Performing Advanced Cartography with Esri Production Mapping

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Agenda

- Outline generic cartographic workflows
- Discuss database driven cartographic production workflows in a multi-user environment
- Overview of Production Mapping tools that extend core functionality
- Discuss how these tools can be used to enforce standards and reusability
- Maintenance of maps and the underlying cartographic data over time using map editions
Production Mapping

- Supports high-volume map creation
- Facilitates standard, repeatable workflows
- Configurable for specific industries

Enterprise GIS for advanced data management and cartography
Cartographic workflow overview
Geographic Context

Map location, content and appearance
Product Library
Centralized management of production rules, maps and documents

• **Centralized information & behavior**
  - Data editing configuration
  - Quality control & assurance rules
  - Cartographic specifications

• **Product management**
  - Production life cycle:
    - Input/source
    - Production
    - Output/Publish
  - Integration with ArcMap
  - Integration with Workflow Manager
  - Multi-user permission control
Product Library
Database permissions and document control

• **Personal/file**
  - All users have the same access

• **SDE - Two roles (DB Permissions)**
  - Administrator
  - User

• **Enterprise management of files**
  - Storage (File system/database)
  - Check in/out, undo, get local copy (permissions)
  - Versions
  - Linking
  - Searching
Production Workflow using Product Library

- Workflows
- Editing
- Validation
- Cartography
- Files

Technical Lead
Product Library

Automated rule based cartographic production

• Configuration & MXD management
  - Map sheets
  - Map books (Data Driven Pages)
  - Batch product actions

• Standardized cartographic behavior
  - Shared symbology specifications
  - Template Instructions
    - Data frame rules
    - Layout rules
    - Python scripts
Demo: Cartographic Context
Cartographic Data Creation

Features and attributes used for cartographic production
Cartographic Data
What is cartographic data?

• Supplements GIS data
  - Visualization of abstract concepts
    - Contours
    - Annotation
    - Etc…

• Support for other common carto data
  - Grids and graticules (coordinate systems)
  - Magnetic lines/points (navigation)
  - Hypsometric tinting (elevation)
**Grids and graticules layers**

*Creation of grids, graticules and borders*

**Features in the geodatabase**
- Feature dataset with feature classes
- Editable with standard data editing tools
- Visible in data view

**Shareable specifications**
- > 40 out-of-the box supported specifications
- Design custom specifications
- Shareable using a GDB or XML
- Enhanced formatting
- UTM convergence
Other Cartographic Data Creation Tools
Features and attributes used for cartographic production

• **Magnetic**
  - Geoprocessing tools
  - Isogonic Line Tool (Resource Center)

• **Banding Hypsometric tinting**
  - Bands from features
  - Bands from raster
Symbology

Standardizing and sharing feature symbology
Overview of Production Symbology

- Manage Cartographic Business Rules
- Standardize symbology across products
- View data layers
- Storage in geodatabase, likely Product Library
**Visual Specifications**

Standardizing feature symbology

- Representations
- Attribute Driven Symbology
- Normalized Data Schema
- Rapid Maintenance
Visual Specifications
Features of Visual Specifications

• Types of rules
  - Calculated Representations
  - Calculated Fields

• Database Driven Cartography
  - SQL Expressions
  - Visual Basic Scripts (VBScript)

• Stored and managed in “central” geodatabase
Visual Specifications

Usage

• **GP Tools**
  - Calculate Visual Specifications
  - Drop Visual Specifications
  - Select Features by Specifications Difference

• Manage visualization across many layers

• Single production workflow for symbology and text
Views
Layer and map settings distribution and deployment

• Save/retrieve MXD, Data Frame and Layer setting to a database location

• Stored and managed in a geodatabase

• Allow maps settings within a single document to be updated quickly
Cartographic Editing

Automated and interactive maintenance tools
Cartographic Editing
Editing feature class representations and annotations

- Cartographic Editing Toolbar
  - Easy access to new and existing editing tools
  - Tools that honor representation geometry
  - Toggle visibility of representations and annotations
  - Hide, Show, Nudge, Reshape
Cartographic Editing
Maintenance of cartographic products

- Locate features that have changes between map editions
- Focus reviews and edits on changed areas only
- Layer Snapshot
  - Creates a “snapshot” of data with symbology
  - Compare the “snapshot” with current state of the layer and data
  - Does not require SDE databases
Demo: Cartographic Data, Symbology, & Cartographic Editing

Grids and Graticules Views
Production Cartographic Editing Toolbar
Layout

Map Surrounds
Surround Elements
Static and dynamic graphic on the layout page

- **Layout window**
  - Centralized layout management
  - Similar to graphic applications
  - Element locking
  - Ordered list

- **Layout rules**
  - Relative element rule placement
  - Automatically change page size

- **Advanced surround elements**
  - Graphic table
  - Topo North Arrow
  - US National Grid Reference Box
Graphic Table
Dynamic illustrated table

• Dynamic table creation capabilities
• Tables are linked or independent of feature layers
• Ability to include text, symbols and graphics
Database Elements
Persist and share layout elements

- Store elements in a geodatabase
- Share elements across organization
- Track element metadata

Useful for:
- Legends
- Scale bars
- North arrows
- Logos
- Common notes
Publish, Archive and Automation

Final output and workflow automation
Export
Map printing and exporting

- **Printing and exporting**
  - Layout GeoTIFF
    - Georeferenced Layout
  - Separated TIFF
  - Production PDF
    - Color Separation
    - Overprinting
    - Spot Colors
  - PDF to TIFF GP
    - 32 bit CMYK TIFF
    - Geo-enabled PDF to GeoTIFF
    - Core 10.3
Production Mapping for ArcGIS Server – 10.3
*Enabling Mapping Organizations to serve their detailed map products*

- **Moving map & chart product generation from the back office to everyone**
  - Simple, easy to use interface, Non GIS user
  - Starter Java Script app

- **High-end map graphic output**
  - Complements Web Maps
  - Extends standard web/server printing
  - Masking, symbol level drawing, grids and graticule, layout management

- **Behavior-based cartographic calculators**
  - Projections, scale, area, page size and layout arrangement
  - Creating cartographic data, standardized symbology, generalization

- **Collection of industry specific map surround elements**
  - Tables and north arrows
Archiving

Document management with Product Library

- Archive output files created during production
  - Stored with product or grouping of products
    - Search based on file metadata
      - File type, status (checked/out), date, etc...
  - Automate using geoprocessing
Automation
Python scripting module

• ArcPyProduction.Mapping
  - Production Mapping site package
  - Call functionality through Python to automate workflows

• Map export functions

• Accesses to Grids and Graticules

• Layer Masking and Data Frame Clipping

• Changing Layout using Layout Rules

```python
>>> import arcpy
>>> import arcpyproduction
```
Demo: Layout, Export, Archive and Automation

Product On Demand: Production Mapping for ArcGIS Server

ArcPyProduction
Surround elements
Production Mapping Exporters
Summary

Refers to: Design, Purpose, Extent & Scale

*Tools*: Product Library, Template Instructions

Refers to: Cartographic Data, collecting Features/Attributes

*Tools*: Grids and Graticules layers, Magnetic Isolines, Hypsometric Bands

Refers to: Symbology, Labels

*Tools*: Views and Visual Specifications

Refers to: Exporting, Archiving, Automation

*Tools*: Production PDF, Layout GeoTiff, ArcpyProduction, Product Library

Refers to: Elements, Layout Management

*Tools*: Layout Window, Graphic Tables, Topographic North Arrow, Layout Rules

Refers to: Automated, Interactive Finishing

*Tools*: Cartographic Editing Tools, Layer Snapshot

Refers to: Specification Driven, Interactive Finishing
Thank you...

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