Nathan W. Hartman, Ed.D.

MODEL-BASED DEFINITION AND PRODUCT DATA SECURITY





The industrial collaboration journey...

Yesterday

Communications often in serial fashion You trusted the data because you trusted the person or company that generated the data

Collaboration meant face-toface communication



JCT LIFECYCLE MANAGEMENT

The industrial collaboration journey...

Tomorrow

The **digital product definition** becomes the *conduit* in a standardsbased communication process.

The product *model* is the basis for a **secure**, **authoritative** source of product definition.

Recycle

Service



Design

You come to *trust the process* that generates product data (because the person may be unknown).

Manufacturing



PRODUCT LIFECYCLE MANAGEMENT

Ongoing industrial challenges

- Driving product lifecycle data with high fidelity representations
- Global competition vs. democratization of technology?
- Design/make vs. make to print (model)?
- Product complexity: combination of mechanical, electrical, and software
- Product knowledge stored with people or artifacts?
- Mobility, Collaboration, and Interfaces → the social psychology of expertise
 PRODUCT DEFENSION

What did we put into drawings?



PRODUCT LIFECYCLE MANAGEMENT CENTER OF EXCELLENCE

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What do we put into models?

For many people, it is a matter of whether they are an author or a consumer. MBD is fundamental to the future of digital manufacturing, but it is more than a proxy for a drawing.



Evolution of product representations

An exercise in information flow: right place, right form, right time



The communications spectrum...

A complete MBD supports lifecycle communication



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How is the model structured?

Singular representation vs. multiple, connected representations



Enabling a Digital Twin

- Data needs to be in a usable form to allow queries and inter-operability
- A prerequisite to updating component / product information is the ability to access data when needed





Integrated Architecture

Digital Twin Taxonomy



Images from Tuegel, AFRL, ADT 101: Introduction to the Airframe Digital Twin Concept, 88ABW-2013-2396, 23 May 2013

Enabling a Digital Twin

By comparing the 3D data sets, variation can be tracked and used to inform design of next-generation products or to develop verification and validation schemes for existing products (predictive modeling).

As Designed



As Manufactured



Variability between As Designed and As Manufactured Variability between As Manufactured and As Used

As Used



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RODUCT LIFECYCLE MANAGEMENT

Security of paper vs. digital





	Age of Paper-based Data	Age of Digital-based Data
Tracking	Difficult, often personal notes and information	Relatively easier, often automated, still able to have personal copies
Version control	Difficult to update	Easier, but still with challenges
Storage/Access	Physical files, folders, personal copies	Cloud, central locations, accessible to many
Security access	Dependent on marking schemes, authority at group levels, literally lock and key	Role-based access, levels of security more flexible, still not completely secure
Counterfeiting	Difficult, time consuming	Relatively easy, dependent on equipment and process



What does the future hold for MBD?

- Workflow views → minimum information model
 Lifecycle views → common elements
- Continued leveraging of the digital product definition as the carrier of product information → 3DMBD as normal
- Changing industrial culture that embraces digital data
- Increased sophistication of the supply chain
- Model anywhere, print anywhere
- Ongoing development of 3D data standards



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