

The background features a topographic map with various elevation contours and colors (blue, green, yellow, orange, red, purple). Overlaid on this are large, semi-transparent geometric shapes: a large blue hexagon in the center, a green arrow pointing right on the right side, and several other triangles and polygons in shades of blue, green, and orange. The text is centered within the blue hexagon.

DEVELOPER SUMMIT

March 10–13



WELCOME

Leveraging Military Symbology Across Apps

Andy Bouffard

Esri Defense Services

Jim Weakland

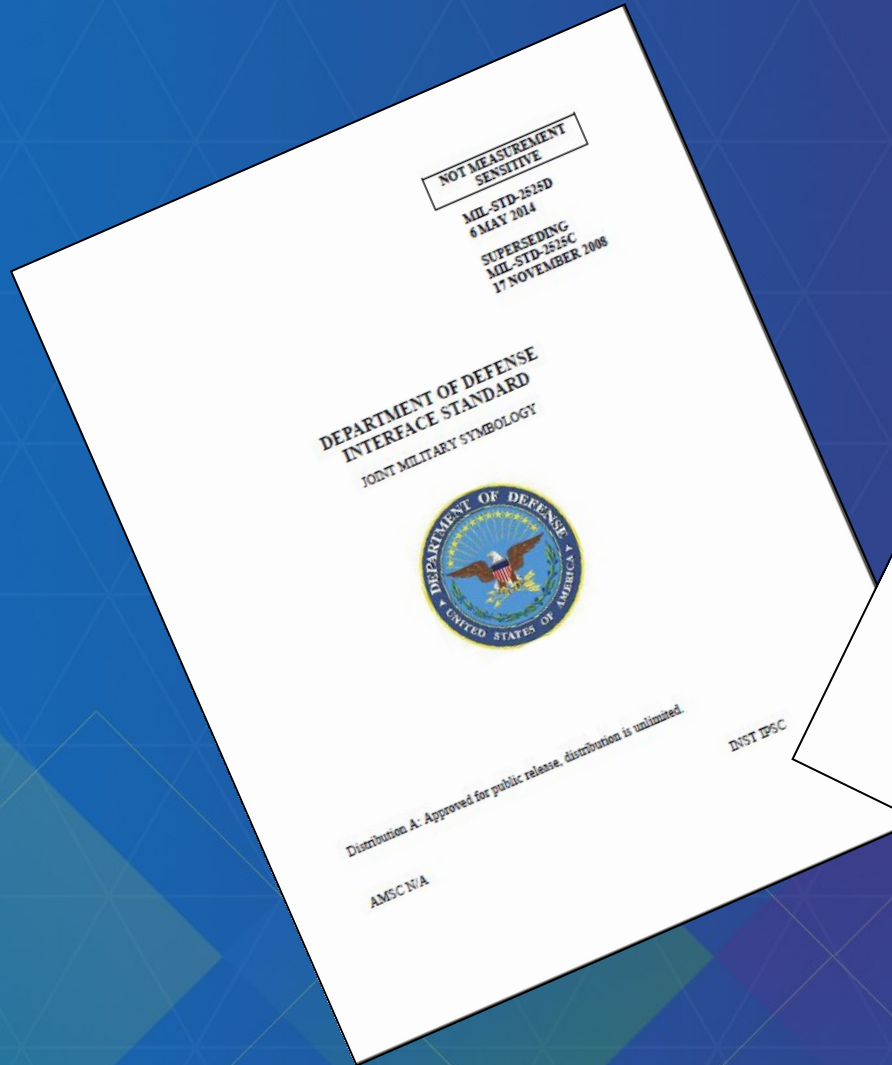
Esri ArcGIS for the Military Solutions

Topics...

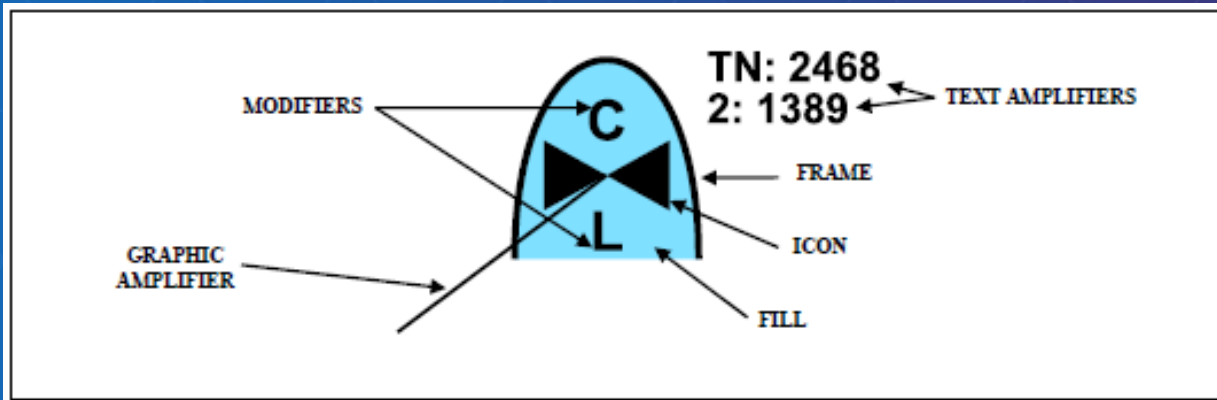
- **Military Standards**
- **Military Symbology in Desktop**
- **An Example: ArcGIS Pro 1.0**
- **Dictionary Renderer**
- **Military Symbology in ArcGIS Runtime**
- **Building Military Symbology**
- **Customizing Military Symbology**
- **Additional Resources**



MIL-STD-2525 and NATO APP-6



Anatomy of a Symbol













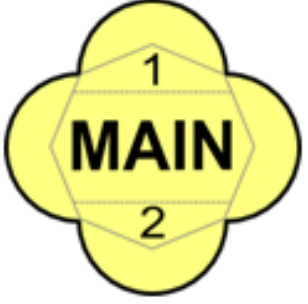
			LAND EQUIPMENT AND SEA SURFACE	SUBSURFACE	ACTIVITY/EVENT

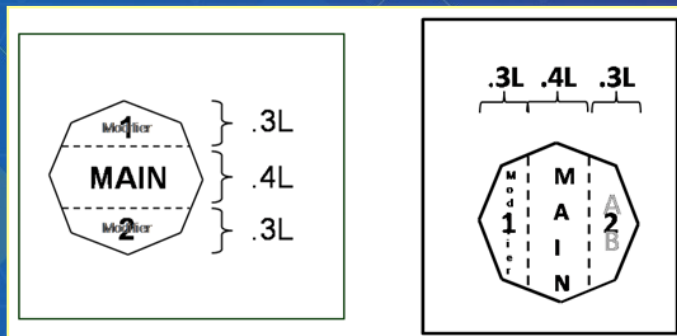
Framing a Symbol

DIMENSION STANDARD IDENTITY	UNKNOWN	SPACE	AIR	LAND UNIT	LAND EQUIPMENT AND SEA SURFACE	LAND INSTALLATION	SUBSURFACE	ACTIVITY/ EVENT
PENDING (YELLOW)								
UNKNOWN (YELLOW)								
FRIEND (CYAN)								
NEUTRAL (GREEN)								
HOSTILE (RED)								
ASSUMED FRIEND (CYAN)								
SUSPECT (RED)								

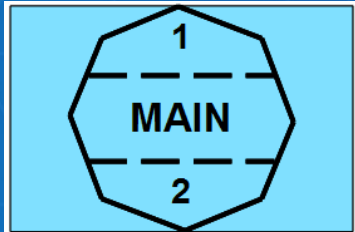
“Parts Box” Approach

SYMBOL COMPONENTS					
					
BOUNDING OCTAGON	FRAME	FILL	ICON	MODIFIER 1	MODIFIER 2
1 GRAPHIC AMPLIFIER			20 TEXT AMPLIFIER		
COMPLETED SYMBOL					
					

FRIENDLY	HOSTILE
	
NEUTRAL	UNKNOWN
	



Full Frame or Main Icon



Code: 120300

Icon Type: Full Frame

ANTITANK/ANTIARMOR

Type: Entity Type
Entity: MOVEMENT AND
MANEUVER
Symbol Set Code: 10
Code: 120400
Icon Type: Full Frame

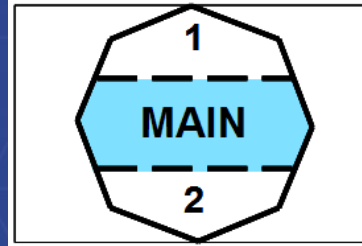
ARMORED

Type: Entity Type
Entity: MOVEMENT AND
MANEUVER/
ANTITANK/ANTIARMOR
Symbol Set Code: 10
Code: 120401
Icon Type: Full Frame

MOTORIZED

Type: Entity Type
Entity: MOVEMENT AND
MANEUVER/
ANTITANK/ANTIARMOR
Symbol Set Code: 10
Code: 120402
Icon Type: Full Frame

	ICON	REMARKS
		The grey box is not to be drawn. It is shown here only as a reference to position and proportion of the icon within the frame.
		The grey box is not to be drawn. It is shown here only as a reference to position and proportion of the icon within the frame.
		The grey box is not to be drawn. It is shown here only as a reference to position and proportion of the icon within the frame.



Entity: MOVEMENT AND
MANEUVER
Symbol Set Code: 10
Code: 121600
Icon Type: Main

SPECIAL FORCES

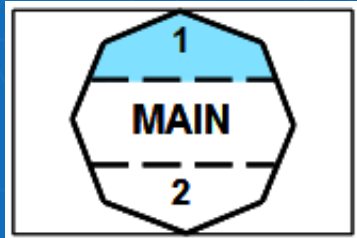
Type: Entity Type
Entity: MOVEMENT AND
MANEUVER
Symbol Set Code: 10
Code: 121700
Icon Type: Main

**SPECIAL OPERATIONS FORCES
(SOF)**

Type: Entity Type
Entity: MOVEMENT AND
MANEUVER
Symbol Set Code: 10
Code: 121800
Icon Type: Main

DN	ICON	REMARKS
		N/A
		N/A
		N/A

Sector Modifiers



Code: 01

AREA

Symbol Set Code: 10
Code: 02

ATTACK

Symbol Set Code: 10
Code: 03

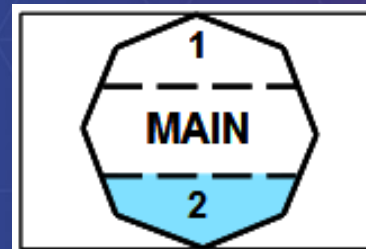
BIOLOGICAL

Symbol Set Code: 10
Code: 04

BORDER

Symbol Set Code: 10
Code: 05

CATEGORY	MODIFIER	REMARKS
MOBILITY		US only
CAPABILITY		N/A
CAPABILITY		N/A
CAPABILITY		N/A
CAPABILITY		N/A



ARCTIC

Symbol Set Code: 10
Code: 02

BATTLE DAMAGE REPAIR

Symbol Set Code: 10
Code: 03

BICYCLE EQUIPPED

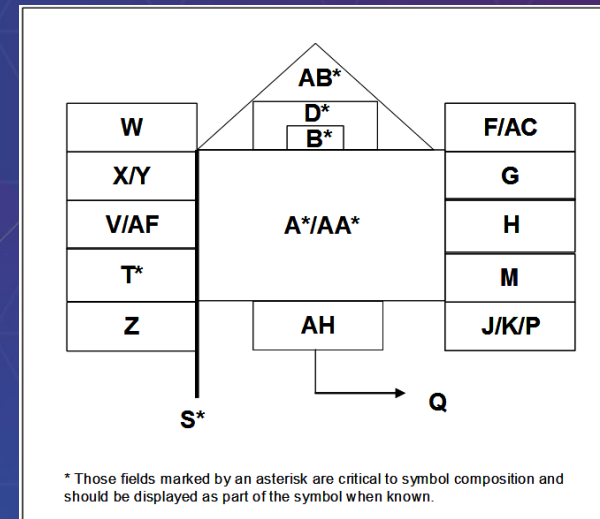
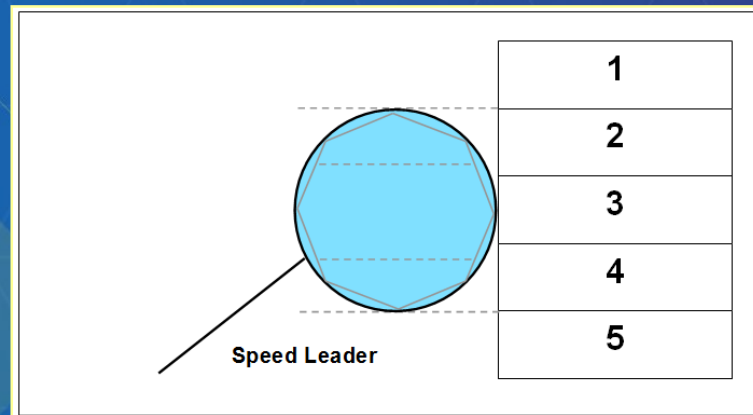
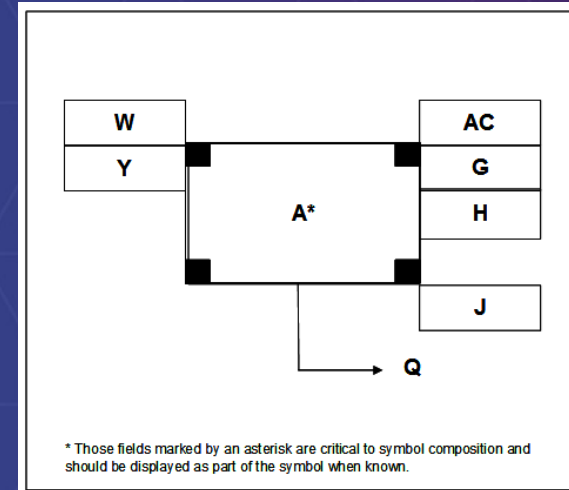
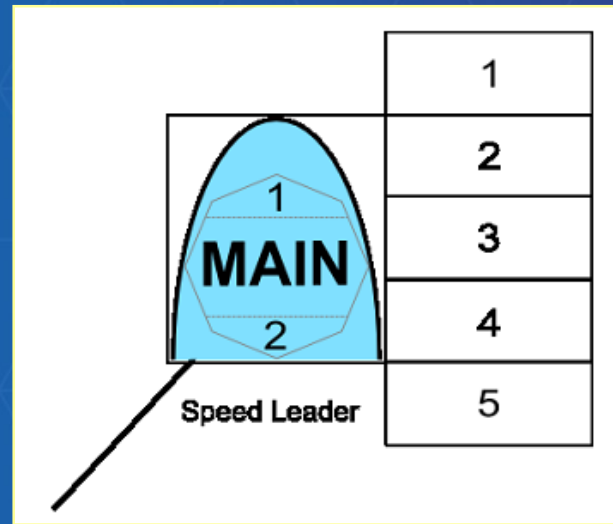
Symbol Set Code: 10
Code: 04

CASUALTY STAGING

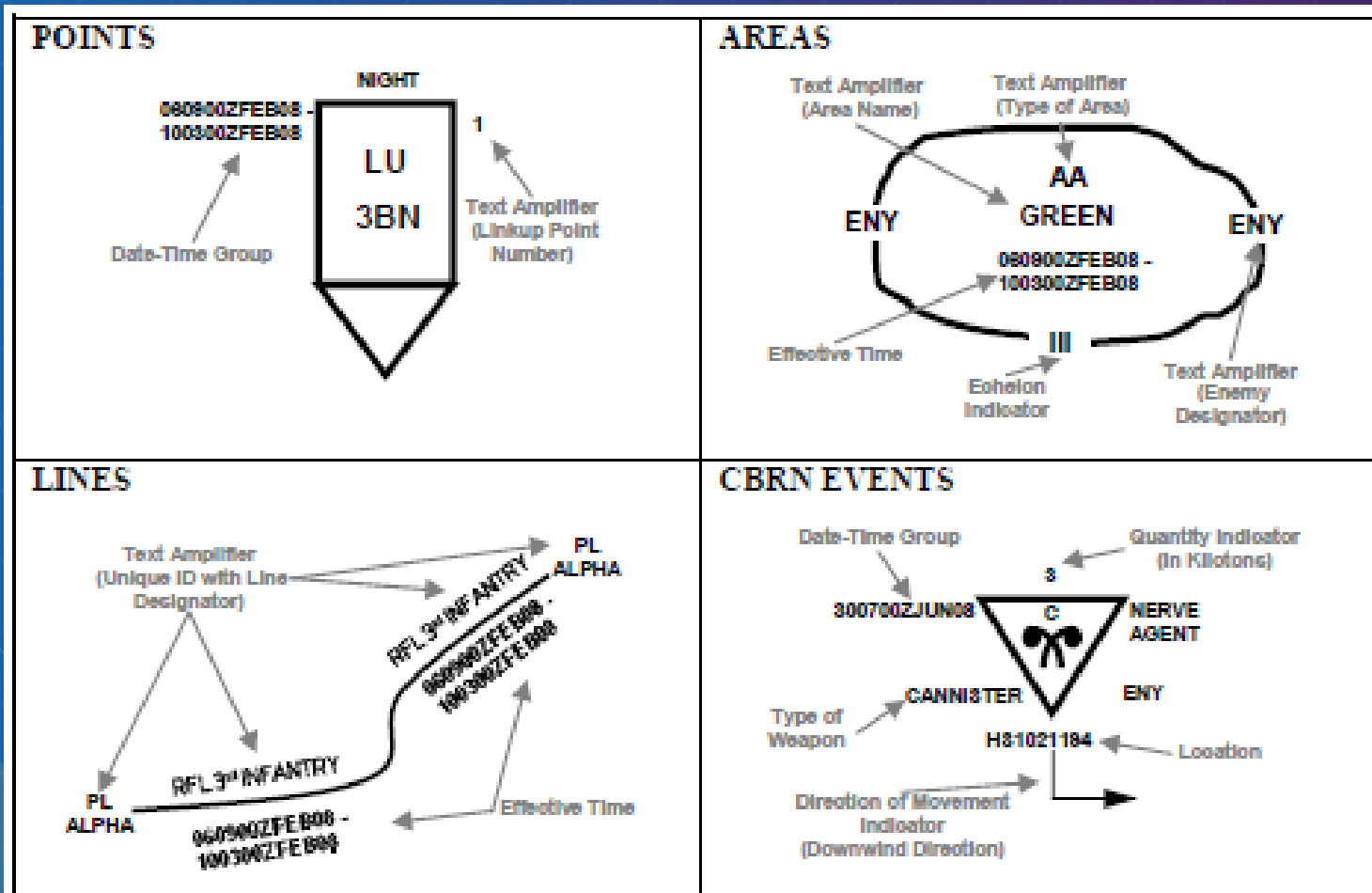
Symbol Set Code: 10
Code: 05

CATEGORY	MODIFIER	REMARKS
MOBILITY		N/A
MOBILITY		N/A
CAPABILITY		N/A
MOBILITY		N/A
CAPABILITY		Modifier is offset so that the modifier is not compromised by the main sector icon.

Amplifiers Differ by Dimension



Control Measures



Identifying a Symbol



Military Symbology in Desktop

Evolution of Solutions

- **The “2000s” – Military Overlay Editor (MOLE)**
 - ArcObjects based custom layers and symbols
 - Initially built to create static tactical overlays
 - Provided an abundance of features and customizability
 - Worked in Desktop and Engine (not across the Enterprise)
 - Struggled when high performance was needed
- **The “2010s” - Military Feature Templates**
 - ArcObjects based using standard feature and symbology components
 - Initial replacement for MOLE, in Engine, Desktop, and through published map services
 - Basic edit and display of labeled military symbols, not overly customizable
 - Worked better across the ArcGIS Enterprise
 - Difficult to modify/use when new symbols are needed
- **Today (ArcGIS 10.3 in 2015) – A New Feature Renderer in ArcGIS Pro**

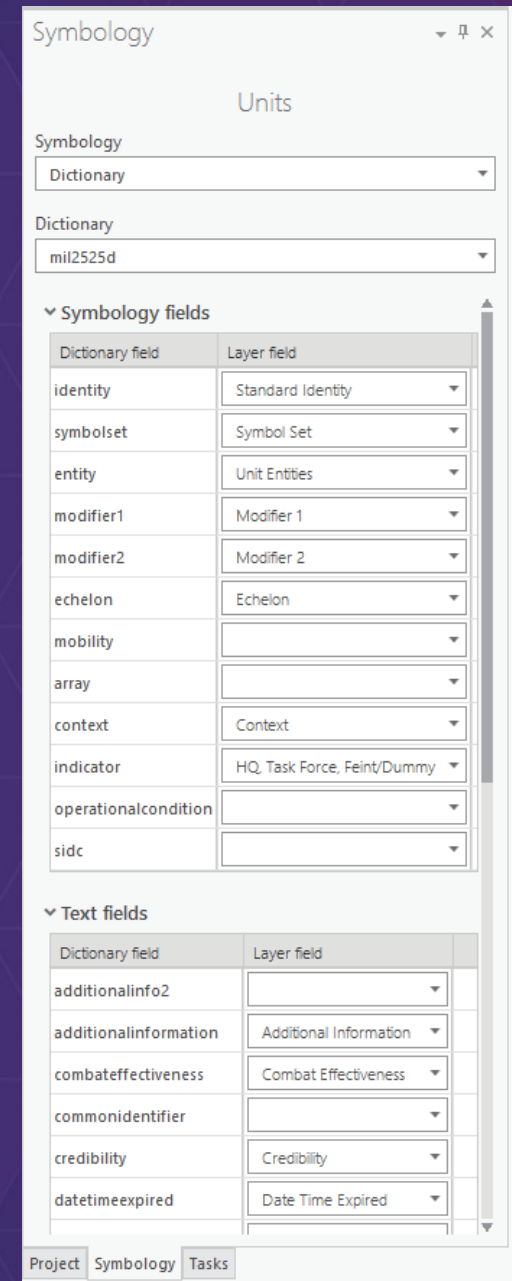
Demo Time!

Military Symbology in ArcGIS Pro



Dictionary Renderer

- **Introduced in Runtime**
 - **Esri.ArcGISRuntime.Symbology.Specialized Namespace**
 - **Used in conjunction with the SymbolDictionary and MessageLayer classes**
 - **Optimized for fast search and retrieval of given symbol**
- **New version developed for ArcGIS Pro**
 - **Rule-based**
 - **Multiple dictionary fields (the “keys”)**
 - **“Values” are used to identify specific symbol elements**
 - **Elements are “combined” to create a displayed symbol**
- **New version is being added to Runtime 10.3**
 - **In the future will work directly on Feature and Graphic layers**
- **Server development team is working on an implementation**

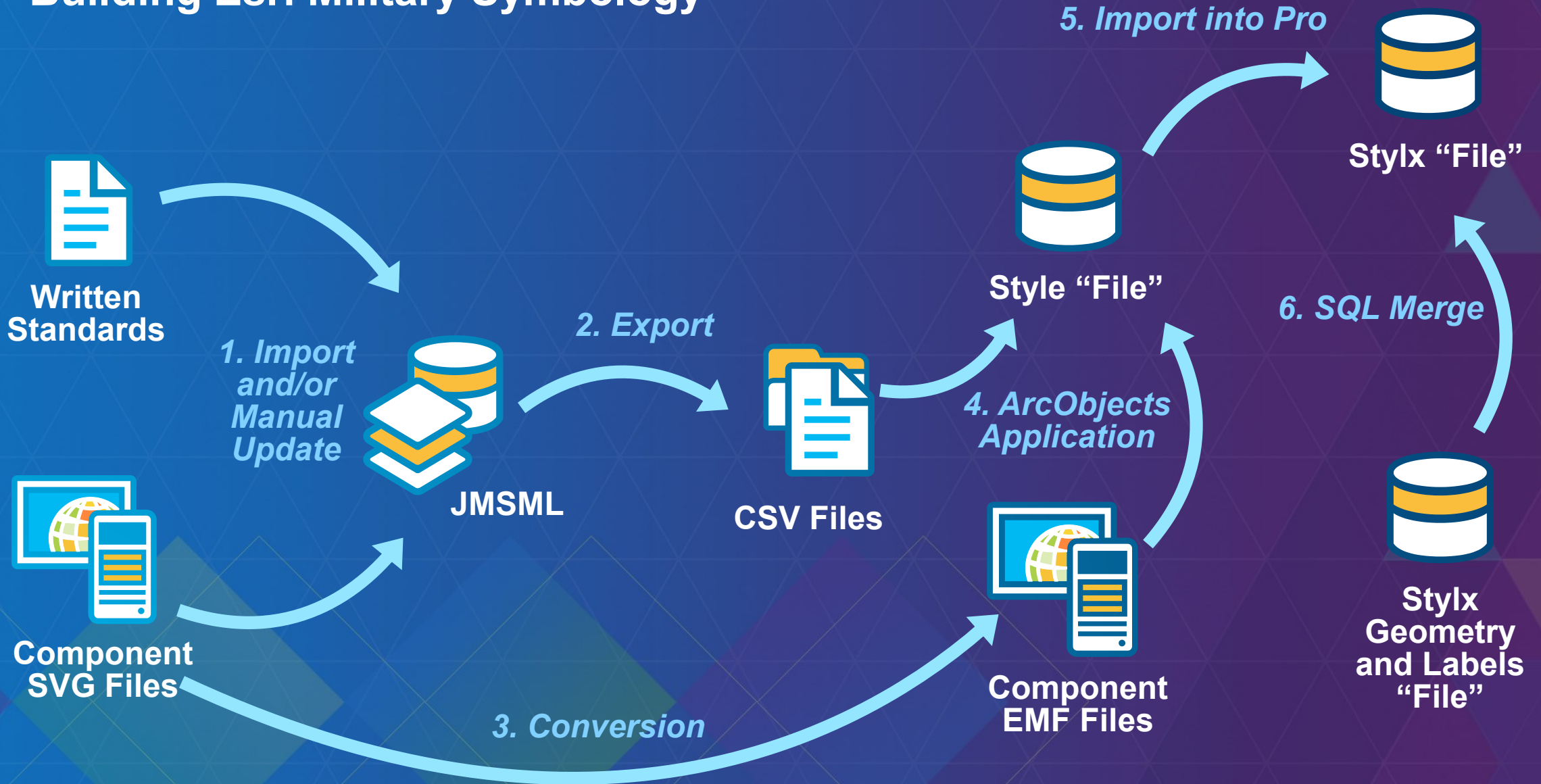


Demo Time!

Military Symbology in Runtime



Building Esri Military Symbology



Joint Military Symbology Markup Language (JMSML)

- An XML schema for 2525 and APP-6
- Configuration management database, not an information exchange format
- Provides a machine readable version of the valid AND invalid symbol definitions
- Implement changes to the standard, in systems, more rapidly
- More efficient and consistent means of interpreting these standards
 - Greatly reduce or even eliminate guess work
 - Joint systems become more joint with regards to symbols
- No Esri software license required

<https://github.com/Esri/joint-military-symbology-xml>

Military Features Data

- Source data for Esri defense and intelligence feature templates
- Used to create features and derived data products using military symbology
- Data for APP-6B, MIL-STD-2525C, and MIL-STD-2525D
- Conversion utilities and procedures
- Sample data
- Test applications and data
- Style and stylx files
- Requires Desktop and/or Engine licenses to run utilities and test apps

<https://github.com/Esri/military-features-data>

Customization Options

- **Modify content in JMSML**
 - Batch reconstruction of the style and stylx files
 - Follow the procedures found in the [military-features-data GitHub repo](#)
 - No need to understand the internals of style/stylx
- **Modify content in style/stylx directly**
 - Less work
 - Good choice for small changes
 - No representation of changes in “source” (JMSML) data
- **Create a new dictionary renderer plugin**
 - No “cookbook” for this yet
 - Requires more work
 - Provides for greatest level of customization

Demo Time!

Customizing for “Operation Untappd”



Further Resources

- **GitHub**

- <https://github.com/Esri/joint-military-symbology-xml>
- <https://github.com/Esri/military-features-data>

- **Solutions Website**

- <http://solutions.arcgis.com/military/>

- **Blogs**

- <http://blogs.esri.com/esri/arcgis/category/subject-defense/>

- **Twitter**

- <https://twitter.com/EsriDefense>

Did We Do A Good Job?

We would like your feedback

- Please visit the following link:
- <http://www.esri.com/events/session-rater?id=90#18987>

Any Questions?

Thank you and enjoy the conference!

