Summary and General Observations

- $10 M total spend on Capacitors – across different divisions
- 1250 Capacitors provided – we generated over 29,500 values for the analysis
- Convergence harvested data from MFG part numbers.
- 12% (150) of the capacitors were exact duplicates based on MFG part number
- 27% (338) of the capacitors were duplicates based on key attributes
- 35% (438) of the capacitors were near duplicates based on key attributes
- $216k Annual Savings due to eliminating 80 new part requests (20% of 400/yr)
- $190k Annual Savings from pricing rationalization from top 20 (90 capacitors) cluster groupings (27% of spend)

Key Terms for Duplicate Parts:
- Exact Duplicate – Same MFG Part Number
- Duplicate – Same key attribute values (not all attributes)
- Near Duplicate – Very similar key attribute values
- Key attribute – subset of attributes typically used to identify a part in a search query. Usually the most important characteristics.
Convergence Data Overview

Our Mission
Help our customers extract more value out of their enterprise systems with improved part data.

- **Enrich & Normalize**
  Data from disparate sources (Purchased parts, MRO, design parts, etc.)

- **Prepare**
  Data for migrations: ERP, PLM, MDM, PIM

- **Support**
  Parts re-use initiatives, mitigate parts proliferation

- **Provide**
  1) Analytics supporting cost reductions – duplicates, near duplicates
  2) Customer friendly data

Providing services to:
- Aerospace/Defense
- Electronics
- Automotive/Industrial
- Consumer/White Goods
- Oil/Gas

19 Years Experience
Population Report: Capacitors

- Number of Capacitors – 1400
- Chart below describes fill rates for key attributes
- Started with 12,456 attributes
- Ended with 49,080 attributes
- Over 36,500 attribute values generated for the 1400 capacitors
Classification Structure - Capacitors

Example of 1 Capacitor

Category Attributes

31 Attribute Values
## Capacitors

### Cleansed Data Comparison

<table>
<thead>
<tr>
<th>Capacitor Type</th>
<th>Material</th>
<th>Mount Style</th>
<th>Size</th>
<th>Capacitance (µF)</th>
<th>Voltage (VDC)</th>
<th>Price</th>
<th>Supplier Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceramic, 0.10µF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>0.1</td>
<td>50</td>
<td>0.005</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 1µF, 25V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>1</td>
<td>25</td>
<td>0.007</td>
<td>VENKEL</td>
</tr>
<tr>
<td>Ceramic, 270pF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>270</td>
<td>50</td>
<td>0.038</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 10pF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>10</td>
<td>50</td>
<td>0.020</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 22pF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>22</td>
<td>50</td>
<td>0.027</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 47pF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>47</td>
<td>50</td>
<td>0.024</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 100pF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>100</td>
<td>50</td>
<td>0.024</td>
<td>AVNET</td>
</tr>
<tr>
<td>Ceramic, 0.01µF, 50V, SM</td>
<td>Ceramic Body, Tin Terminal</td>
<td>1.6mm Width, 3.2mm Length, 1.0mm Thickness</td>
<td>1.0</td>
<td>0.01</td>
<td>50</td>
<td>0.021</td>
<td>AVNET</td>
</tr>
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<td>0.021</td>
<td>AVNET</td>
</tr>
</tbody>
</table>

**Columns:**
- **BMS_ID**
- **Qualifier**
- **Item Description**
- **SHORT DESCRIPTION**
- **CASE STYLE**
- **MATERIAL**
- **MOUNT**
- **SIZE**
- **CAPACITANCE (µF)**
- **VOLTAGE (VDC)**
- **Price**
- **Supplier Name**

**Legend:**
- **Numeric Data With UOMs**
- **Normalized Data**
- **Cleansed Supplier Names**

**Notes:**
- Capacitors are categorized under Cleansed Data Comparison.
- Data includes normalized values and units of measurement.
Capacitors – Case Style

- 20% (197) capacitors – most common case style of 1206 value
- Least common case style values below

<table>
<thead>
<tr>
<th>Value</th>
<th>Item Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>0306</td>
<td>1</td>
</tr>
<tr>
<td>0607</td>
<td>1</td>
</tr>
<tr>
<td>0512</td>
<td>1</td>
</tr>
<tr>
<td>0606</td>
<td>1</td>
</tr>
<tr>
<td>0607</td>
<td>1</td>
</tr>
<tr>
<td>0806</td>
<td>1</td>
</tr>
<tr>
<td>0807</td>
<td>1</td>
</tr>
<tr>
<td>1005</td>
<td>1</td>
</tr>
</tbody>
</table>
Potential Duplicates – Capacitors

- We found 27% (338) duplicate capacitors based on 8 attributes.

Key Terms for Duplicate Parts:
- Exact Duplicate – Same MFG Part Number
- Duplicate – Same key attribute values (not all attributes)
- Near Duplicate – Very similar key attribute values
- Key attribute – subset of attributes typically used to identify a part in a search query. Usually the most important characteristics.
Near Duplicate Cluster Analysis
Capacitors (35%) 438 Near Duplicates

Cluster Attribute Weightings
9 Key attributes
438 Capacitors

- Procurement opportunities to rationalize spend – pricing variances

**Key Terms for Duplicate Parts:**
- Exact Duplicate – Same MFG Part Number
- Duplicate – Same key attribute values (not all attributes)
- Near Duplicate – Very similar key attribute values
- Key attribute – subset of attributes typically used to identify a part in a search query. Usually the most important characteristics.

### Capacitors from Different Divisions

### Similar Capacitors

### Different Suppliers

### Different Pricing from Different Plants

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Benefit Analysis – Less New Parts

• **New Part Request Mitigation**: based on the data we conservatively *estimate 20% duplicates capacitors* are being requested each year
  
  • Assume 400 new capacitors created each year
  • 20% of requests could have reused an existing capacitor or 80 capacitors/year
  • Assume $2,700 lifecycle costs of a part – design, procurement, inventory, material handling
  • **$216k – Estimated Annual Savings** – ($2.7k x 80 Capacitors)
Benefit Analysis – Rationalize Pricing Variances

**Min Price Supplier Savings:** The min price supplier analysis shows an optimal potential $190k

- Min price – lowest price of capacitor in a cluster
- Total Annual Spend – the total spend for a cluster
- Min Annual Spend – total spend for a cluster based on min price
- Annual savings – (total spend – min annual spend)

<table>
<thead>
<tr>
<th>Cluster #</th>
<th># capacitors</th>
<th>total annual spend</th>
<th>min annual spend</th>
<th>annual savings</th>
<th>% Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>90</td>
<td>$710,000</td>
<td>$520,000</td>
<td>$190,000</td>
<td>27%</td>
</tr>
</tbody>
</table>

Note: Took the lowest price for each cluster and calculated a new spend - 90 capacitors/10 clusters
## Design for Retrieval (DFR)

### Back-End
**Administrators**

- **Classification Manager**: Creation and maintenance of the category structure by adding/editing attributes to a category, submitting category for approval and using the description generator.
- **Attribute Manager**: Enables the user to create attributes, relationship attributes, image attributes and groups of attributes to set up in the category tree.
- **Item Loader**: Used to load data in batches and populate items with attribute and relationship values. Attribute data can be added or updated with additional items.
- **Data Developer**: Allows the assigned user to check, modify or verify the attribute values for each data item assigned to him/her.
- **Allowed Values Manager**: Allows users to cleanse data, impose rules for creating new data. Users can request an attribute value and workflow for approval/denial of values.

### DFR Administration Client

- **Windows Azure cloud-based architecture**

### Front-End
**Web users**

- **DFR Online**
  - **Smart Integration**: SOA/API layer - Framework to integrate with your ERP, PLM, PIM
  - **Export Manager**: Exports categories, category attributes, allowed values and items.
  - **Options Manager**: Direct access to the catalog configurations via the UI.
  - **Policy Manager**: Manages Data rules

### SOA/API layer
- Framework to integrate with your ERP, PLM, PIM

### Administrative User Mgmt. & Permissions
Leading Provider of Part Data Cleansing Services and Solutions

Harvesting, Classifying, and Enriching Data

- De-duplication & Scrubbing Tool
- Auto Classification Tool
- Normalization Tool
- Data Extraction Tool
- Data Pattern Analysis Tool

200 Data Cleansing Engineers

Classification Staging Database Hosted – Via Azure

DFR Design for Retrieval

Analysis & Search
Convergence Data PartsLink Data Enrichment Process

**Legacy Sources**
- Import Batch XML, CSV, etc.
- Legacy Data Model Consolidation
- Harvesting and Enriching Data Content

**DFR Design for Retrieval**
- DFR Part Enrichment:
  - Data Model Rationalization
  - Business & Technical Attributes
  - Standard Codes & Descriptions
  - Enrich & Normalize Data

**PLMXML: Structure**
- Enhance Categories
  - Descriptions
  - Field Length
  - LOVs (Allowed Values)
  - UOM Rationalization

**PLMXML: Part Data**
- Standardize:
- Bi, SAP, MDM, ERP

**Siemens Teamcenter**