Effective Value Engineering Depends on Having the Right Data

DMSMS Conference
August 2011

Richard Turner
rturner@convergencedata.com
http://www.convergencedata.com/

Abstract

- Information needed for supporting decisions regarding cost savings and/or quality improvements not readily available
  - Cost-driving Product Information buried in Specification Documents, Drawings, CAD files, etc.
  - Cost data itself lodged in other enterprise information silos
- Window of opportunity for VE Cost Improvements associated with Redesigns to New Specifications closes quickly
  - Agility is required to capture the highest value for the lowest cost before the window closes
  - Without accurate and up-to-date information decisions may be made based on incorrect assumptions
- Presenting a Process for more effective Value Engineering / Cost Savings Decision Support based on Information that is Accurate, Complete and Up-to-date

Avoid long lead times collecting data prior to your VE event

Value Engineering

- "**Value engineering** (VE) is a systematic method to improve the "value" of goods or products and services by using an examination of function."

- Value = Function / Cost

- Value can therefore be increased by either improving the function or reducing the cost….

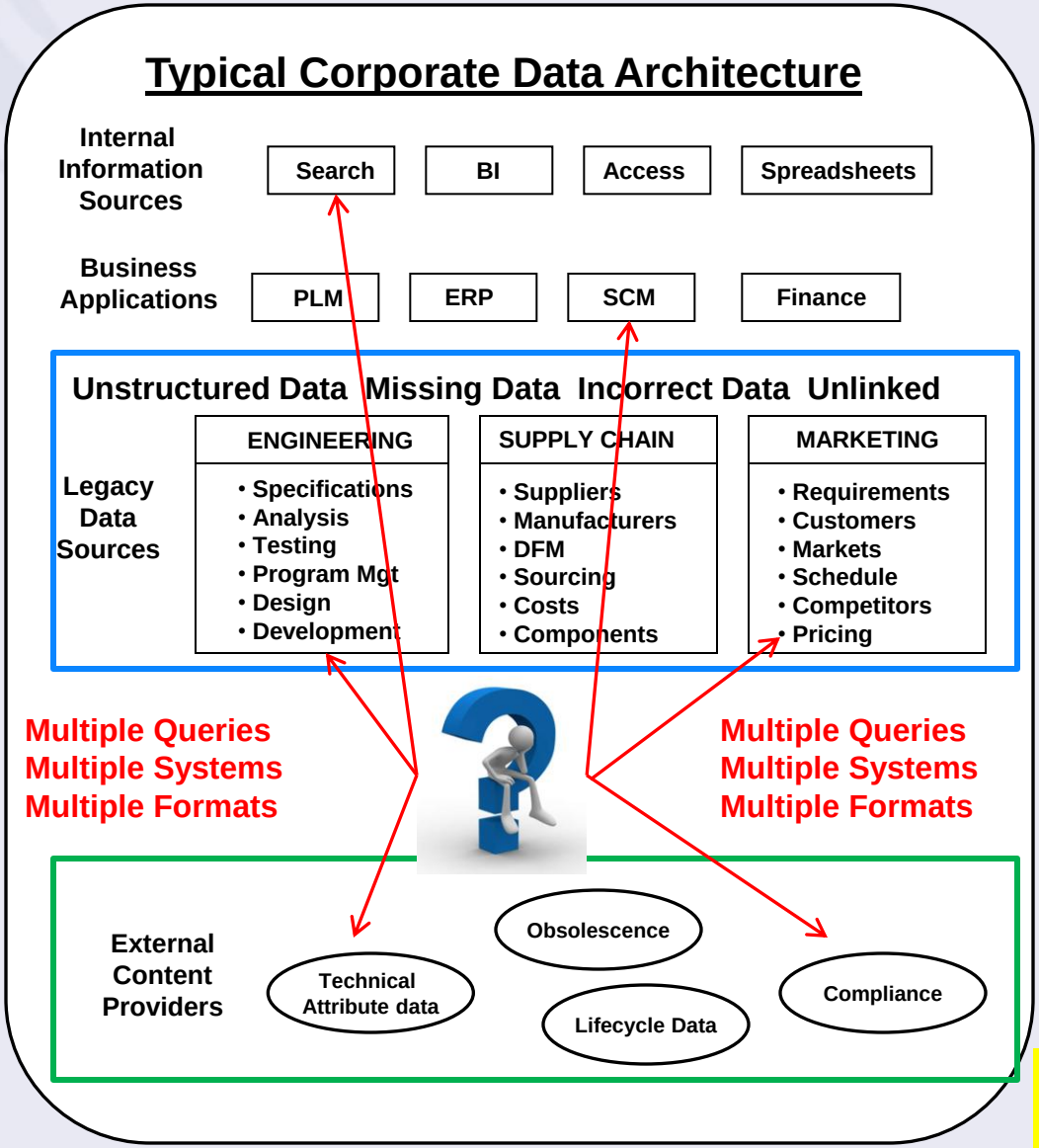
Wikipedia

Function = Important Functions

Effective cost management in Value Engineering requires accurate, complete and up-to-date information.

- Typical Cost Reduction Levers
  - Dictate new terms to existing suppliers?
  - Leverage larger buys with fewer “strategic” suppliers?
- Greatest Value Engineering opportunities come from replacing systems or components with functionally equivalent but lower cost items while retaining adherence to specifications
- How to Find Functional Equivalents?
  - Need to somehow “classify” components based on form, fit and function independent of usage
  - Identify functionally equivalent components of lower cost that can be substituted
- Detailed, readily available part information is required to follow this path

The typical corporate information management infrastructure lacks a complete, integrated digital representation of part data.



Roadblocks

- **Unstructured Data** – missing data, erroneous data and unlinked data elements
- **Decentralized** – data within and outside the enterprise resides in multiple databases
- **Ineffective Aggregation** – vital sources of information are not effectively aggregated, including information existing outside the firewall
- **Compounding Issue** - organizations are constantly acquiring new data sources, compounding the data issues
- **Data Governance** – lack of guidelines for creating information drives incompleteness, data quality issues and data inconsistencies.

How do you find the best component – when finding parts is difficult and cost data resides in another system?

Most companies load existing components into their PLM which results in inadequate search and find.

In most PLM implementations, try finding a bearing that meets specific requirements: outside diameter, race, material, etc.

Search: Bearing

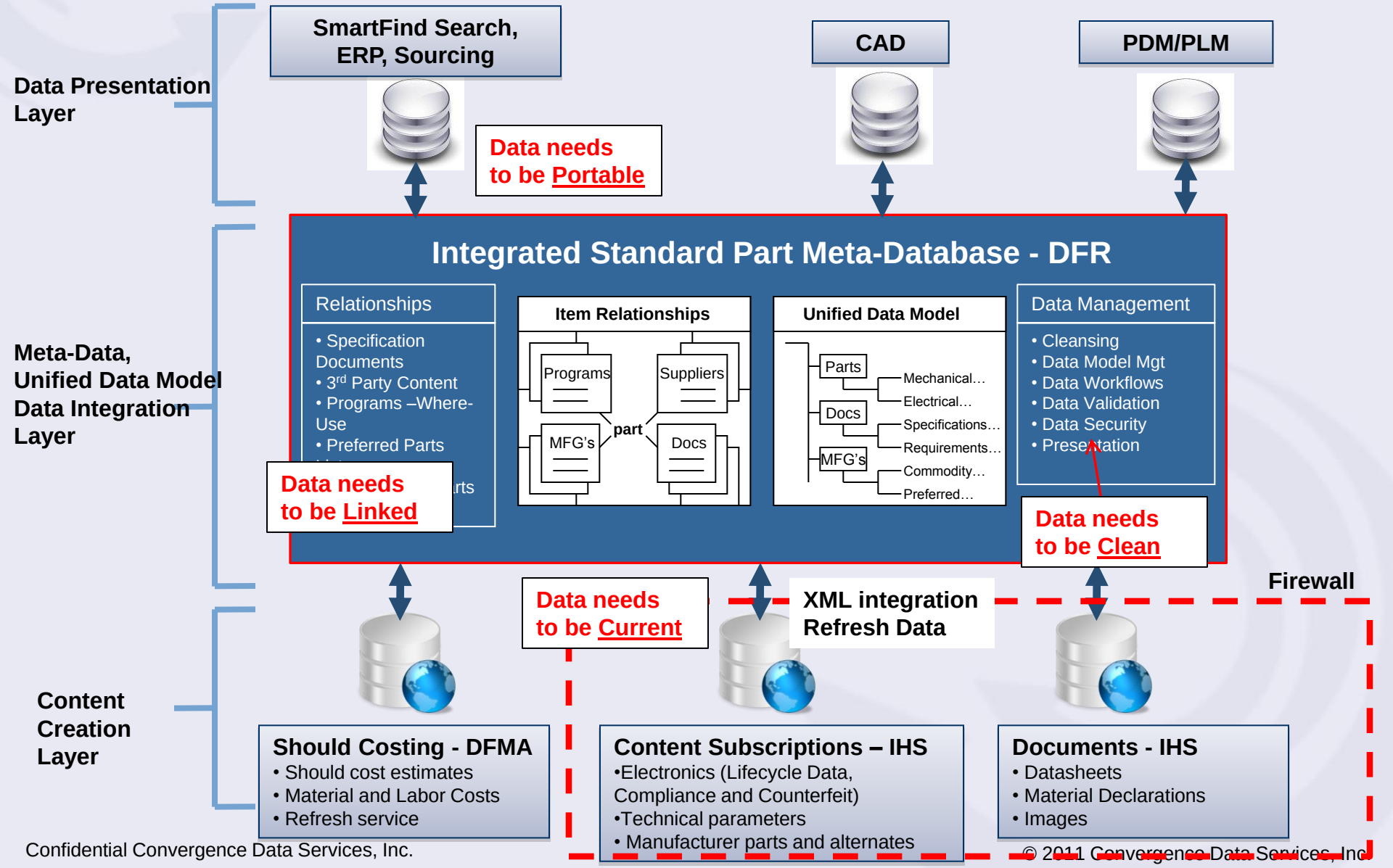
Part Number	Type	Status	Description
4619-640-39641	part	released	FC BALL BEARING ASSY JET CHEF
4619-640-49541	drawing	released	BEARING SUPT&THERMO ASSY(SERVI
4619-640-49541	assembly	released	BEARING SUPT&THERMO ASSY(SERVI
4619-641-89271	part	released	TT BEARING
4619-641-89272	part	released	TT BEARING A6
4619-644-174	drawing	released	BEARING SUPPORT
4619-644-17481	drawing	released	BEARING SUPPORT
4619-644-17481	part	released	BEARING SUPPORT
4619-644-17482	part	released	BEARING SUPPORT
4619-656-98011	drawing	released	BALL BEARING
4619-656-98011	part	released	BALL BEARING
4619-670-03651	part	obsolete	BALL BEARING HOLDER
4619-670-03652	drawing	released	BALL BEARING HOLDER
4619-670-03652	part	released	BALL BEARING HOLDER
4619-670-03741	part	obsolete	BALL BEARING HOLDER 1
4619-670-03741	drawing	released	BALL BEARING HOLDER
4619-670-04821	drawing	released	BEARING HOLDER
4619-670-04821	part	released	BEARING HOLDER
4619-677-40381	drawing	released	TT BEARING PF
4619-677-40381	part	obsolete	TT BEARING PF
4619-677-40391	drawing	released	TT-BEARING PF
4619-677-40391	part	obsolete	TT-BEARING PF
4619-677-41671	drawing	released	TT-BEARING PF
4619-677-41671	part	obsolete	TT-BEARING PF
4619-677-50061	part	released	BEARING
4619-677-50061	drawing	released	BEARING

People can't reuse what they can't find!

- **So what do you do?**
- **Design a new component**
- **Source a component from a different supplier**
- **Too much effort to find what you need**

The CDS Design for Retrieval solution provides an Integrated Standard Electronic Component Data Architecture

Data Hub = Success in Value Engineering

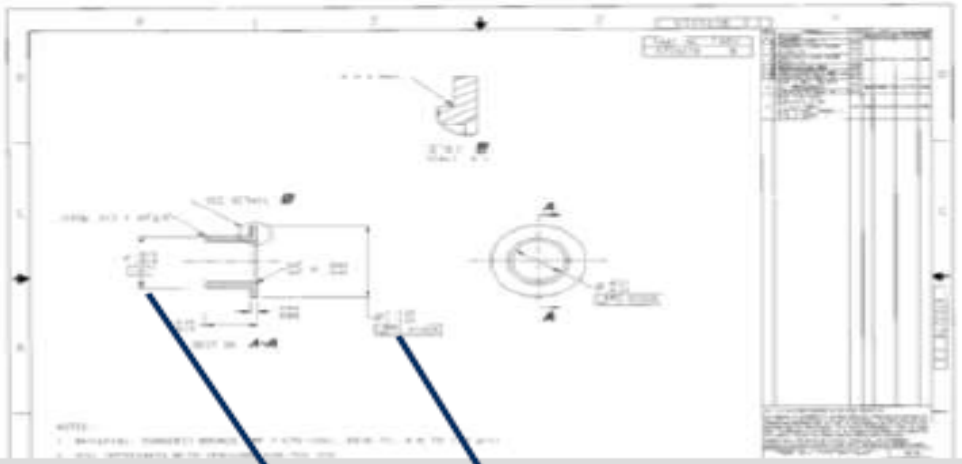


A data development process with classification and attribute management is required for complete component identification and analysis.

Classification Structure

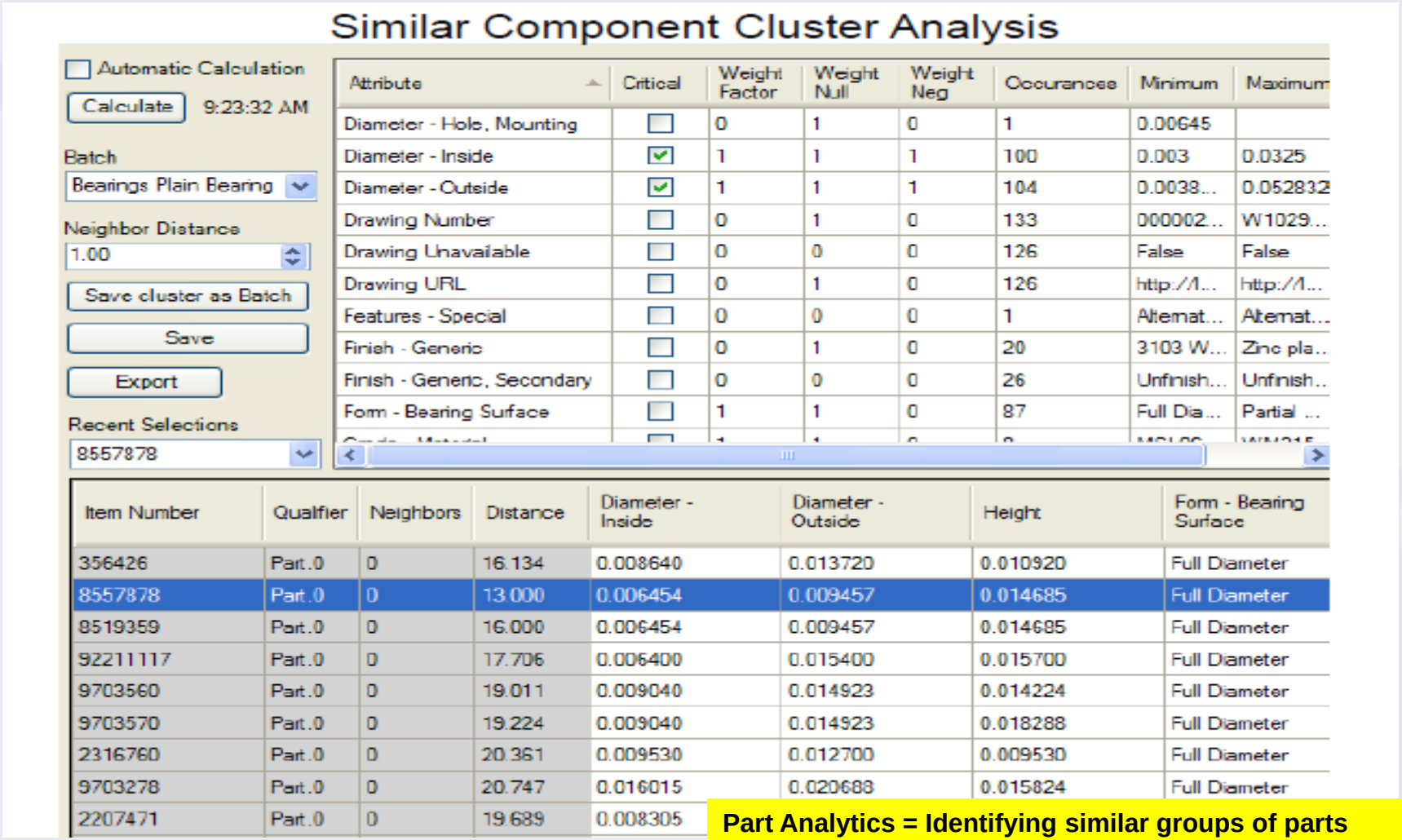
- _Engineering CAD Assemblies
- Adhesive - Die Cut
- Air Flow Systems
- Bases And Supports
- Bearings
  - Dishwasher Rail Components
  - Dishwasher Rails
  - Drawer Glides
  - Plain Bearings
    - Linear
    - Rotary
    - Spherical
    - Thrust
  - Rail Systems - Module Variants
  - Roller Bearings
  - To Be Classified
- Bowls And Jars
- Brackets And Braces
- Brand Badges

Data is extract from drawings and entered into the database



Item Description	Status	Create User	Create Date	Update User	Diameter - Inside	Diameter - Outside	Drawing Number	Drawing URL	Height
BUSHING-HINGE	In Work	Admin	6/13/2008	dfr_api_p	6.4540 mm	9.4565 mm	8557878	http://desr	14.6850 mm
BEARING - SLEEVE	In Work	Admin	6/13/2008	dfr_api_p	6.2550 mm	12.7150 mm	8558877	http://desr	32.2500 mm
BEARING - SLEEVE BRONZE	In Work	stratpd	6/1/2009	dfr_api_p	6.2700 mm	12.7300 mm	8559101	http://desr	32.2500 mm
BUSHING - HINGE	In Work	Admin	6/13/2008	dfr_api_p	8.2620 mm	12.4940 mm	8577253	http://desr	14.6750 mm
PLASTIC BUSHING	In Work	Admin	6/13/2008	dfr_api_p	6.4000 mm	15.4000 mm	92211117	http://desr	15.7000 mm
BUSHING AGITATOR SHAFT	In Work	Admin	6/13/2008	dfr_api_p	19.1150 mm	25.4400 mm	92312913	http://desr	33.3200 mm
SLEEVE BEARING - FGA	In Work	Admin	6/13/2008	dfr_api_p	0.6305 in	0.8145 in	9703278	http://desr	0.6230 in
BEARING - UPPER, CENTER	In Work	stratpd	6/1/2009	dfr_api_p	0.5020 in	0.6905 in	9703368	http://desr	0.5700 in

Identifying similar items according to their detailed characteristics affords the opportunity to assess for potential substitution.



Part Analytics = Identifying similar groups of parts that may have different pricing or expose differentiators that drives pricing and standardization guidelines

Convergence Data Services – What we do

Build Better Data

Phase I

- Tools and services that help companies **create, organize, augment, cleanse and validate data**

DFR – Data Developer

- **Custom, hierarchical taxonomy** of products and services

DFR – Classification Mgr

- **Unified Data Model** that comprises a variety of information sources including item relationships

DFR – Item Loader

Integrate and Sustain Data

(Sustain = Governance)

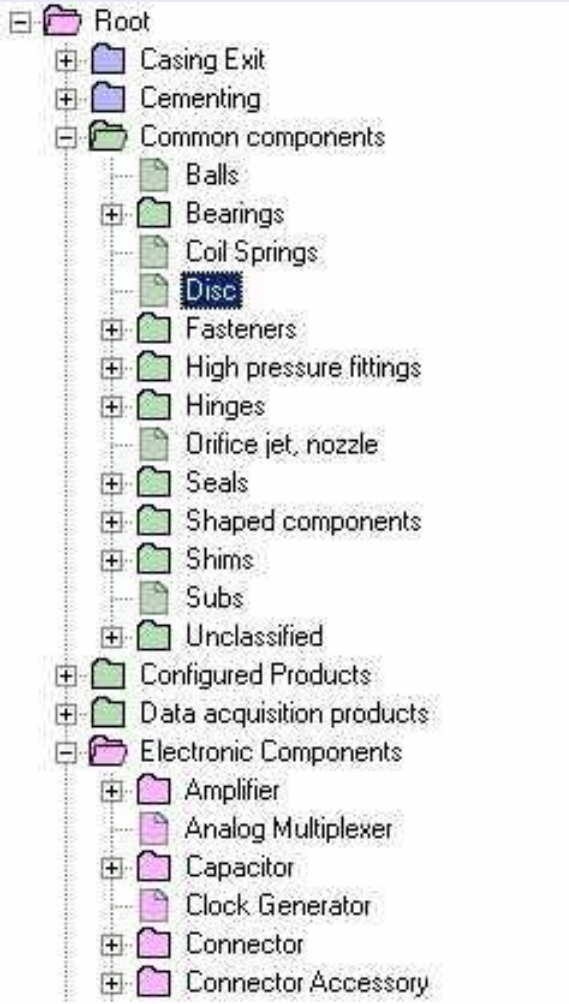
Phase II

- Application and **data integration** capabilities e.g. direct material sourcing applications, engineering tools (DFM, CAD, PDM, etc.)
- **NPI – New Part Introduction Workflow**
- **Data analysis** tools supporting cluster identification for sourcing or product standardization
- **3rd party content integration** including lifecycle analysis services; material compliance
- **Data migration** services for part catalogs, PLM, ERP and other enterprise systems (i2, PTC, JDE, etc.)

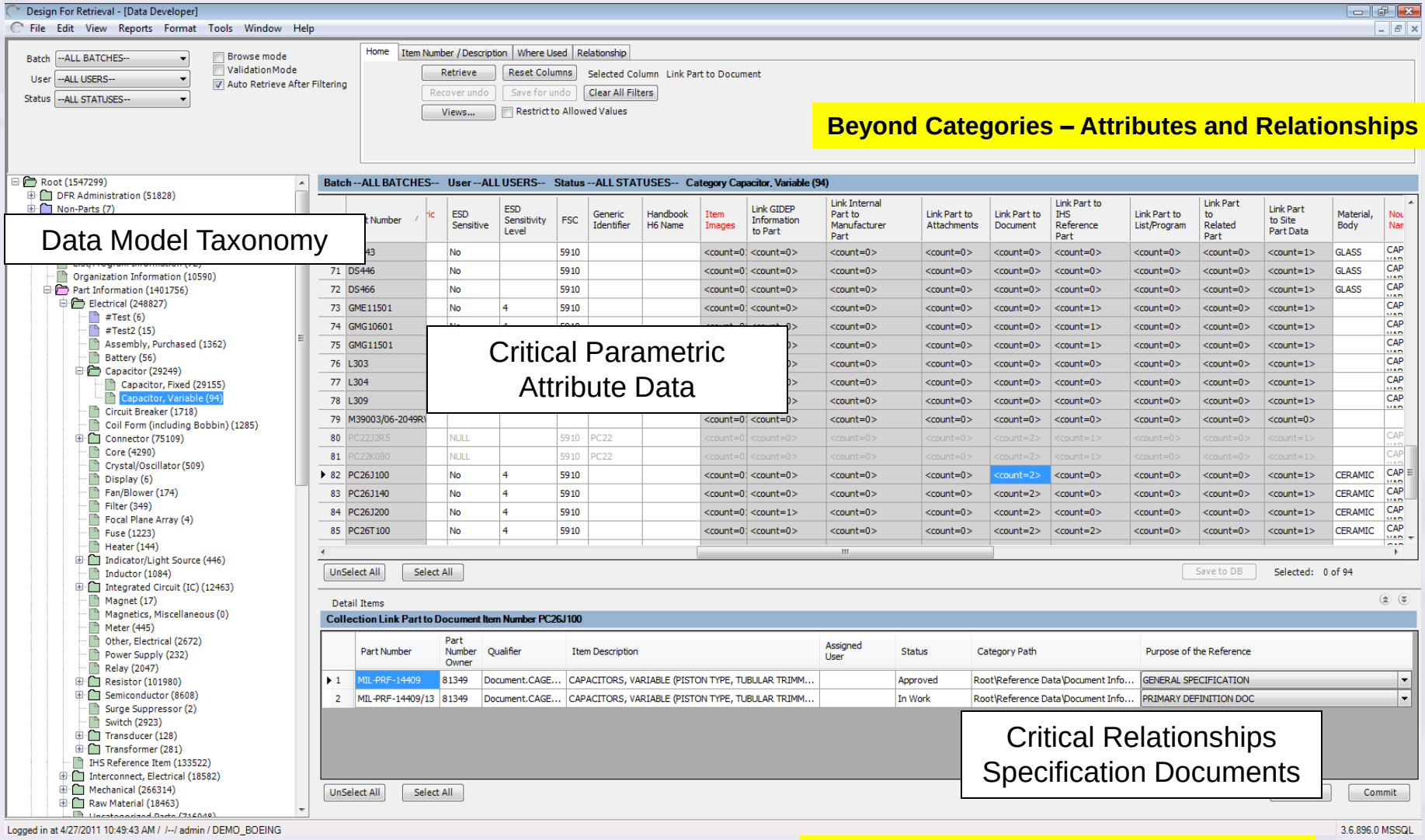
Classification 101 Summary

- Why classify: To be able to search and find items - based on form, fit and function - independent of usage.
- Classification process: defines the new structure down to the Terminal Node Category level – the level where item data is stored.
- Attributes: and their properties refine categories and items to the point of item differentiation.
- Attribute Properties: add additional characteristics to attributes to the point of item uniqueness.

Classification - Customized to your Business



DFR manages the creation and maintenance of the Standard / Part Data Model including the cleansing of parametric attribute data.



Links to Customer Requirements…helps Engineers prioritize design input

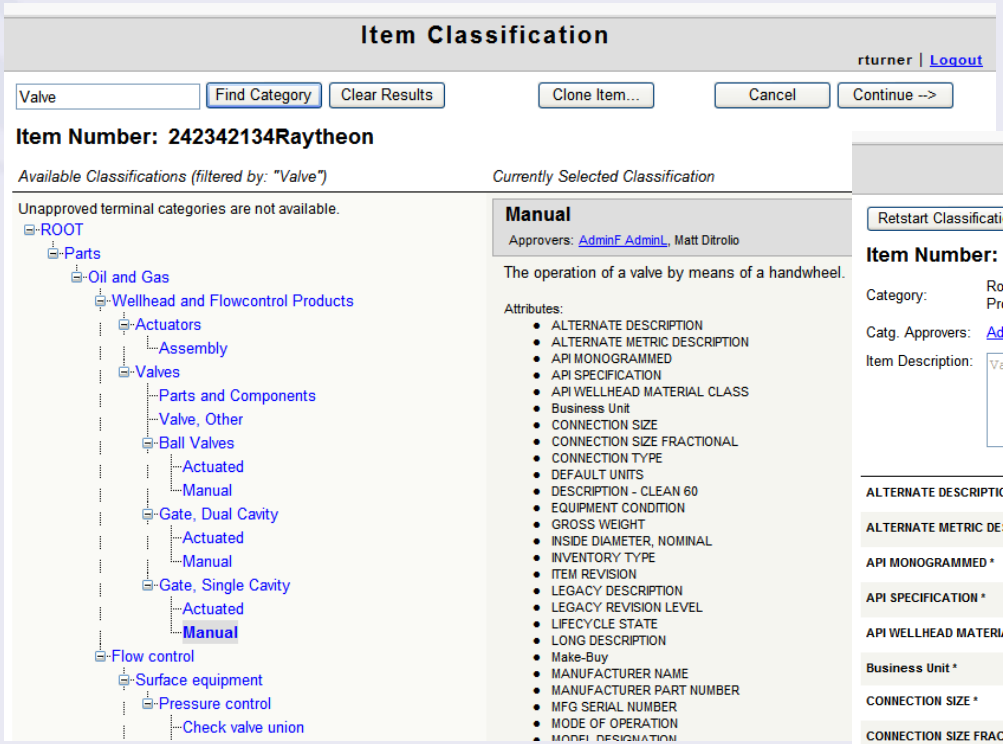
DFR's Integration Tools ensure extended enterprise integration of your standard part architecture.

- Application Integration
  - PDM and ERP data integration
  - New part request process integration

- 3rd Party Content Integration
  - Multi-dimensional mapping; part number, mfg number and content ref number
  - Enabling lifecycle data and Hazmat data services

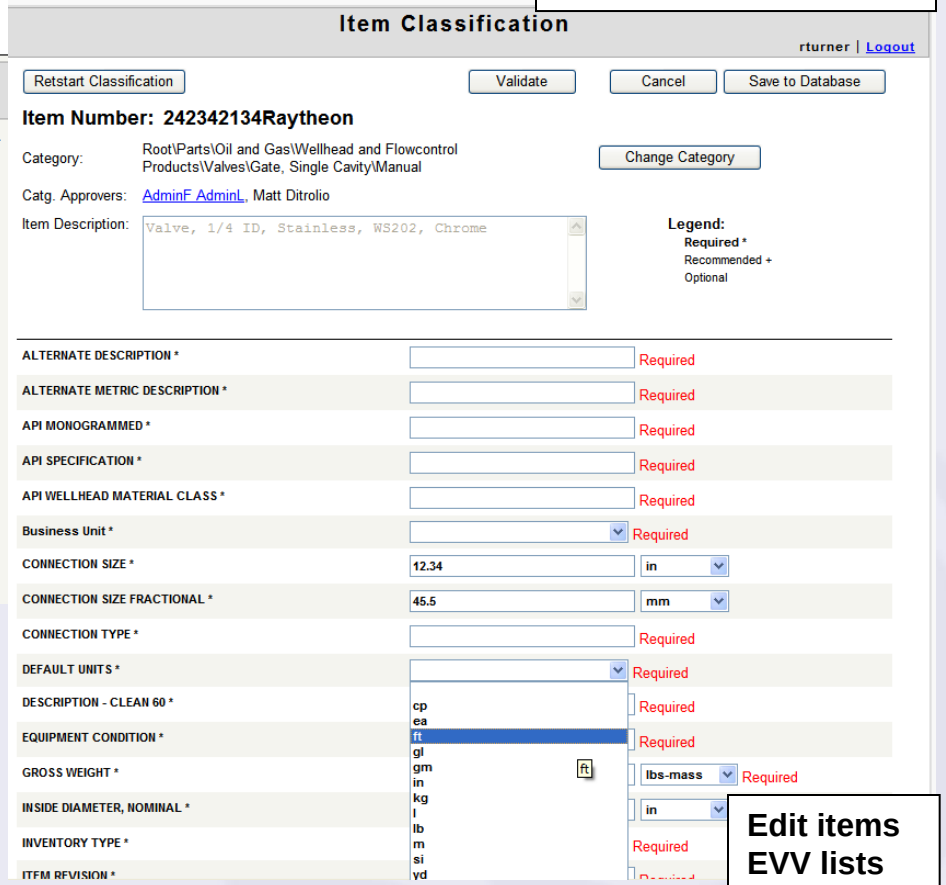
- Search Integration
  - Custom exporting creating search index's
  - Updates for baseline and incremental changes
  - UI to configure search tool and access control for users

WebDFR – supporting the new part creation process, classifying parts and entering the correct attribute data.



Engineers find the category for a new part

Engineers enter required attribute data for new part



Edit items EVV lists Validations

Cluster of Duplicate Casters from different suppliers, used by different business units that have different prices

Automatic Calculation

Calculate 4:24:29 PM

Batch: HNI Item Cluster

Neighbor Distance: 2.00

Save cluster as Batch

Save

Export

Recent Selections: F-FM00115296

Attribute	Critical	Weight Factor	Weight Null	Weight Neg	Occurances	Minimum	Maximum	Base UOM
Cluster Name	☐	1000	0	0	0			
Stem Length	☐	10	1	1	18	1	1.375	in
Stem Size	☐	10	1	1	18	0.3125	0.4375	in
Item Height	☐	1	1	1	24	2.625	6.25	in
Wheel Width	☐	1	1	1	24	0.8125	1.25	in
Attaching Bolt Size	☐	0	0	0	6	0.25	0.25	in
BALL DIAMETER	☐	0	0	0	18	2	2	in
Bar Code Number	☐	0	0	0	0			
BEARING STYLE	☐	0	0	0	24	Delrin	Delrin	
Bolt Hole Spacing	☐	0	0	0	6	13/16 x...	13/16 x...	
Color 1	☐	0	0	0	24	Black	Chrome	

Attribute Data Grid is used to set weighting factors critical to the cluster analysis

Results are displayed in the lower grid. This cluster analysis returned items with similar / same technical characteristics.

Small Neighbor Distance will find close duplicates

Item Number	Qualifier	Neig			Item Unit Cost	Vendor Item Number	Vendor Name	Cluster Name	Item Height	Stem Length	Stem Size	Wheel Width
F-FM00115296	Part.0	5	0.000	HBF	9.70...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500
H-115296	Part.0	5	0.000	HON Company	3.51...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500
A-5296	Part.0	5	0.000	Allsteel Inc	6.95...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500
G-4836	Part.0	5	0.000	Gunlocke Co...	5.45...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500
L-FM115296	Part.0	5	0.000	Lamex	4.95...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500
M-504836	Part.0	5	0.000	Maxon Furniture	8.72...	9FM00115296	E. R. Wagner	9FM00115296	2.625000	1.375000	0.437500	0.812500

- **Technical Attributes are same for clustered items – Friction Ring Stem caster**
- **Internal Item Numbers for same caster are different among 6 business units**
- **Supplier Part numbers are same from all 6 variations of the item number**
- **Item Unit Cost varies from $3.51 to $9.70 for the same item**

Part / item data are collected, technical attributes are extracted and exposed, and are managed in a common database.

Typical ERP Domain Item Master Data

Item Number	Qualifier	Item Description	UNSPSC	ECCMA SCD
DDXB30US16-36	Part.CAGE-Code.08742	Screw 12 pt	31161614	0161-1#01-076683#1
DDXB30US16-47	Part.CAGE-Code.08742	Bolt nickel	31161614	0161-1#01-076683#1
DDXB30US16-51	Part.CAGE-Code.08742	Bolt 12 pt Nickel	31161614	0161-1#01-076683#1
DDXB30US16-52	Part.CAGE-Code.08742	Bolt	31161614	0161-1#01-076683#1
DDXB30US16-83	Part.CAGE-Code.08742	Screw 12 pt	31161614	0161-1#01-076683#1
DDXB30US16K116	Part.CAGE-Code.08742	Bolt nickel 220KSI	31161614	0161-1#01-076683#1
DDXB30US16K118	Part.CAGE-Code.08742	Bolt 12 pt Nickel	31161614	0161-1#01-076683#1
DDXB30US16K147	Part.CAGE-Code.08742	Bolt	31161614	0161-1#01-07668
DDXB30US16K14X	Part.CAGE-Code.08742	Bolt 1/64 oversized	31161614	0161-1#01-07668
DDXB30US16K18X	Part.CAGE-Code.087			
DDXB30US16K19	Part.CAGE-Code.087			
DDXB30US16K20	Part.CAGE-Code.087			

Before
Ambiguous Descriptions
No Attributes

Attributes + Cost = Value

Item Number	Qualifier	Item Description	Component Length(in)	Grip Length(in)	Shank Length(in)	Thread Length(in)	Unit Cost	YTD Cost
DDXB30US16-36	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	4.573	2.25	3.773	1.523	5.25895	694.1814
DDXB30US16-47	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	5.2605	2.9375	4.4605	1.523	6.049575	623.106225
DDXB30US16-51	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	5.5105	3.1875	4.7105	1.523	6.337075	716.089475
DDXB30US16-52	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	5.573	3.25	4.773	1.523	6.40895	1371.5153
DDXB30US16-83	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	7.5105	5.1875	6.7105	1.523	10.139175	1024.056675
DDXB30US16K116	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	9.573	7.25	8.773	1.523	12.92355	180.9297
DDXB30US16K118	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	9.698	7.375	8.898	1.523	13.0923	392.769
DDXB30US16K147	Part.CAGE-Code.08742	BOLT, 12 POINT HEAD, 220 KSI MIN TENSILE, 125 KSI MIN SHEAR, NICKEL ALLOY 718 (NOMINAL)	11.5105	9.1875	10.7105	1.523	15.539175	1849.161825

After
New Descriptions
Technical Attributes
Cost Data

"Part identification is no longer limited to description and part number…To uniquely identify/differentiate some of our equipment takes more than 40 attributes per part."

DFMA ® – Design for Manufacture and Assembly – Should Cost Modeling

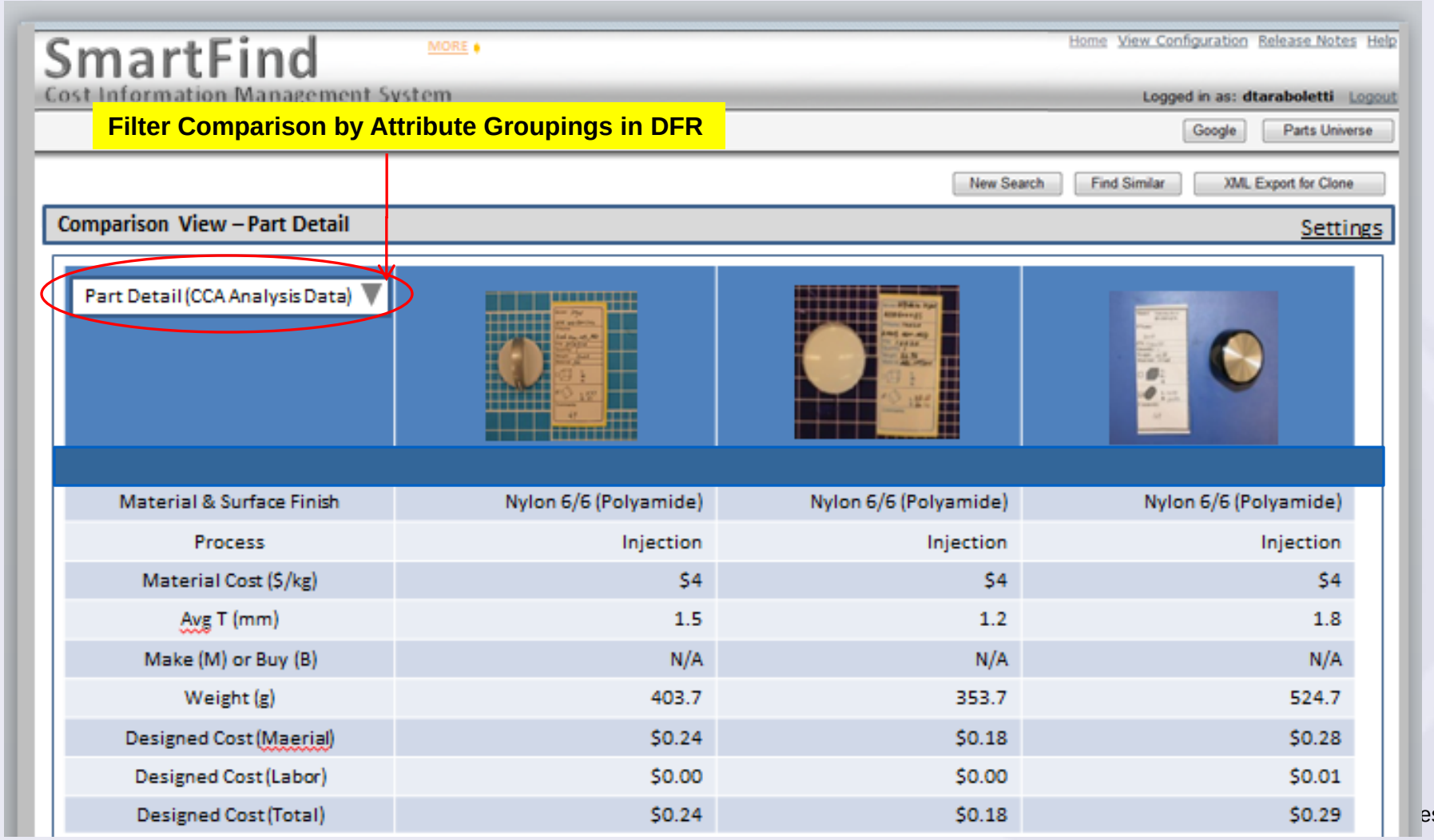
- More widely distributed DFMA ® should cost data and promote re-use of cost models
- Make it easier to find should cost data, run comparisons, and create custom reports
- Create a database of should cost benchmark data, both internal and external design comparisons
- Batch refresh of should cost data to do apple to apple comparisons based on today's material/labor costs
- Do what if analysis – understand the impact of increased material or labor cost to your company

Its like comparing "apples to oranges" if your library inputs are different

Compare products based on technical attributes, should costs and target costs in a single query….

Component Level Details – Both Technical and DFMA ® Cost Data

- Compare products by technical data or by DFMA ® data
- Filter comparisons to obtain different views



Material & Surface Finish	Nylon 6/6 (Polyamide)	Nylon 6/6 (Polyamide)	Nylon 6/6 (Polyamide)
Process	Injection	Injection	Injection
Material Cost ($/kg)	$4	$4	$4
Avg T (mm)	1.5	1.2	1.8
Make (M) or Buy (B)	N/A	N/A	N/A
Weight (g)	403.7	353.7	524.7
Designed Cost (Maerial)	$0.24	$0.18	$0.28
Designed Cost (Labor)	$0.00	$0.00	$0.01
Designed Cost (Total)	$0.24	$0.18	$0.29

Summary: Benefits Data can Bring to Value Engineering

Finding the right component

- Finding parts via categorization structure and attribute values

Critical data in a single view

- Technical Attribute Data + Cost = Value

Access to Data – Window of Opportunity

- To take advantage of value engineering, you need the data now

Analytics

- Identify groups of parts “Clusters” with similar characteristics but different pricing
- Identify what features are driving differentiation and cost – opportunities to standardize

Apples to Apples comparisons

- Comparing different parts based on the same cost structure e.g. labor rates and material cost