

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

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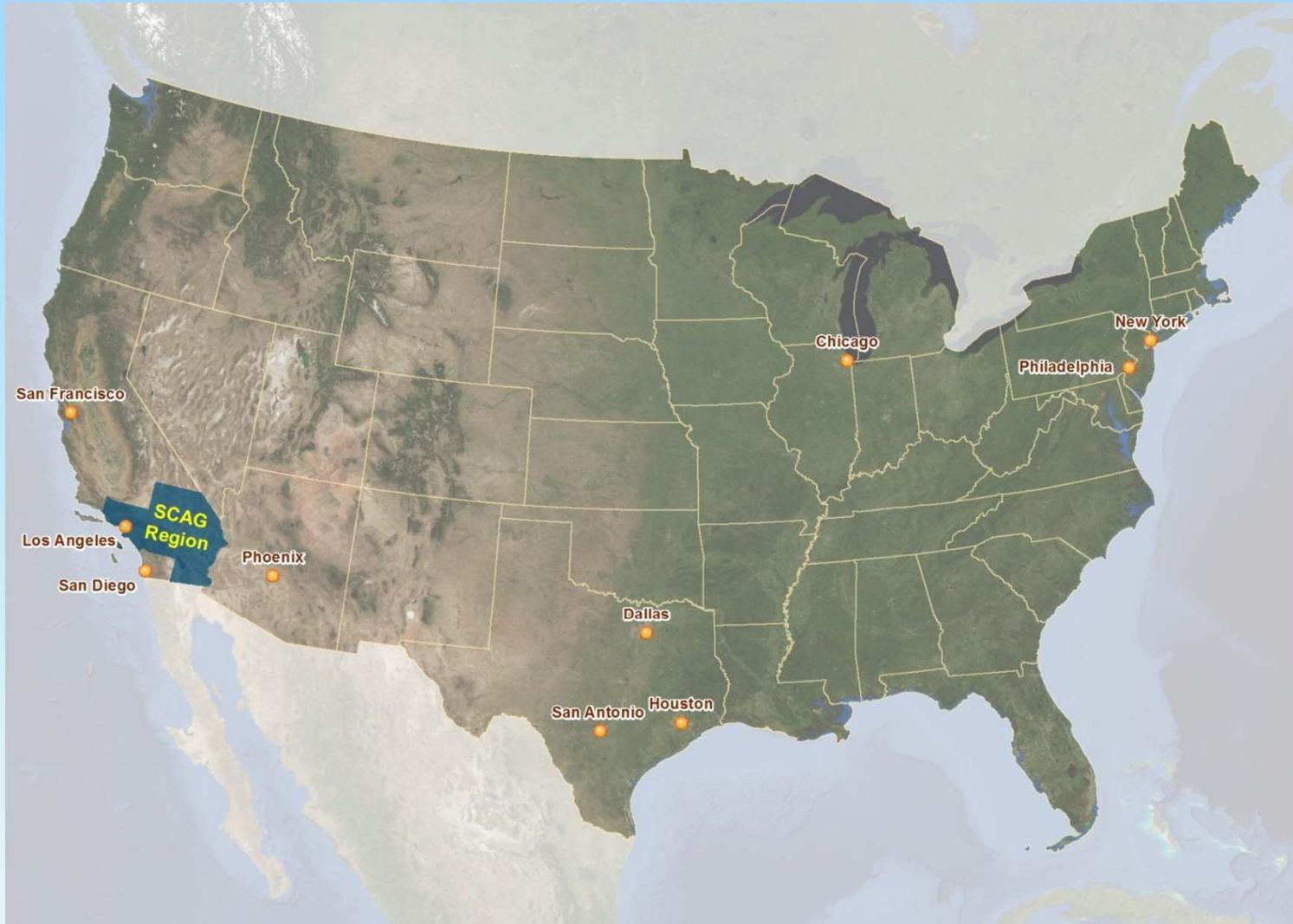
Research & Analysis

Southern California Association of Governments

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Southern California Association of Governments (SCAG)



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Nation's largest Metropolitan Planning Organization (MPO)

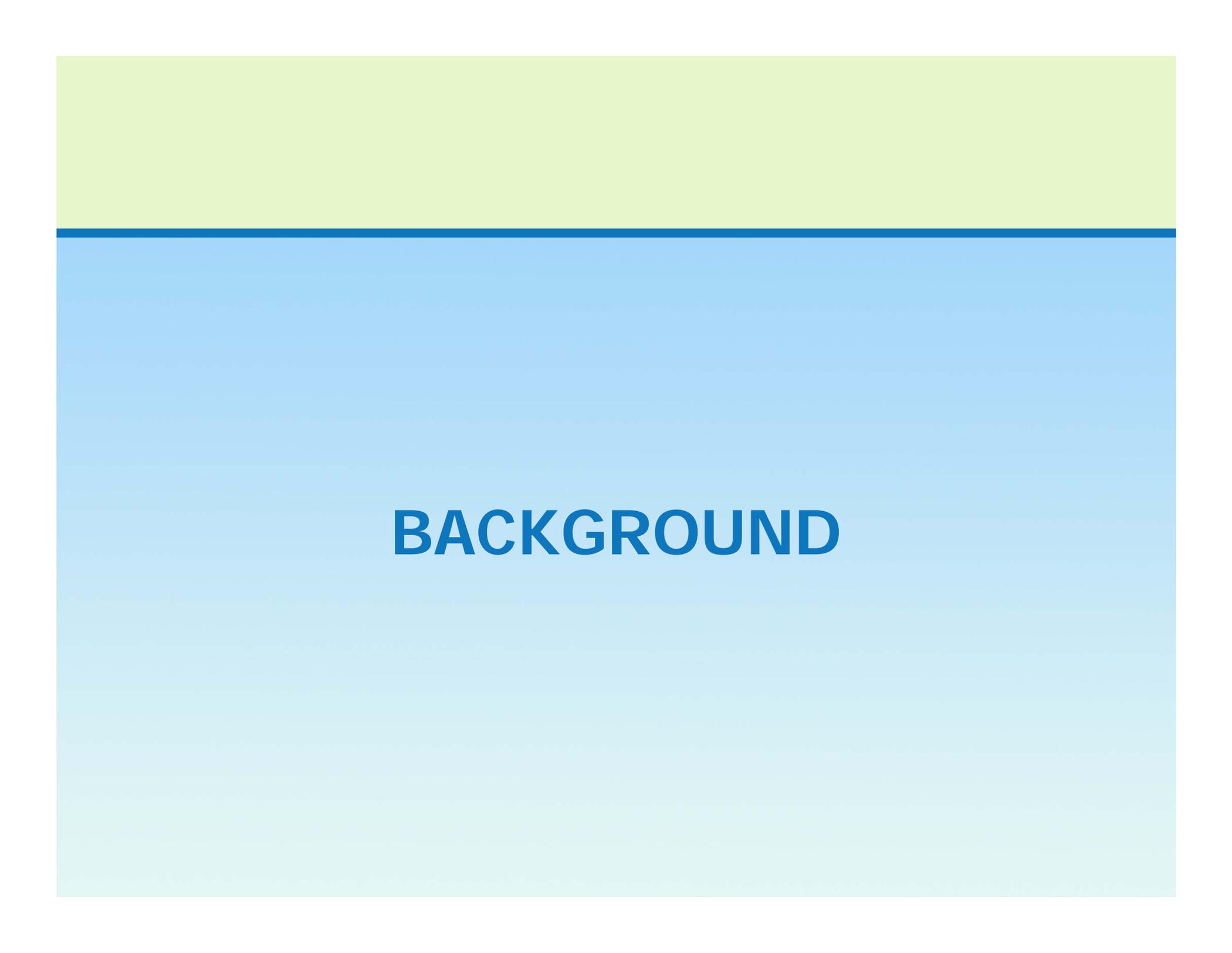
6 counties and 191 cities

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 (SCS) and Climate Protection Act
 - Integration of transportation, land use, housing and environmental planning to meet the regional GHG emission reduction targets
 - Requirements for land use, resource areas and farmland information
 - 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, resource areas datasets and socioeconomic growth forecast information
 - 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.*)

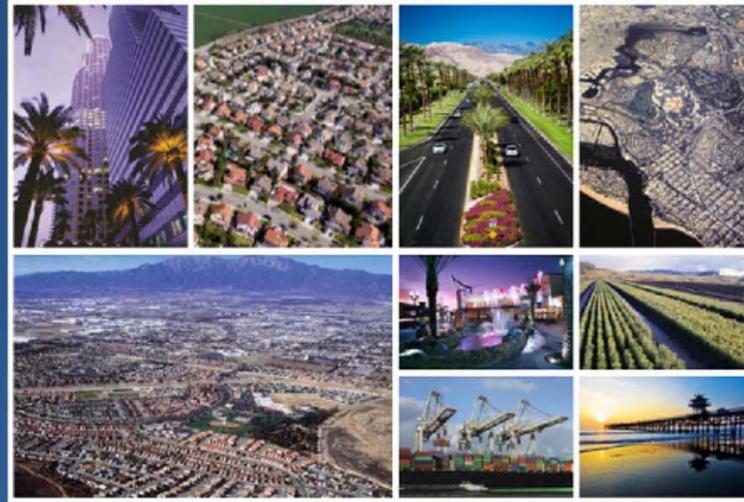
- Key stages of the SCAG's Local Input Process
 - Stage 1 – Preliminary land use and resource areas data collection and review
 - Released ***SCAG Map Book*** in Aug. 2013
 - Stage 2 – Review of land use, resource areas and socioeconomic data
 - Released ***SCAG Data/Map Book*** in Nov. 2013
 - Stage 3 – Land use scenario planning exercises
 - Scenario Planning Model (SPM)

SCAG Data/Map Book

- Development of land use, resource areas and socioeconomic datasets in preparation for 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
- Major Transit Stops and High Quality Transit Corridors
- Transit Priority Areas
- City boundary, sphere of influence, census tract, transportation analysis zone (TAZ)
- Socioeconomic data



Draft
SCAG Data/Map Book



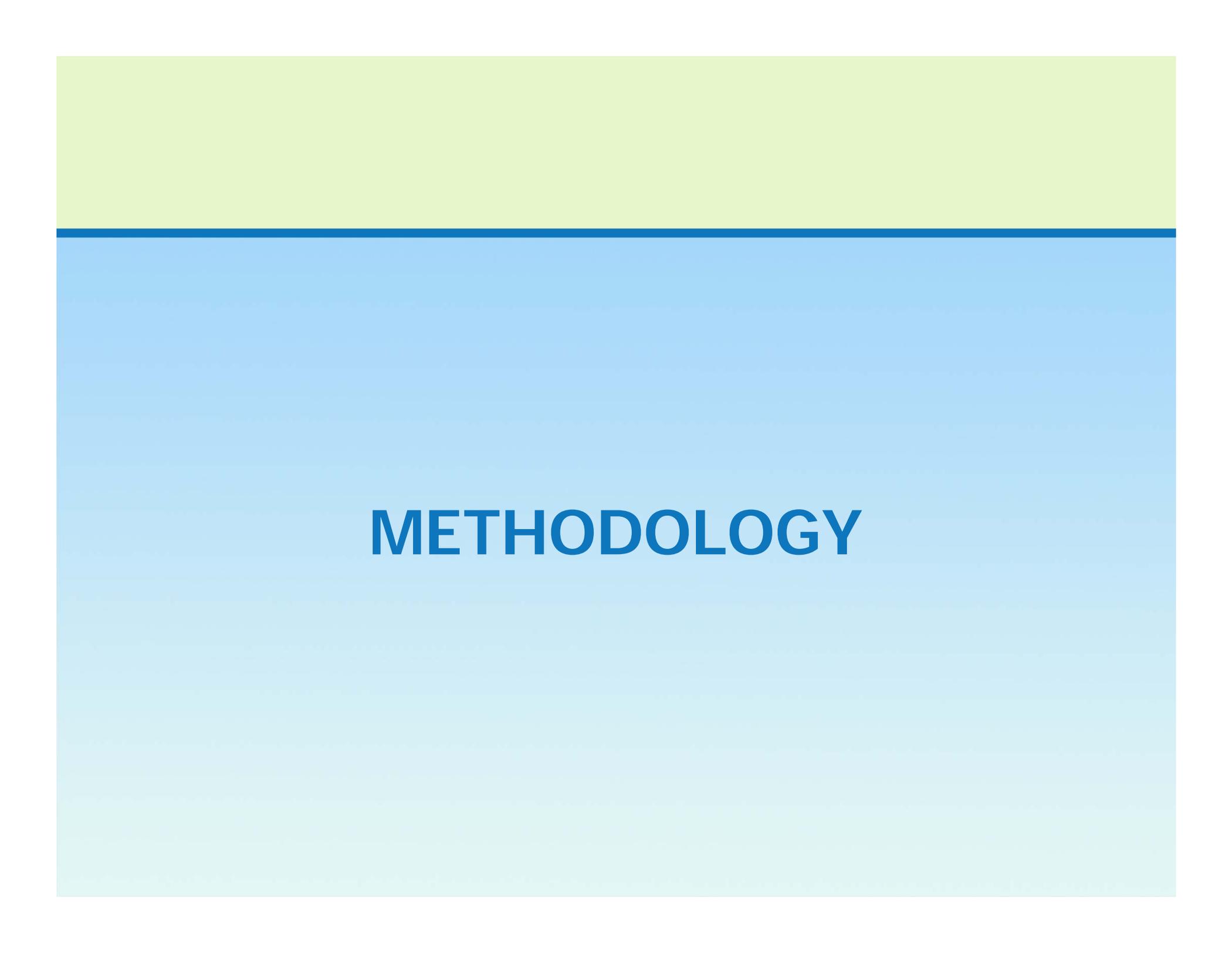
for the Development of 2016-2040 Regional Transportation Plan/
Sustainable Communities Strategy (RTP/SCS)

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
 - New functionality in ArcGIS 10 to create a series of maps from a single map document
 - Easy and Quick – no need to write code
- Python scripting module / Arcpy.mapping
 - Arcpy.mapping – a Python scripting module that is part of the ArcPy site package
 - Allows users to manipulate map contents and to automate map production
- Combining Data Driven Pages with Python scripting module

Using Data Driven Pages with Python

- Extends the capabilities of Data Driven Pages
 - Data Driven Pages does not provide enough functions for complicated map books.
 - Powerful Python scripts enables users to automate the redundant map book and map compilation
- Save Python code by using Data Driven Pages-enabled map document.
 - Data Driven Pages set-up for page extents, map scales, dynamic text, and so on
- Enable users to create complicated map books in more efficient manner.

Data Driven Pages-Enabled Map Document

GP_Landscape.mxd - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:54,710 60%

index_layer Snapping Labeling

Table Of Contents

- main
 - index_layer
 - city_boundary_scag_2012
 - freeways
 - GeneralPlan_poly_IM_2011
 - GeneralPlan_poly_LA_2011
 - GeneralPlan_poly_OR_2011
 - GeneralPlan_poly_RV_2011
 - GeneralPlan_poly_SB_2011
 - GeneralPlan_poly_VN_2011
 - street labels
 - city clip
 - Basemap

Page and Print Setup

Printer Setup

Set Up Data Driven Pages

Definition Extent

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

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

OK Cancel

Data Driven Pages... OK Cancel

Land Use in City of Garden Grove

Legend

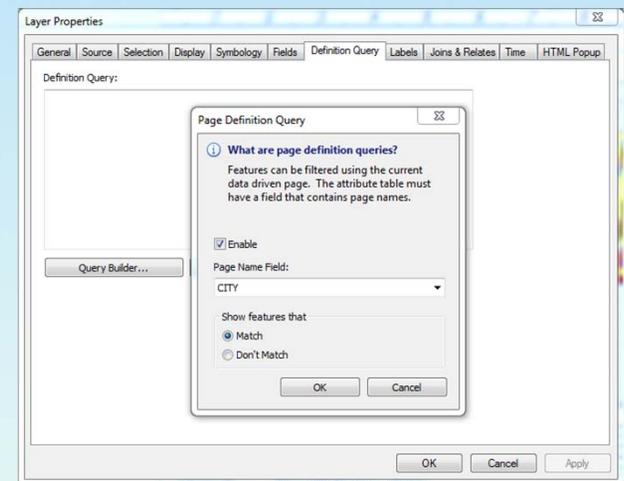
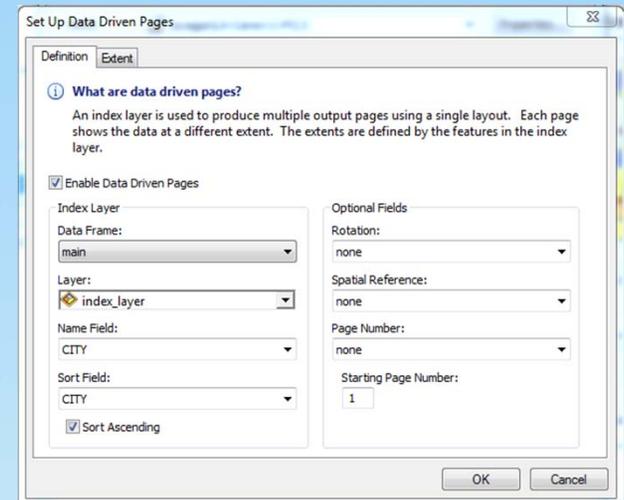
- Transportation, Communications, and Utilities
- Mixed Commercial and Industrial
- Mixed Residential and Commercial
- Open Space and Recreation
- Agriculture
- Vacant
- Water
- Specific Plan
- Undevelopable or Protected Land
- Unimproved

Garden Grove Page Text

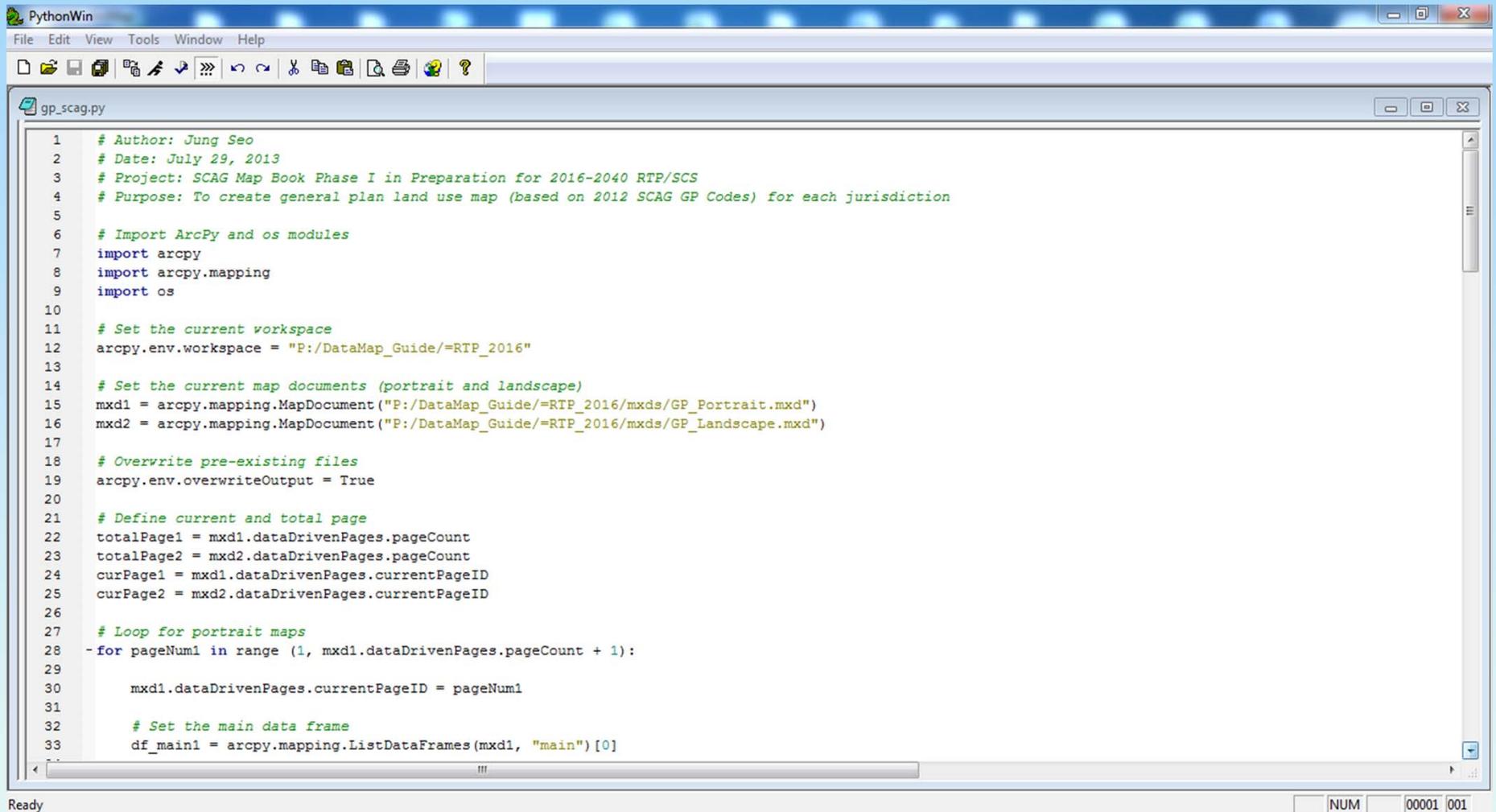
-2.38 0.27 Inches

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 and Arcpy.mapping



```
PythonWin
File Edit View Tools Window Help
gp_scag.py
1 # Author: Jung Seo
2 # Date: July 29, 2013
3 # Project: SCAG Map Book Phase I in Preparation for 2016-2040 RTP/SCS
4 # Purpose: To create general plan land use map (based on 2012 SCAG GP Codes) for each jurisdiction
5
6 # Import ArcPy and os modules
7 import arcpy
8 import arcpy.mapping
9 import os
10
11 # Set the current workspace
12 arcpy.env.workspace = "P:/DataMap_Guide/=RTP_2016"
13
14 # Set the current map documents (portrait and landscape)
15 mxd1 = arcpy.mapping.MapDocument("P:/DataMap_Guide/=RTP_2016/mxds/GP_Portrait.mxd")
16 mxd2 = arcpy.mapping.MapDocument("P:/DataMap_Guide/=RTP_2016/mxds/GP_Landscape.mxd")
17
18 # Overwrite pre-existing files
19 arcpy.env.overwriteOutput = True
20
21 # Define current and total page
22 totalPage1 = mxd1.dataDrivenPages.pageCount
23 totalPage2 = mxd2.dataDrivenPages.pageCount
24 curPage1 = mxd1.dataDrivenPages.currentPageID
25 curPage2 = mxd2.dataDrivenPages.currentPageID
26
27 # Loop for portrait maps
28 - for pageNum1 in range (1, mxd1.dataDrivenPages.pageCount + 1):
29
30     mxd1.dataDrivenPages.currentPageID = pageNum1
31
32     # Set the main data frame
33     df_main1 = arcpy.mapping.ListDataFrames(mxd1, "main")[0]
```

Ready NUM 00001 001

Python Script

- Import arcpy.mapping module
 - *Import arcpy*
- Set up workspace and map document
 - *arcpy.env.workspace, arcpy.mapping.MapDocument*
- Loop for generating maps for 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 Using Python Scripting in ArcGIS

- 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!

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