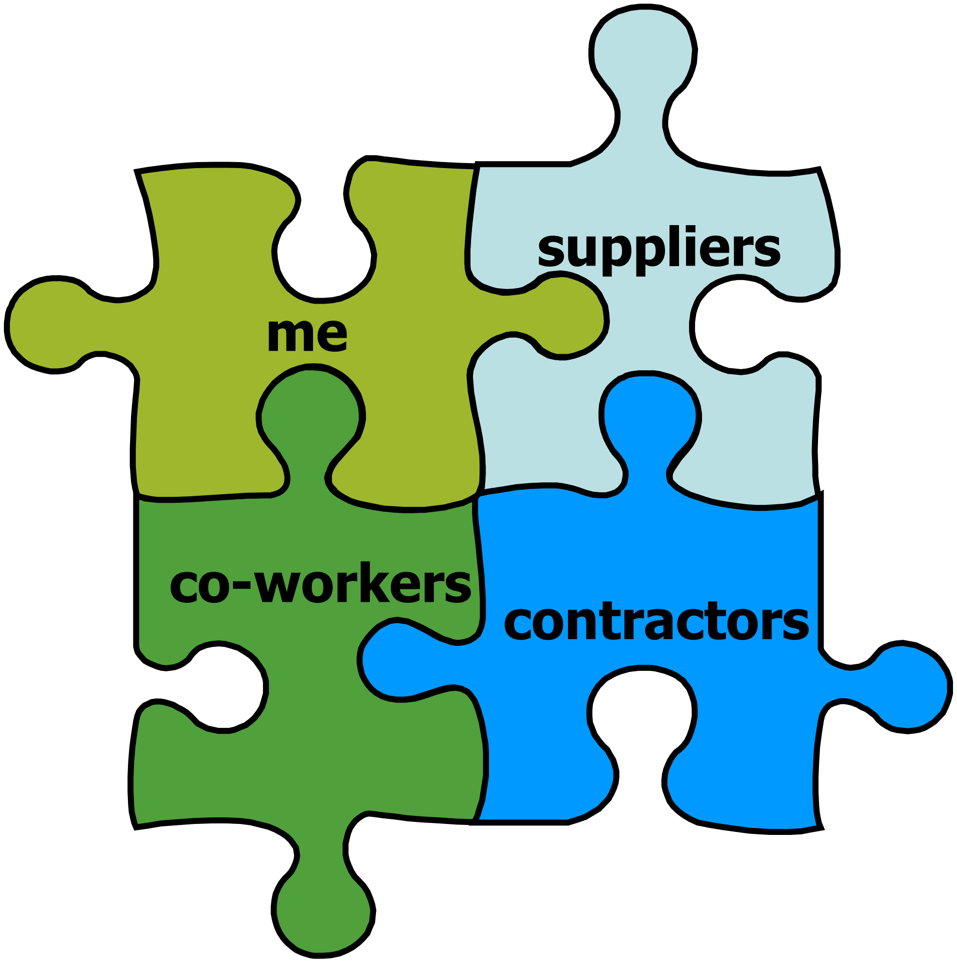
Collaborate

Stakeholders in VPD



Collaborate

Matereality is collaborative,



Collaborate

flexible,

- Highly efficient data pipelines

Collaborate

secure!

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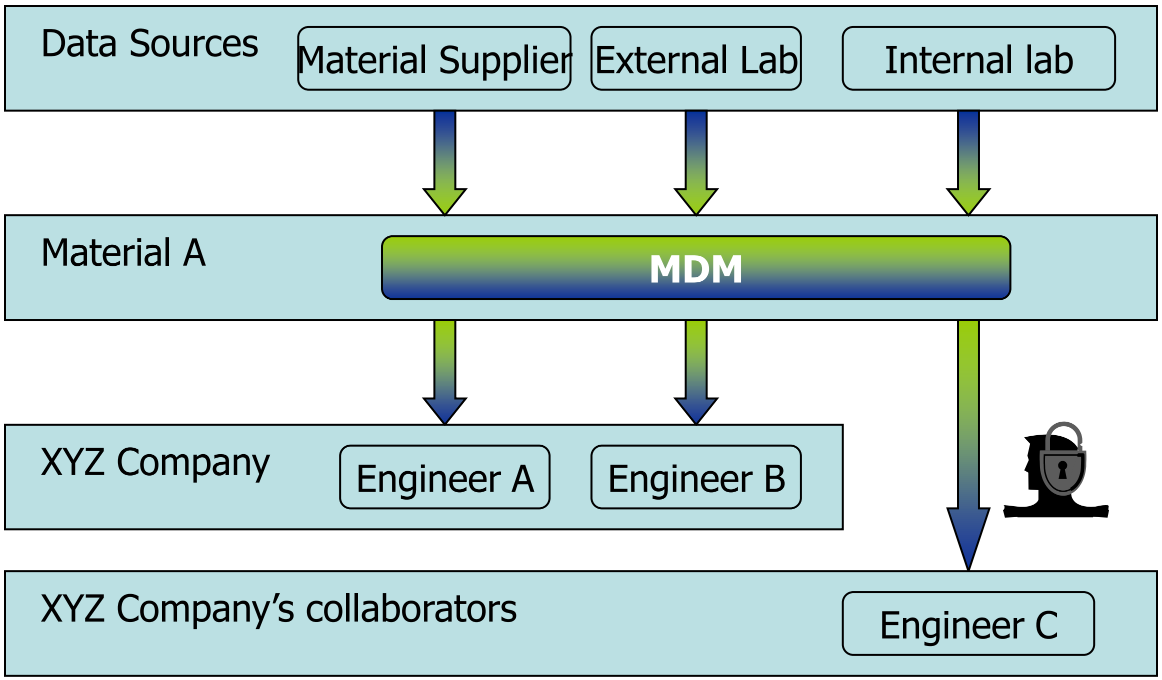
creates secure, flexible networks

Matereality applied consistently



Cost savings

- Only the properties needed are measured
- Once measured, properties are shared by all stakeholders
- Reduced risk- no searching in dubious places for data

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Conclusions

- Authoritative source of material data for the enterprise
- Handles any kind of material data
- Selectively shareable by stakeholders
- Achieves cost benefits
- Reduces risk
- Extensible to entire product life cycle

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