

# CM1746: Developing Drawing Validation Rules

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## Class summary

Once a drafting standard has been established, a drawing validation process must exist to ensure compliance with it. Oftentimes this consists of one or more drafters/checkers performing drawing audits from within Autodesk® AutoCAD® software.

This class illustrates how Feature Manipulation Engine (FME) can be used to audit a drawing to ensure compliance with corporate drafting standards, thus reducing or eliminating the cost for drawing validation prior to project closure.

# Key learning objectives

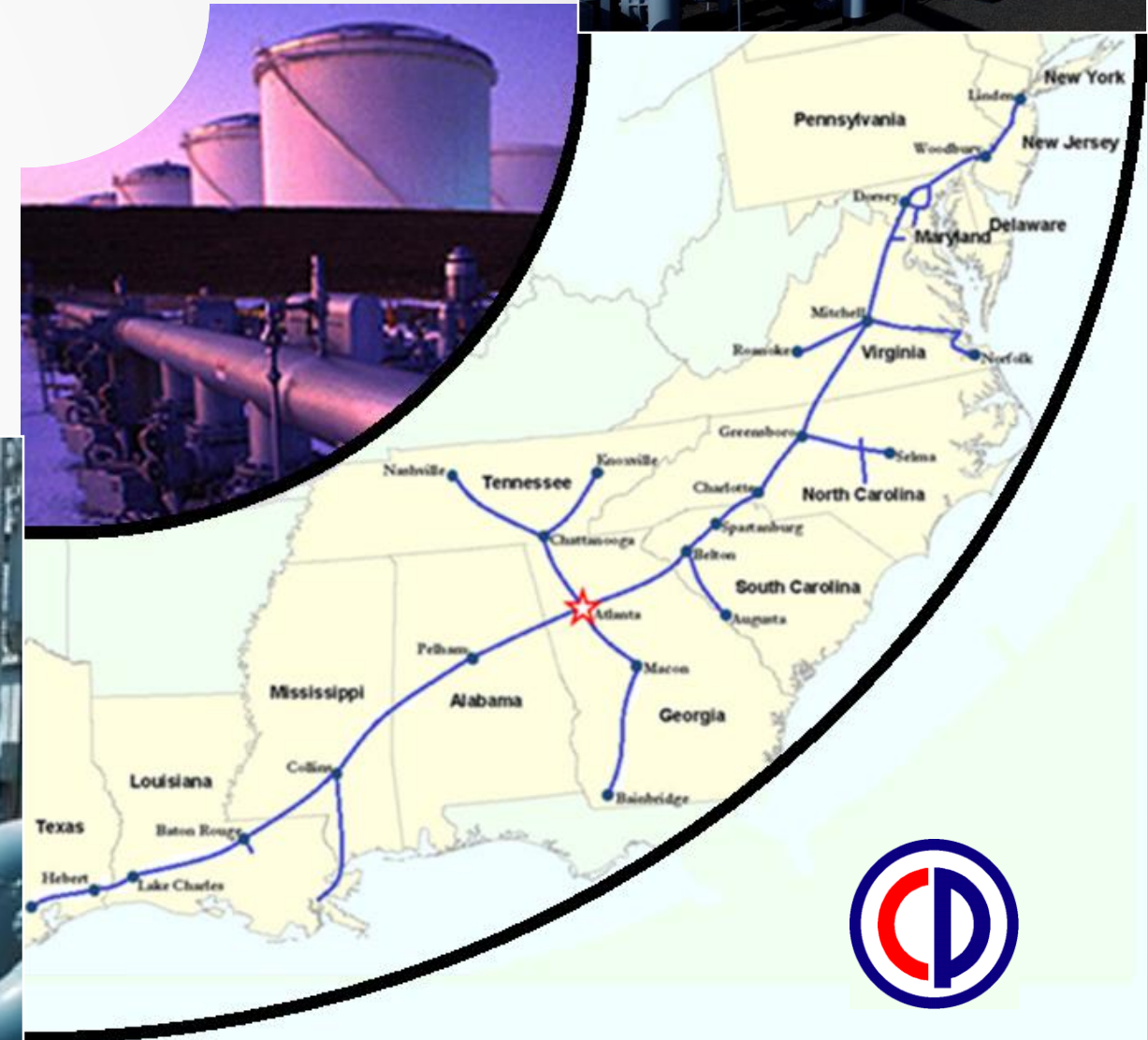
At the end of this class, you will be able to:

- Reduce the cost of drawing audits
- Reduce the cost of third-party multiseat applications
- Use applications that your GIS team may already have access to
- Automate data validation prior to project closure

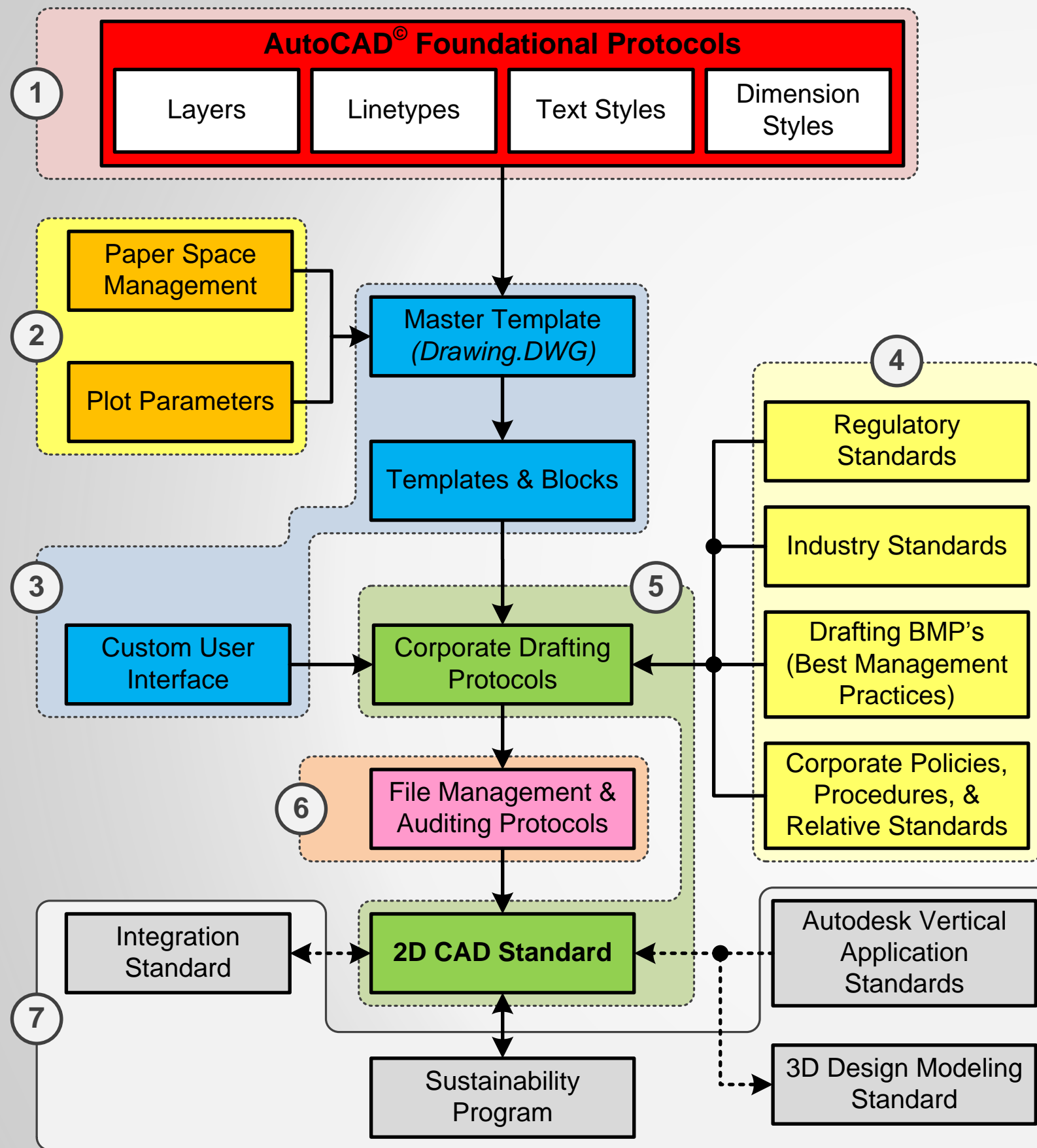


# Colonial Pipeline Company – Business Overview & Safety Share

- Interstate common carrier of refined petroleum products
- Over 5,500 miles of pipeline stretching from Houston to New York
- Headquartered in Alpharetta, GA
- ~700 employees
- Transports approximately 100 million gallons per day:
  - Gasoline
  - Home heating oil
  - Diesel fuel
  - Commercial jet fuel
  - Military fuels



# A Pipeline Company's DWS Model



## LEGEND:

- = Autodesk® defined file structure
- = User defined parameters
- = User developed entities
- = Institutionalized CAD Standard
- = Corporate/Industry parameters
- = Corporate document management protocols
- = Corresponding standards development (as needed, dependant upon company initiatives)

# Standards validation within the CAD environment...

The image displays several AutoCAD tool windows used for standards validation:

- Layer Translator:** A window for mapping existing layers to standard layers. It features two lists: "Translate From" (containing \_IMAGES, \_TEXT, \_VIEWPORT, and 0) and "Translate To" (containing \_PRIMARY, \_ANCILLARY, \_BDR, \_CTRL\_PTS, and \_DIM). Buttons for "Map", "Map same", "Load...", and "New..." are present. A "Layer Translation Mappings" table is also shown.
- Check Standards:** A window for identifying non-standard objects. It shows a "Problem:" section with the message "Textstyle 'Standard' Properties are non-standard". Below is a "Replace with:" table:

| Textstyle | Standards File |
|-----------|----------------|
| BLOCK     | CPC_Standards  |
| Standard  | CPC_Standards  |

A "Preview of changes:" table is also provided:

| Property     | Current Value | Standard Value |
|--------------|---------------|----------------|
| Fixed Height | 0.0000        | 0.1000         |
| Font Name    | bt            | simplex.shx    |

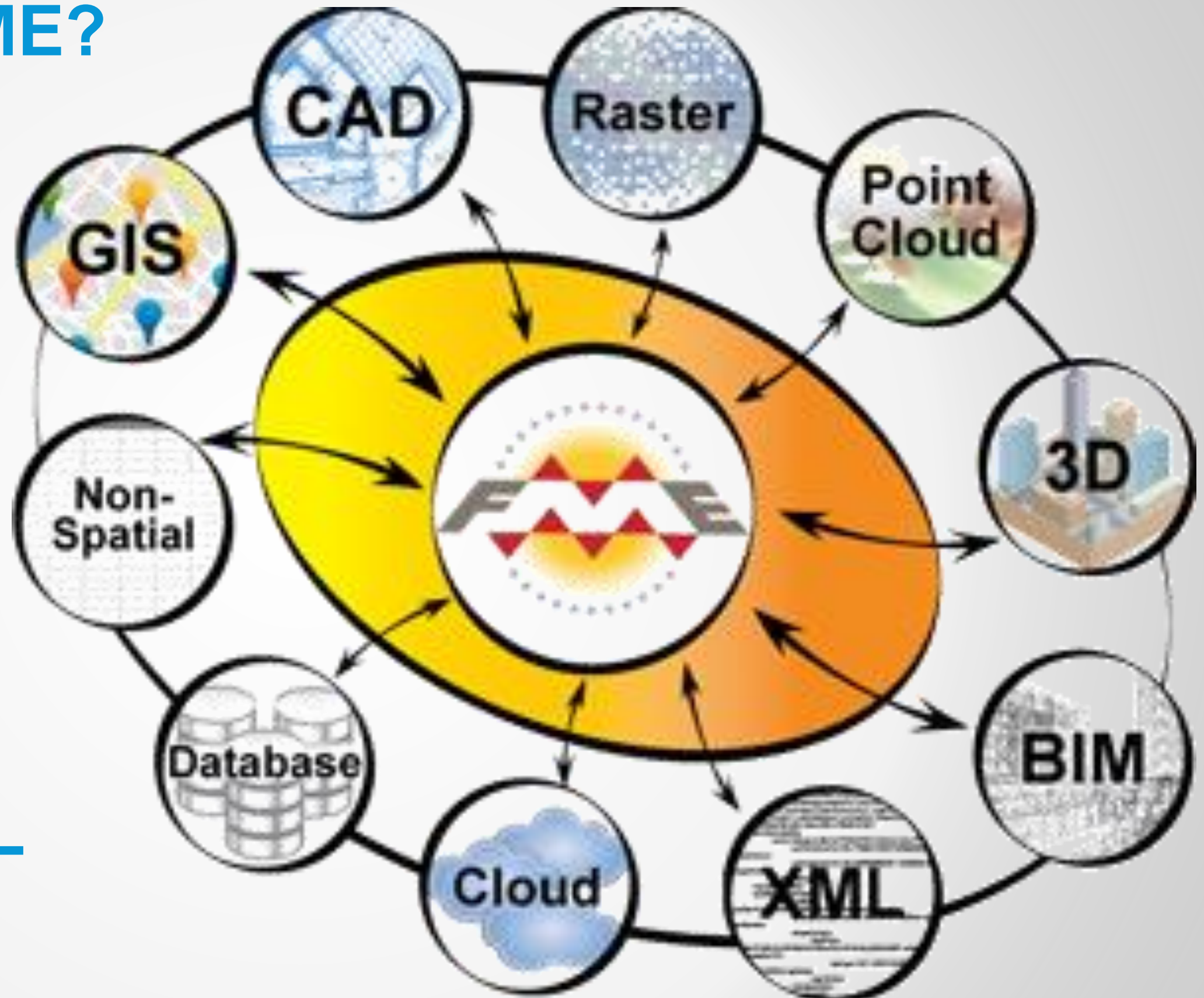
Buttons for "Fix", "Next", "Settings...", and "Close" are at the bottom.
- LayerWalk - Layers: 42:** A window showing a list of layers: \_PRIMARY, \_ANCILLARY, \_BDR, \_CTRL\_PTS, \_DIM, \_EQUIPMENT, \_FOUNDATION, \_FRAMES, \_ICON, \_IMAGES, \_TEXT, and \_VIEWPORT. The layer "0" is currently selected.
- Configure Standards:** A window for managing standards files. It includes a "Standards File" section and a "Plug-ins used when checking standards:" list with checkboxes for Dimension Styles, Layers, Linetypes, and Text Styles.
- Configure:** A small dialog box that appears over the main interface, stating: "Manages the association of standards files with drawings. Associates the current drawing with one or more standards (DWS) files and lists the plug-ins used to check standards. Press F1 for more help."



# Standards validation beyond the CAD environment ...

- Automation
    - External of AutoCAD
  - Scalability
    - PC based and/or Server based
  - Cost & Time Reduction
  - Customization
    - Pertinent to Industry or Corporate specific standards
    - Evolve with business processes
    - Error logging, correction, and notification
- ... Our solution? ...FME

# Introduction to FME?

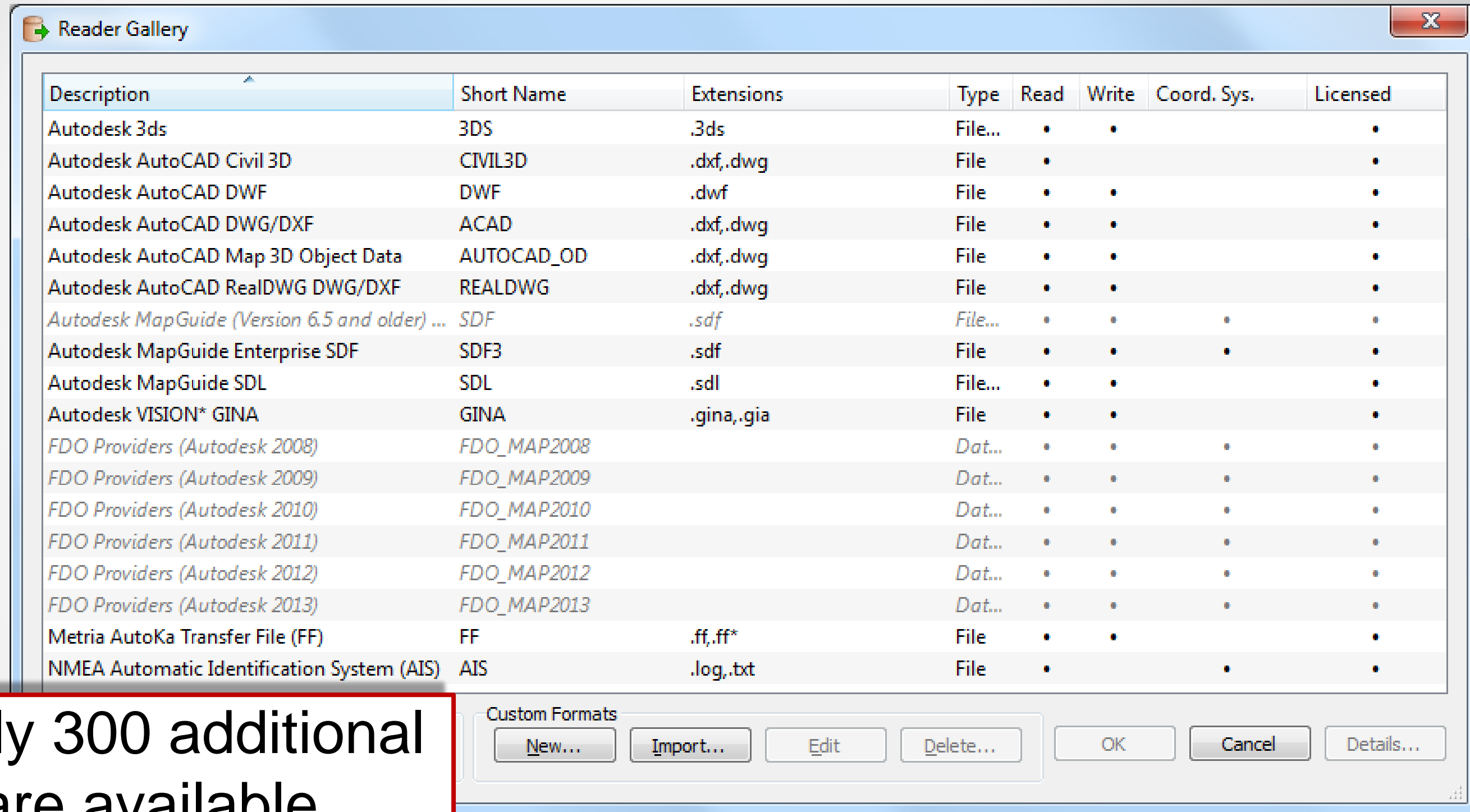


**It's a Spatial ETL**



# Extraction...

T  
L



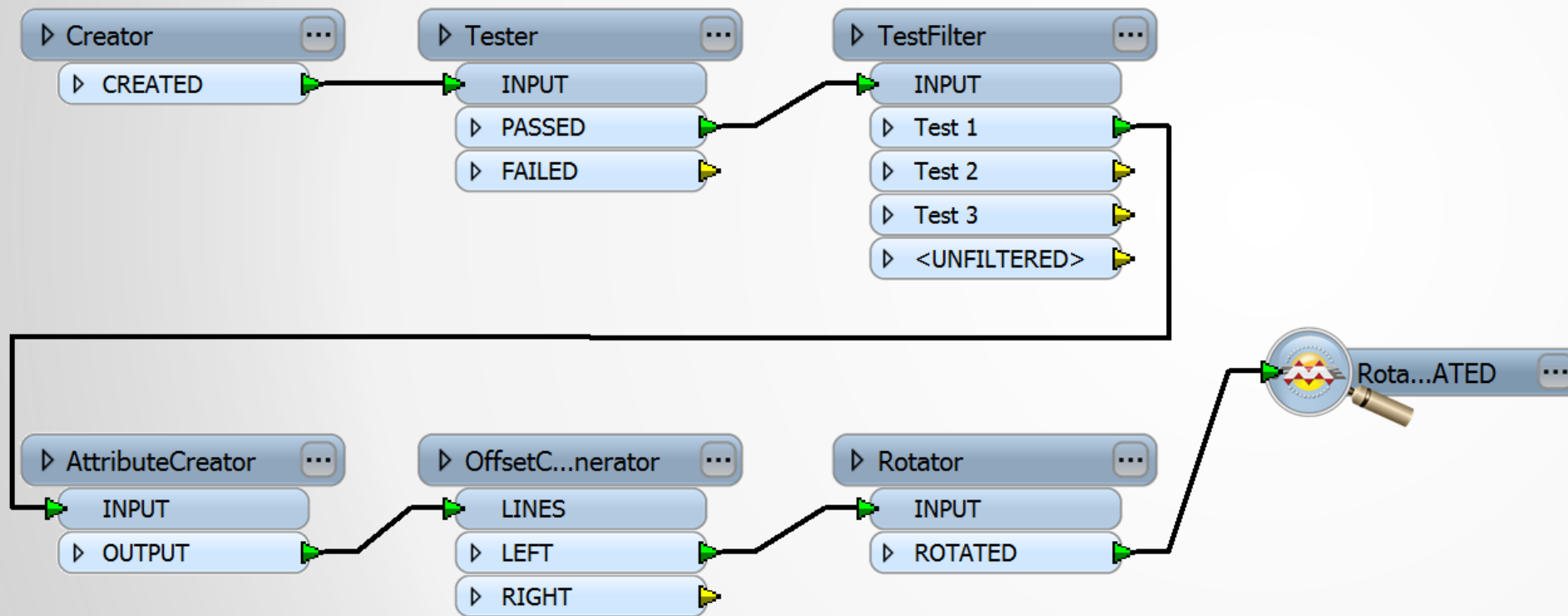
The screenshot shows the 'Reader Gallery' dialog box with a table of supported file formats. The table has columns for Description, Short Name, Extensions, Type, Read, Write, Coord. Sys., and Licensed. Below the table are buttons for 'Custom Formats' (New..., Import..., Edit, Delete...), 'OK', 'Cancel', and 'Details...'.

| Description                                   | Short Name  | Extensions | Type    | Read | Write | Coord. Sys. | Licensed |
|---|-------------|------------|---------|------|-------|-------------|----------|
| Autodesk 3ds                                  | 3DS         | .3ds       | File... | •    | •     |             | •        |
| Autodesk AutoCAD Civil 3D                     | CIVIL3D     | .dxf,.dwg  | File    | •    |       |             | •        |
| Autodesk AutoCAD DWF                          | DWF         | .dwf       | File    | •    | •     |             | •        |
| Autodesk AutoCAD DWG/DXF                      | ACAD        | .dxf,.dwg  | File    | •    | •     |             | •        |
| Autodesk AutoCAD Map 3D Object Data           | AUTOCAD_OD  | .dxf,.dwg  | File    | •    | •     |             | •        |
| Autodesk AutoCAD RealDWG DWG/DXF              | REALDWG     | .dxf,.dwg  | File    | •    | •     |             | •        |
| Autodesk MapGuide (Version 6.5 and older) ... | SDF         | .sdf       | File... | •    | •     | •           | •        |
| Autodesk MapGuide Enterprise SDF              | SDF3        | .sdf       | File    | •    | •     | •           | •        |
| Autodesk MapGuide SDL                         | SDL         | .sdl       | File... | •    | •     |             | •        |
| Autodesk VISION* GINA                         | GINA        | .gina,.gia | File    | •    | •     |             | •        |
| FDO Providers (Autodesk 2008)                 | FDO_MAP2008 |            | Dat...  | •    | •     | •           | •        |
| FDO Providers (Autodesk 2009)                 | FDO_MAP2009 |            | Dat...  | •    | •     | •           | •        |
| FDO Providers (Autodesk 2010)                 | FDO_MAP2010 |            | Dat...  | •    | •     | •           | •        |
| FDO Providers (Autodesk 2011)                 | FDO_MAP2011 |            | Dat...  | •    | •     | •           | •        |
| FDO Providers (Autodesk 2012)                 | FDO_MAP2012 |            | Dat...  | •    | •     | •           | •        |
| FDO Providers (Autodesk 2013)                 | FDO_MAP2013 |            | Dat...  | •    | •     | •           | •        |
| Metria AutoKa Transfer File (FF)              | FF          | .ff,.ff*   | File    | •    | •     |             | •        |
| NMEA Automatic Identification System (AIS)    | AIS         | .log,.txt  | File    | •    |       | •           | •        |

Custom Formats  
New... Import... Edit Delete... OK Cancel Details...

Approximately 300 additional  
formats are available

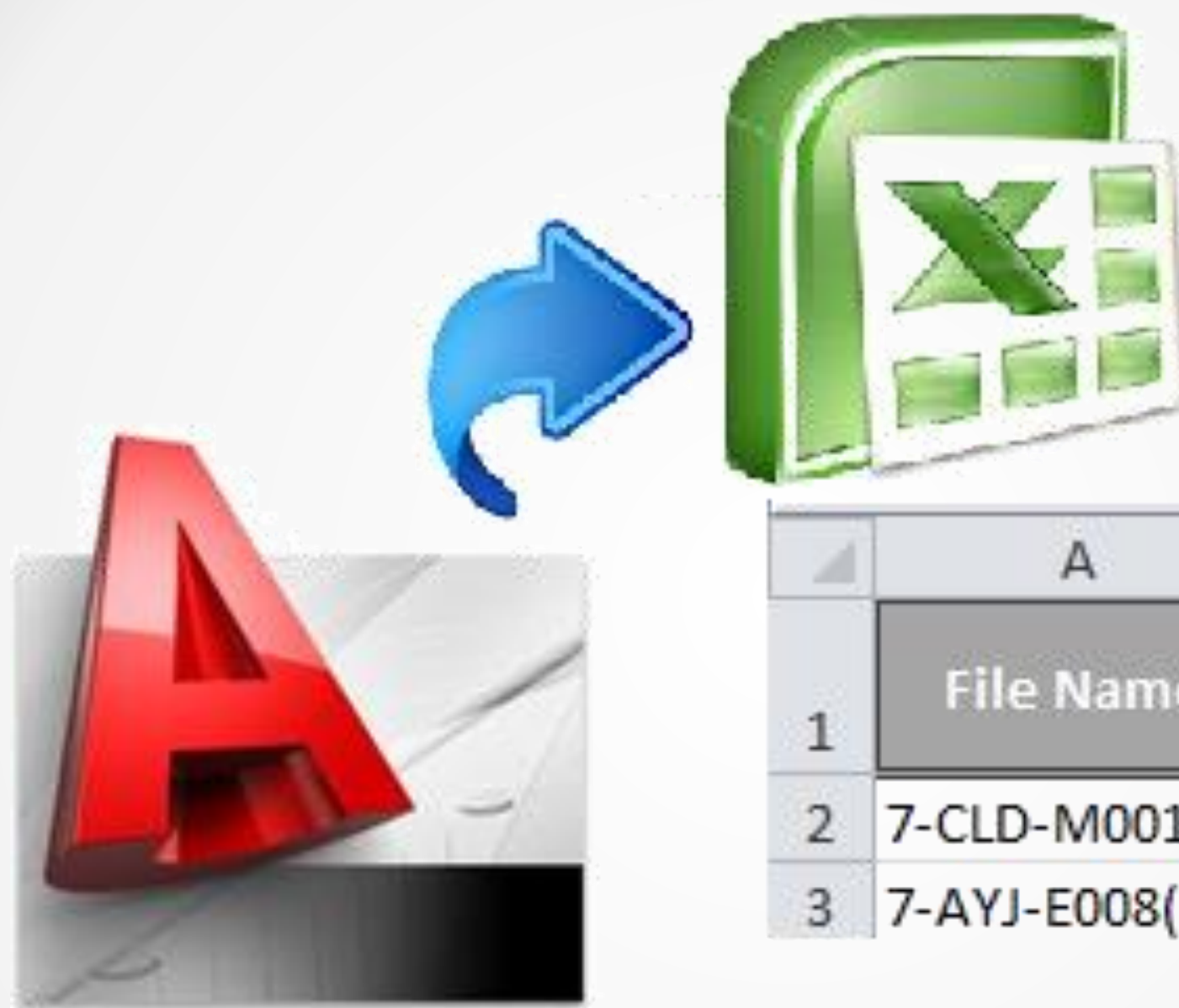
# Transformation ...



Defined as the actual Transformers used within FME to manipulate what was just extracted.

Approximately 450 additional transformers are available

# ET Load...



|   | A              | B              | C             | D                 |
|---|----------------|----------------|---------------|-------------------|
| 1 | File Name      | Number Records | Number Errors | Percentage Errors |
| 2 | 7-CLD-M001     | 994            | 87            | 8.75%             |
| 3 | 7-AYJ-E008(01) | 2272           | 131           | 5.77%             |

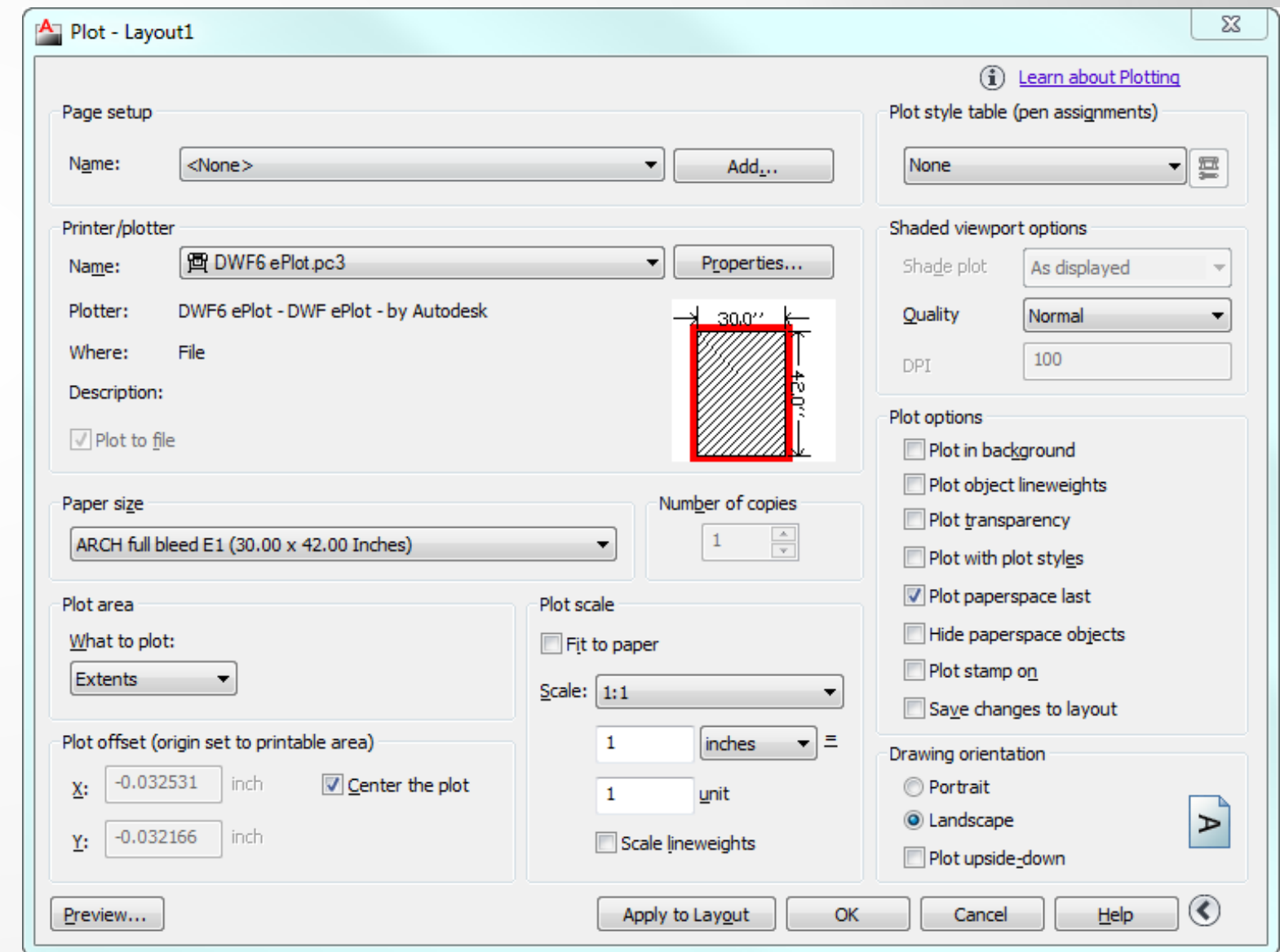
Displaying the results of the extracted file as it was processed against the drafting standards.



# Known Limitations of FME for CAD Drawing Validation...

- Writing to multiple Layouts within a single CAD file
  - Plot parameters are not supported
- FME is not intended to be used for hardcopy output – moreover, to transform data (in all or part) from one file format to another.

FME's biggest limitation is...  
**Your Imagination!**



# So What's Next?

- Error Correction
- Vendor Distribution
- Cloud Deployment
- Integration with 3D, GIS, EAM, and/or other Enterprise Applications
- 4D

