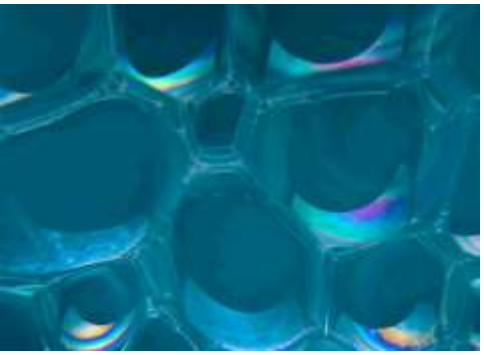
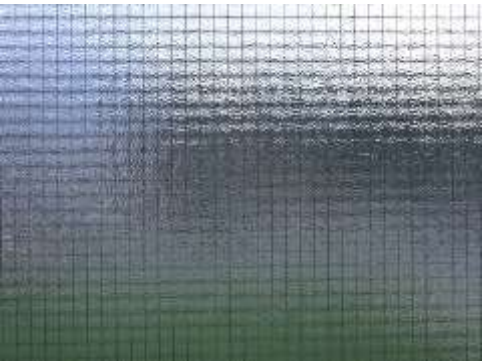




mat

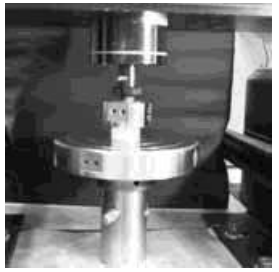
a world of materials

many products

reality

each with its own reality

material data



compressive

stress relaxation

tensile

viscosity

fatigue

conductivity

expansion

properties that describe reality

web services for material data

Can Material Property Databases Meet the Needs of Global Enterprises

Hubert Lobo

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Outline

- Needs Analysis
- Solution elements
- Solution implementation
- Conclusions

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Needs

Requirements

- Enormous data diversity
- Search for data
- Authentication of data
- Selective global access
- Security
- Visualization and connectivity

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Diversity

Material properties differ…

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

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Diversity

Data is application-specific

- The correct material property for a particular use may not be the right one for another application
  - Many property measurements
  - Each applicable for its stage in the product life cycle

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Example

Specificity of material data

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

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Diversity

The case in singular

- I need to store a variety of properties
- On the materials that I use most
- Which must be pertinent to my class of applications

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Diversity

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

a major mess…

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Problem

Typical current scenarios

- Many limited data stores
  - Region specific
  - Company specific
  - Application specific
  - Material specific
  - Property specific
- No common data interchange

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Search

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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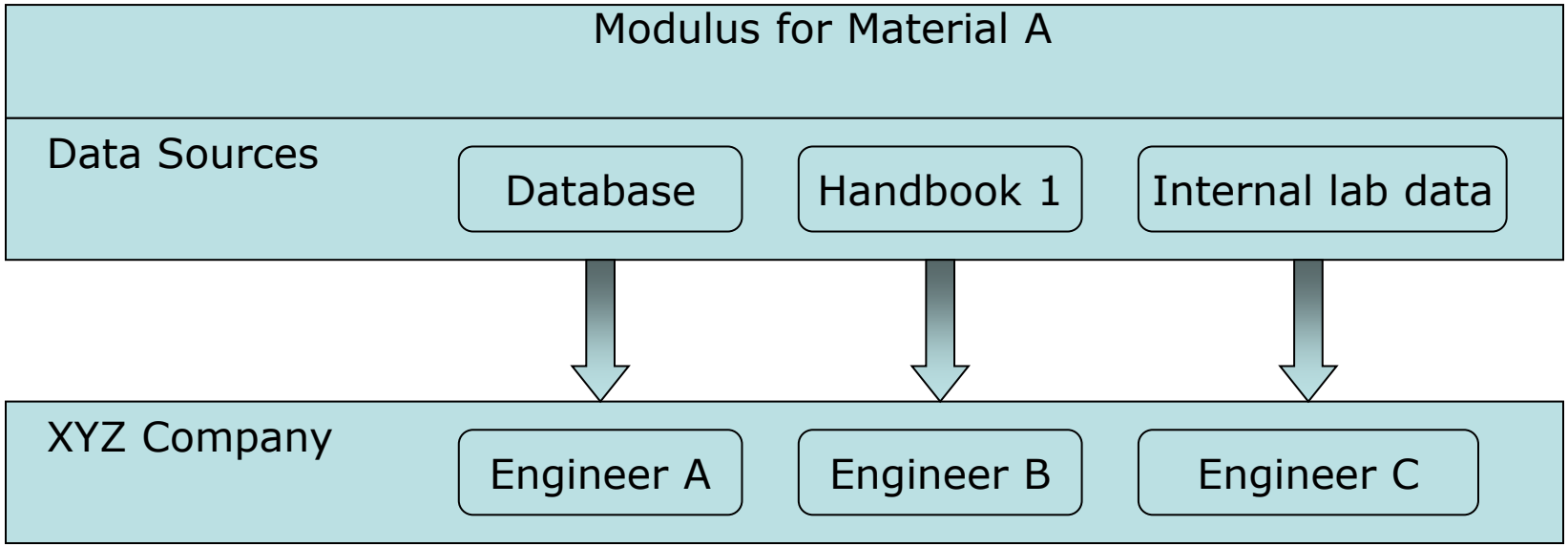
Problem

Inconsistent use of data



the six sigma killer…

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Authenticity

Ensuring trust

- How do we know how good it is?
  - Data source
  - Variability
  - Pertinence to my application
  - Certification
    - all data is not created equal
    - conversely, some data cannot be used without certification

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Access

Data access and security

- Highly collaborative
- Many stakeholders
  - Material suppliers
  - Part suppliers
  - Consultants
  - CAE vendors
- Selective sharing is essential

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Summary

- Piecewise data stores are inefficient
- Enterprise has only limited access to data
- Sharing with collaborators is difficult
- Unavailable data = retest
- High risk, lost time and money

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Solution

Basis of a solution

- Collaborative engineering
- Common framework
  - Share data selectively
  - Eliminate duplication of testing
  - Eliminate inconsistent use of data
  - Permit data authentication
  - Track activity

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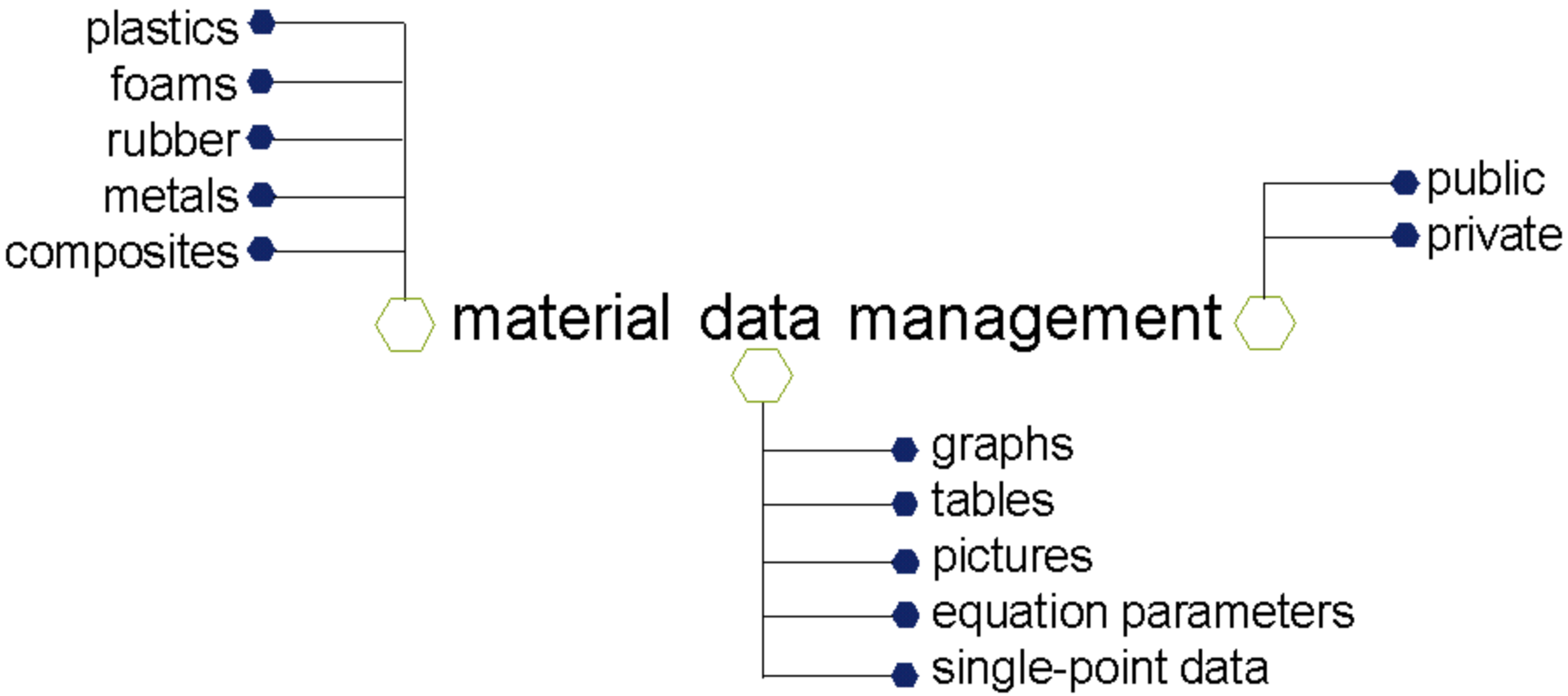
Solution

What is MDM?



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Solution

Basis of MDM

- Material data specific data structures
  - Store diverse data, simple or complex
  - Handle all types of data used throughout product life cycle
- Within a PDM type framework
  - Share data selectively, securely
  - Extensible to entire product life cycle

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Solution

MDMs are living entities,

- A complete data store
  - Your archival data
  - Current data direct from test labs
  - Data from your material suppliers
  - Data from your collaborators

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Solution

and comprehensive!

- Data is purposed for
  - Design
  - Process simulation
  - Material/product certification
  - Manufacturing
  - Failure studies
- Any kind of data- simple to complex

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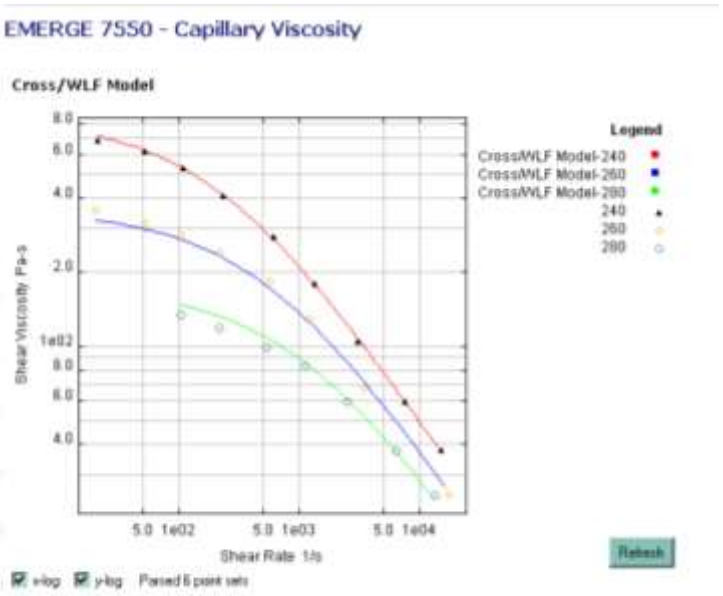
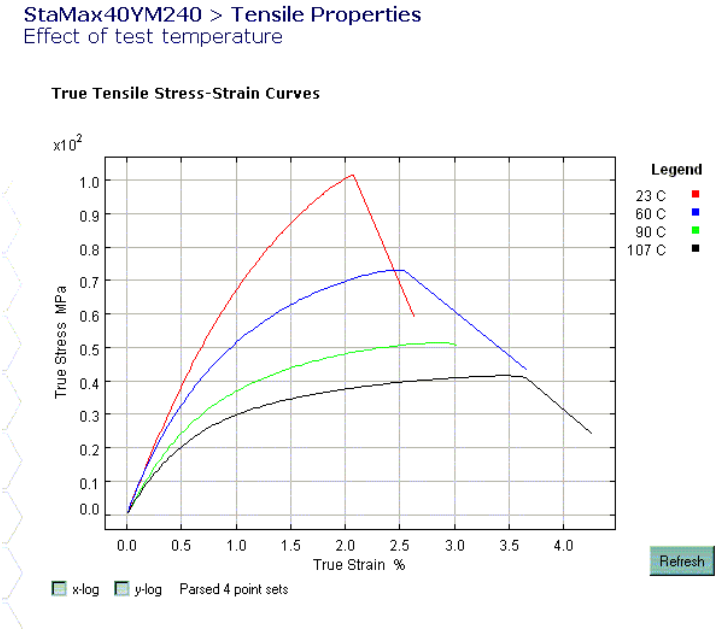
Solution

Handles data diversity





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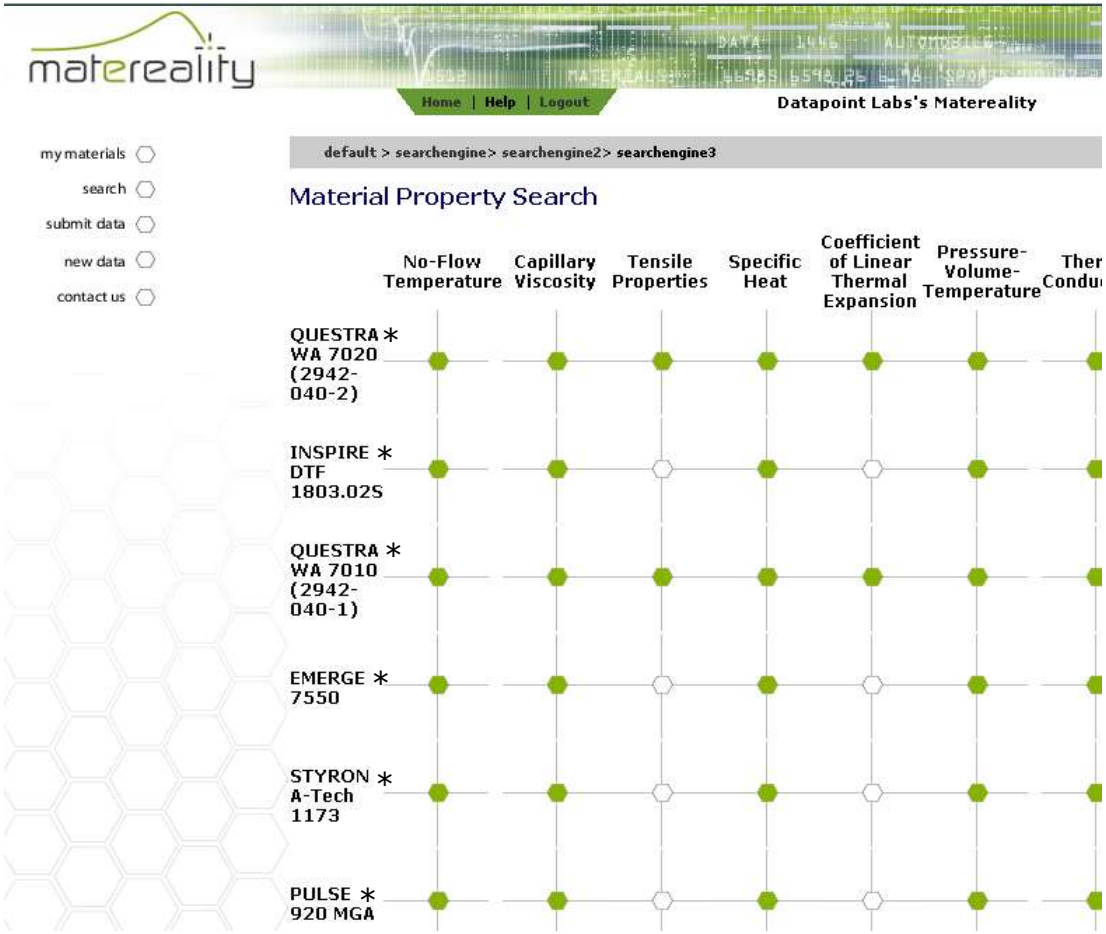
Solution

Stores pertinent data



Material names are trademark of Dow Chemical

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Solution

Records traceability

Material names are trademark of Dow Chemical

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Solution

Displays variability

Tensile Modulus - Youngs

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

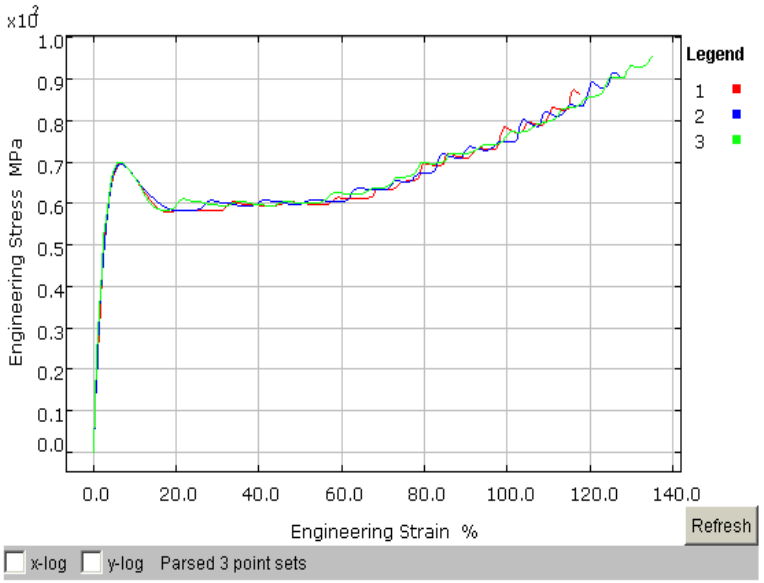
Offset Yield Stress in Tension

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



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Collaborate

MDM is collaborative,

- Highly efficient data pipelines

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Collaborate

secure!

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Sharing is easy with MDM

- Publish your data
  - To all
  - To your own group
  - To your company
  - To selected persons/companies
- Request access to data from others

follow your business practice

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Helping you keep track

- All transactions are recorded
  - Who accessed what
  - Access requests
  - Changes to classification
  - Changes to status of data

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Conclusions

- Global enterprises need to manage their material data
  - Securely for collaboration
  - Diverse material data on one platform
  - Have an authoritative source of data
  - Have interoperability for data exchange
  - Means to monitor usage of their data
- Conventional databases are inadequate

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Conclusions

- Paperless MDM provides the solution
  - Authoritative data source for the enterprise
  - Selectively shareable by stakeholders
  - Handles any kind of material data
  - Means to authenticate all property data
  - Means to track all transactions
  - Ability to export to third party applications
  - Applicable to entire product life cycle

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Questions?

www.matereality.com/FAQ

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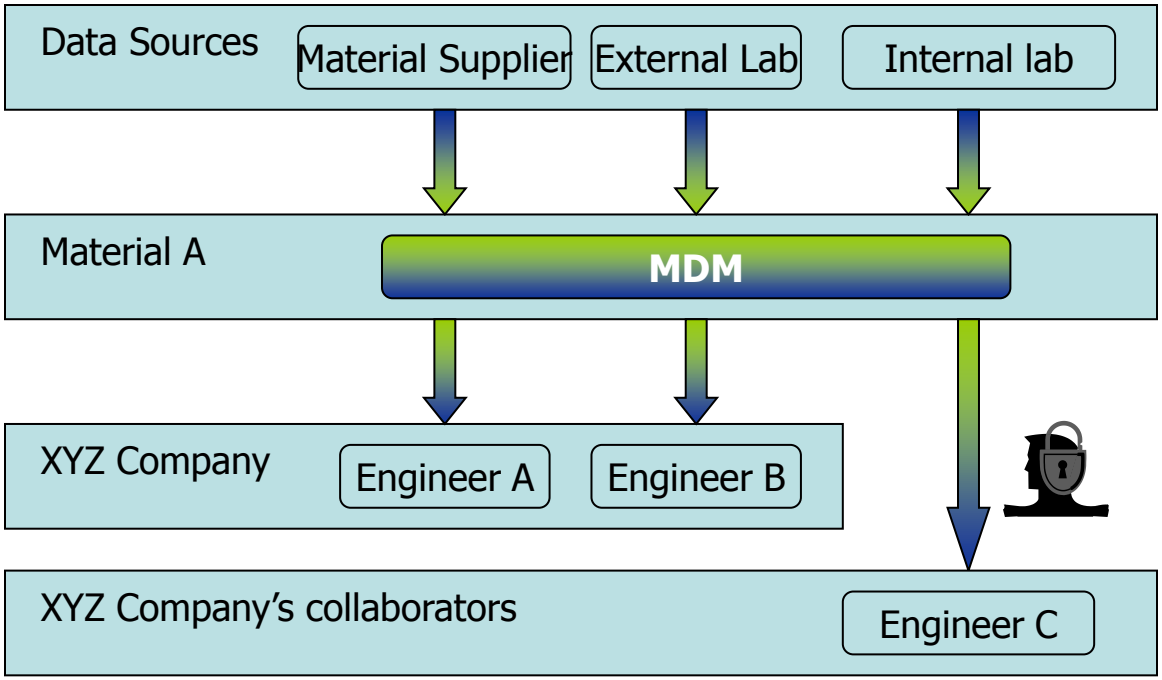
Matereality applied consistently



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Framework

Characteristics of matereality

- A matereality is defined in the context of its end use
- A matereality is self-consistent
- Properties of one matereality may not be applicable to another matereality
- Misuse of properties in a matereality can fracture the matereality

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Framework

Features of matereality

- Pertinent
  - All properties represent the behavior under consideration
- Traceable
  - The source and quality of the data must be assessable
- Describes variability
  - An understanding of the statistical spread of the representative property

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