Esri Production Mapping:  
Map Automation and Advanced Cartography

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Traditional Cartography
What you really want
Cartographic Workflow

- Cartographic Data
- Symbology
- Cartographic Edits
- Layout
- Output
Esri Production Mapping
A collection of ArcMap Extensions
Map Automation

Production Mapping
Cartographic Rules
Civilian Topographic Model (CTM)

- Based on the National System for Geospatial Intelligence Feature Data dictionary (NFDD)
- Includes:
  - Database schema
  - Editing Rules
  - Quality Control Rules
  - Cartographic templates for 25K
  - Cartographic templates for 50K
  - 50K Generalization Models
  - Coming soon:
    - Workflow Manager Workflows

https://github.com/esri/ctm
Cartographic Data

Output

Cartographic Data

Symbology

Layout

Cartographic Edits
Cartographic Data

- Data and text used to enrich cartographic products
- Create data appropriate for your cartographic scale
Grids and Graticules

Design

- Feature based
- Fine Grain Custom Design
- Geographically aware
  - Scale
  - Coordinate system
  - Rotation
Grids and Graticules

Applying

```python
# Define grid object
grid = arcpyproduction.mapping.Grid(grid_xml)

# Uses the appropriate XML for to create the grid
arcpy.AddMessage("Creating the Grid...")
output_layer = map_name + '_' + grid.type
grid_result = arcpy.MakeGridsAndGraticulesLayer_cartography(grid_xml,
aoi, gfds, output_layer, map_name)
grid_layer = grid_result.getOutput(0)

# Add the grid layer to the top of the map
arcpy.mapping.AddLayer(data_frame, grid_layer, "TOP")
arcpy.AddMessage("Grid Layer added to map...")

# Updates the data frame properties based on the grid
final_mxd.activeView = 'PAGE_LAYOUT'
grid.updateDataFrameProperties(data_frame, aoi)
```
Generalization

- Resolves the appearance of feature geometry at smaller scales
Feature Generalization

- Features assessed individually without regard to symbology or spatial relationships

1: 25000

1: 50000
Contextual Generalization

- Features are assessed collectively
  - Maintain pattern, density, and spatial relationships
Contextual Generalization

- Features from multiple layers assessed simultaneously
  - Maintain pattern, density, and spatial relationships
Generalization Tools

- Aggregate Polygons
- Convert Polygons
- Delete Dangles
- Delete Polygons And Extend Lines
- Extend Polygon Sides
- Fill Gaps
- Generalize Shared Features
- Increase Line Length
- Increase Polygon Area
- Modify Underlying Polygon
- Thin Hydro Features
- Thin Spot Heights

- Add Geometry Attributes
- Add XY Coordinates
- Adjust 3D Z
- Bearing Distance To Line
- Check Geometry
- Copy Features
- Delete Features
- Dice
- Feature Envelope To Polygon
- Feature To Line
- Feature To Point
- Feature To Polygon
- Feature Vertices To Points
- Geodecic Densef
- Minimum Bounding Geometry
- Multipart To Singlepart
- Points To Line
- Polygon To Line
- Repair Geometry
- Split Line At Point
- Split Line At Vertices
- Table To Ellipse
- Unsplit Line

- Representation Management
- Archiving
- Attachments
- Data Comparison
- Distributed Geodatabase
- Domains
- Feature Class
- Features
Find the tool and add to a model
Run the models

1: 25000

1: 50000
Symbology

Cartographic Data

Output

Layout

Cartographic Edits

Symbology
Symbology
Intuitively displaying information
Feature Class Representations
Visual Specifications

Defining

- Create Symbology
- Know Your Rules
- Define Specifications
Cartographic Edits

Cartographic Edits

Cartographic Data

Symbology

Layout

Output
Cartographic Edits
Improving map clarity
Conflict Resolution
Managing placement of symbolized features
Cartographic Refinement
Automating Conflict Resolution
Masking
Masking
Masking

```python
# Masking the grid ladder values and annotations
arcpy.AddMessage("getting output of masks.")
mask_layer = arcpy.mapping.Layer(masks.getOutput(0))
arcpy.mapping.AddLayer(data_frame, anno_mask_layer, 'BOTTOM')
anno_mask = arcpy.mapping.ListLayers(final_mxd, mask_layer.name,
data_frame)[0]
arcpy.AddMessage("Annotation Mask layer added to the map...")
arcpyproduction.mapping.EnableLayerMasking(data_frame, 'true')
arcpyproduction.mapping.MaskLayer(data_frame, 'APPEND', anno_mask,
gridline_layer)
arcpy.AddMessage("Masking applied to gridlines...")
```
Demo
Symbology and Cartographic Editing
Layout
Providing Context
Layout Elements

Types of Elements

- Static Elements
Layout Elements
Types of Elements

- Static Elements
- Dynamic Elements
  - Dynamic Text
  - Dynamic Graphics
- Template Page
Layout Elements

Automating

- Static Elements
- Dynamic Elements
  - Dynamic Text
  - Python
  - Graphic Table Element
- Page Size
Layout Rules

Apply

```
mxd = arcpy.mapping.MapDocument("CURRENT")
arcpyproduction.mapping.ApplyLayoutRules(mxd, layout_rules.xml)
```
Output

Cartographic Data

Symbology

Cartographic Edits

Layout
The Map
Sharing with community, the way they need it
Production PDF
Color Separation
Automating Output
Using Python

```python
if export == 'JPEG':
    filename = map_doc_name + '.jpg'
    outfile = os.path.join(outputdirectory, filename)

    # Run the export tool
    arcpy.mapping.ExportToJPEG(mxd, outfile)

elif export == 'MAP PACKAGE':
    filename = map_doc_name + '.mpk'
    outfile = os.path.join(outputdirectory, filename)
    mxd = mxd.filePath

    # Run the export tool
    arcpy.PackageMap_management(mxd, outfile)

elif export == 'PRODUCTION PDF':
    filename = ap_doc_name + '.pdf'
    outfile = os.path.join(outputdirectory, filename)
    setting_file = os.path.join(product_location, "colormap.xml")

    arcpyproduction.mapping.ExportToProductionPDF(mxd, outfile, setting_file)

arcpy.AddMessage("Output is located: " + outfile)
```
Demo
Layout Management
Production Mapping for ArcGIS Server

Enabling self-service mapping for Authoritative products
Production Mapping for ArcGIS Server

Database

Production Mapping Rules & Templates

GP Services & Python Scripts

Web

Mobile

Public Access

ArcGIS

Server
Product on Demand

https://github.com/Esri/product-on-demand
Demo

POD
Map Automation & Advanced Cartography

- Output
- Cartographic Data
- Symbology
- Layout
- Cartographic Edits
Map Automation & Advanced Cartography

Production Mapping
Cartographic Rules

Geoprocessing
& Python
Production Mapping

Learn More:
Desktop: http://www.esri.com/productionmapping

Email us: productionmapping@esri.com

CTM
Get it:
https://github.com/esri/ctm

Product on Demand
Get it:
https://github.com/Esri/product-on-demand
Try it:
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