

Automated Workflow Using Python Scripting to Build the SCAG Data/Map Book

Jung Seo, Frank Wen, Simon Choi

Research & Analysis

Southern California Association of Governments

2014 ESRI User Conference | July 14-18, 2014 | San Diego Convention Center



Southern California Association of Governments (SCAG)



Southern California Association of Governments (SCAG)

A satellite-style map of Southern California with a dark grey overlay indicating the service area of the Southern California Association of Governments (SCAG). The map shows the outlines of six counties: Ventura, Los Angeles, San Bernardino, Orange, Riverside, and Imperial. The text is overlaid on this map in four horizontal bars.

Nation's largest Metropolitan Planning Organization
(MPO)

6 counties and 191 cities

18.4 million people within 38,000+ square miles

GRP in 2012: \$924 Billion
(16th largest economy in the world)

Overview

- § Background
- § Objectives
- § Methodology
- § Conclusions

BACKGROUND

2016 RTP/SCS and Senate Bill 375

- § 2016-2040 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS)
 - A long-range transportation plan
- § SB375 – California’s Sustainable Communities Strategy and Climate Protection Act
 - Integration of transportation, land use and housing planning to meet the regional GHG emission reduction targets
 - Emphasis on a substantial public participation process and local government input

SCAG's Local Input Process for 2016 RTP/SCS

- § Bottom-up local input process
 - Participation and cooperation of all 197 local government partners within the SCAG Region
- § To facilitate and assist in the local review of SCAG's land use datasets and growth forecast
 - SCAG Data/Map Book
 - One-on-one meeting
 - Collect data changes, answer questions, provide technical guidance

SCAG's Local Input Process for 2016 RTP/SCS (*cont.*)

§ Key stages of the SCAG's Local Input Process

- Stage 1 – Preliminary land use data collection and review
 - Released *SCAG Map Book* in Aug. 2013
- Stage 2 – Review of land use data and socioeconomic data
 - Released *SCAG Data/Map Book* in Nov. 2013
- Stage 3 – Land use scenario planning exercises

SCAG Data/Map Book

- § Development of land use and socioeconomic datasets as required by the 2016 RTP/SCS.
 - Through a bottom-up local input and review process
- § Prepared for each jurisdiction in the SCAG Region
 - To collect input and comments from local jurisdictions
 - To help local planners and public to better understand SCAG's datasets

Contents of SCAG Data/Map Book

§ Land use

- General Plan, zoning, existing land use

§ Resource areas

- Open space, farmland, endangered species, flood areas, conservation areas

§ High quality transit areas & transit priority areas

§ City boundary, sphere of influence, census tract, transportation analysis zone (TAZ)

§ Socioeconomic data



Draft
SCAG Data/Map Book



for the Development of 2016-2040 Regional Transportation Plan/
Sustainable Communities Strategy (RTP/SCS)

City of Alhambra

OBJECTIVES

Objectives

- § Produce the SCAG Data/Map Books for 197 local jurisdictions in a time and labor-efficient manner
 1. Development of an automated workflow to speed up repetitive tasks for regional land use database processing
 2. Development of an automated mapping workflow to speed up repetitive tasks for generating a series of maps for 197 jurisdictions

METHODOLOGY

Automating Map Workflow

§ Data Driven Pages (DDP)

- New functionality in ArcGIS 10 to create a series of maps from a single map document

§ Python and arcpy.mapping

- Arcpy.mapping – a Python scripting module that is part of the ArcPy site package
- Can be used to automate map production
- Can be used to extend DDP

§ Combining DDP with Python and arcpy.mapping

Using DDP with Python and Arcpy.mapping

- § DDP may not provide enough functions for complicated map books, but DDP-enabled map document can save many lines of code.
- § Combine DDP with Python and arcpy.mapping module to create complicated map books in more efficient manner.
- § Interact arcpy.mapping module with DDP-enabled map documents (.mxd), layer files (.lyr) and dynamic layout elements.

DDP-Enabled Map Document

The screenshot displays the ArcMap interface for a map document titled "GP_Landscape.mxd". The main map area shows a land use map of Garden Grove, with a legend at the bottom right. The legend includes categories such as "Transportation, Communications, and Other", "Retail, Office, and Commercial", "Open Space and Recreation", "Agriculture", "Vacant", "Residential", "Neighborhood", and "Industrial".

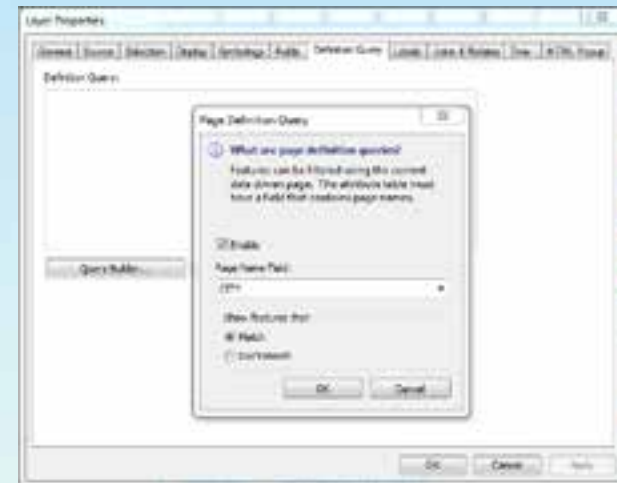
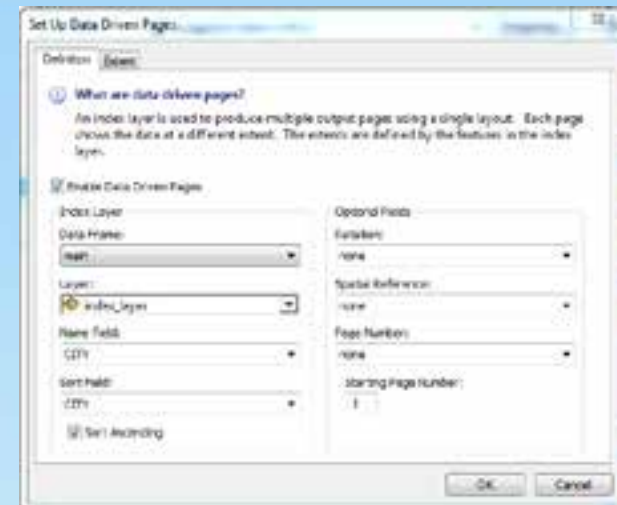
Overlaid on the map is the "Set Up Data Driven Pages" dialog box. The "Definition" tab is active, showing the following settings:

- What are data driven pages?**
An index layer is used to produce multiple output pages using a single layout. Each page shows the data at a different extent. The extents are defined by the features in the index layer.
- Enable Data Driven Pages
- Index Layer:** main
- Data Frame:** main
- Layer:** index_layer
- Name Field:** CITY
- Sort Field:** CITY
- Sort Ascending
- Optional Fields:**
 - Rotation:** none
 - Spatial Reference:** none
 - Page Number:** none
 - Starting Page Number:** 1

The dialog box has "OK" and "Cancel" buttons at the bottom. A "Data Driven Pages..." button is also visible at the bottom left of the dialog box.

DDP-Enabled Map Document Set-Up

- § Index layer – To produce multiple output pages using a single layout
- § Map extent – Defined by the features in the index layer
- § Layer page definition query – Features can be filtered using current data driven pages.
- § Dynamic text – To change page titles, labels, etc. dynamically



Python Script

§ Import arcpy.mapping module

- *Import arcpy*

§ Set up workspace and map document

- *arcpy.env.workspace, arcpy.mapping.MapDocument*

§ Loop for generating maps of 197 jurisdictions

- *for pageNum in range (1, mxd.dataDrivenPages.pageCount + 1):*

§ Manipulate layer visibility

- *if...elif...lyr.visible = True*

§ Export map to image file and combine multiple files into a single file

- *arcpy.mapping.ExportToPDF, finalPDF.appendPages*

CONCLUSIONS

Benefits of Automated Mapping Workflow

- § It makes work easier.
 - By setting up the proper sequence of tasks
- § It makes mapping task faster.
 - By speeding up repetitive map production and compilation tasks
- § It makes mapping task more accurate and consistent.
 - By using same sequence of tasks and consistent map document format

Thank you!

Jung H. Seo

Southern California Association of Governments
seo@scag.ca.gov

