Advanced Business Environment Analysis

Identifying opportunities with advanced thematic mapping and data analysis

—by Fred L. Miller

Introduction

Problem

Janice Brown and Steven Bent plan to open a new home center in the Minneapolis-St. Paul area. The center, called *Living in the Green Lane,*[1] will offer a variety of environmentally friendly building products, home improvement products, and construction technologies.

To develop a business plan for this enterprise, Janice and Steven must analyze the market environment in the Twin Cities area to determine if this area will support such an enterprise. This analysis involves seeking green customers, identifying potential competitors, examining transportation patterns, and pinpointing retail centers that draw consumer traffic.

Janice and Steven have discovered that "green" customers tend to have higher levels of income, education, and home value than the general population of the United States. They wish to determine if the distribution of these households and their proximity to competitors and retail centers will support their retail concept. They have directed you, in your capacity as the firm's business geographic information system (GIS) analyst, to use GIS resources to explore these questions to determine if the Minneapolis-St. Paul market area will support their business plan.

Specifically, you will create customized datasets for color-coded mapping, extract and display map layers for competitors and shopping centers, and use smart map and dynamic ring tools to identify potentially attractive locations for the first *Living in the Green Lane* store.

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[1] The organizations and people in this SpatiaLAB are fictional. Any resemblance to actual individuals or organizations is coincidental.

Keywords: marketing; business GIS; business; environmental scanning; thematic mapping; geodemographics; demographic; color-coded mapping; point layer symbology

Location

Minneapolis-St. Paul core-based statistical area

Time to complete the lab

Four to six hours

Prerequisites

An understanding of the importance of environmental scanning in the process of developing marketing strategy

Access to Esri Business Analyst™ Desktop Premium 10

Data used in this lab

- Demographic and consumer spending data at various levels of geography
- Major highways and streets
- Business listings
- Shopping center listings

Student activity

In the context of a new entrepreneurial enterprise, environmental scanning assesses the consumer and competitive characteristics of a market area to determine its ability to sustain the enterprise profitably. In the case of a new physical retail operation such as *Living in the Green Lane*, this process involves two core questions. First, is there a substantial potential market for the firm's products and services? Second, will the competitive environment in the market support a new retail operation?

For a traditional retailer in a modern urban environment, these questions are intrinsically spatial. The service area for the enterprise is geographically constrained. Groups of target market households and spending on the firm's products and services are distributed unevenly across the market area. The transportation infrastructure in the market area makes some areas more convenient to shoppers than others. Finally, the location and size of retail attractors (shopping centers and malls) and competitors (retailers selling similar goods) create opportunities and threats in the competitive environment.

In their initial research, Janice and Steven have discovered several segments of green consumers, some of whom are motivated by environmental concerns and others who require rapid payback of investments in green technologies from energy savings. They believe the most attractive segments will be True Blue Greens, who are largely in the first category, and Greenback Greens who are in the second (Schaefer 2007). Demographically, these segments are characterized by higher levels of income, education, and home value than the general population in the United States (Kannan 2007). Thus, these will be the demographic characteristics Janice and Steven will use in their evaluation of the market environment for *Living in the Green Lane.*

Your charge is to identify geographic clusters of potential customers in the *Minneapolis-St. Paul core-based statistical area (CBSA)* who meet this combination of characteristics and to map the locations of competitors and retail attractors relative to these clusters and to transportation infrastructure. Specifically, you will use these tools to

- Extract demographic data to create a dataset customized to your research project.
- Calculate new attribute fields and use layer properties to design color-coded maps based on them.
- Map shopping centers and competing home centers to assess the competitive environment.
- Use smart map technology to identify attractive regions in the Twin Cities area.
- Use dynamic ring technology to find at least two potential locations for *Living in the Green Lane*'s first store.
- Use site evaluation technology to order reports for these locations.

At the conclusion of this lab, you may be required to submit written answers to the questions in this exercise or prepare a written project that covers both the basic and advanced labs focusing on business environment analysis.

Conventions used in the data

CBSA Core-based statistical area

CY Current-year data

FY Future-year projections, which are five years beyond the current year
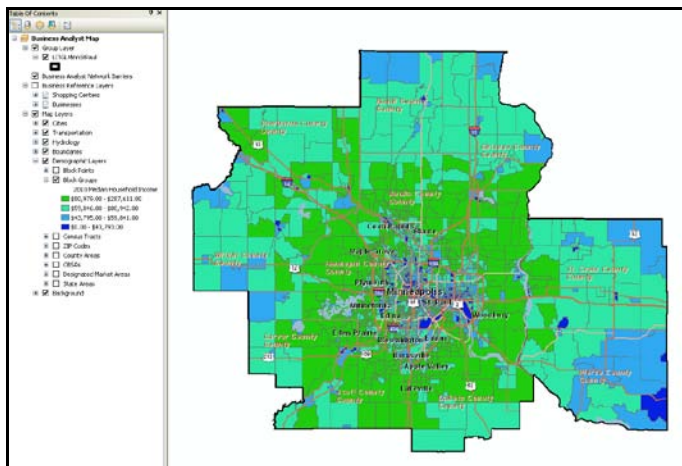
HH Household

Prepare your workspace

This lab uses Business Analyst™ Desktop Premium 10 to perform the analysis. To prepare for it, you should confirm that this software is available on your workstation.

CREATE A CUSTOMIZED DATA SOURCE AND USE IT TO MAP HOUSEHOLD INCOME

While standardized data is very useful in environmental scanning, it is often necessary to create customized datasets and to calculate new feature attributes. In this case, you will do so to explore *Living in the Green Lane*'s business environment more fully.

1   If you have not already done so, copy the *LITGL Minneapolis St Paul* project folder to the *C:\My Output Data\Projects* folder on your hard drive.

2   Click *Start » Programs » ArcGIS » Business Analyst » BusinessAnalyst.mxd* to run ArcMap™, load *Business Analyst Extension*, and then load *Business Analyst Desktop Message Center*.

3   Click *LITGL Minneapolis St Paul* under *Recent Projects* to select this project and load the *Business Analyst* default map.

4   Click *File » Open.* Navigate to *C:\My Output Data\Projects\LITGL Minneapolis St Paul\CustomData\ChapterFiles\Chapter3\LITGLBusinessPlan.mxd*. Click the map file to open it.

The initial map resembles this one:

This is a thematic map of *Median Household Income* in the Minneapolis-St. Paul area. However, the classification scheme is based on a national distribution of the data. To view characteristics of block groups within the target area, you wish to define quartile groups based only on that area rather than on national distributions. To achieve this goal, you will create a new shapefile containing only the block groups in this area and only the attributes you wish to include in this analysis. This solution will also allow you to aggregate the home-related expenditure categories you identified above. You will also apply this approach to educational attainment attributes to customize a new attribute to display on a thematic map.

5   Open the *Layer Properties* window for the *Block Groups* layer. Click the *Fields Visibility* tab. This box designates the attributes that will be visible for each feature. By default, all the attributes in the dataset are displayed. These are listed in the *Visible fields* box on the right.

6   Click the double left arrow button to move them all to the *Invisible fields* box on the left.

7   Press the *CTRL* key and select attributes from the list on the left by clicking them.

   The *CTRL* and click combination allows you to select multiple attributes individually. The *SHIFT* and click option allows you to select a range of adjacent attributes by clicking the first and last attributes in the list. Remember that the CY designation in the attributes below refers to the current-year data in your software installation, while FY refers to future-year projections.

8   When you have selected the attribute or attributes you want, click the single right arrow to add them to the *Visible fields* list.

   Careful—If you click the double right arrow, you will move all attributes to the* Visible fields *list. If that occurs, reverse this operation and repeat the selection process.

9   Click the *Manage* button below the *Used Saved Variable List* option to open the *Manage Lists* box. Select *LITGLIncEdOwnExp* from this list and click *Apply*.

10 Confirm that the attributes in the list below are now included in the *Visible fields* list and then click *OK* to close the box. If you wish, open the attribute table to verify that the following attributes are the only ones displayed:

- *OBJECTID*
- *SHAPE*
- *ID*
- *CY Total Households*
- *CY Average Household Size*
- *CY Total Housing Units*
- *CY Owner Occupied HU*
- *CY Renter Occupied HU*
- *CY Median Age*
- *CY Pop Age 25+ Educ Attain Base*
- *CY Pop Age 25+ by Educ: Assoc Deg*
- *CY Pop Age 25+ by Educ: Bach Deg*
- *CY Pop Age 25+ by Educ: Grad Deg*
- *CY Median HH Income*
- *CY Median Value: Owner HU*
- *FY Total Housing Units*
- *FY Owner Occupied HU*
- *FY Renter Occupied HU*
- *Dominant Tapestry Code*
- *Home Imp Services-Own & Rent: Tot*

- *Home Imp Materials-Own & Rent: Tot*
- *Major Appliances: Tot*
- *Small Appliances: Tot*
- *Lawn and Garden Tot*
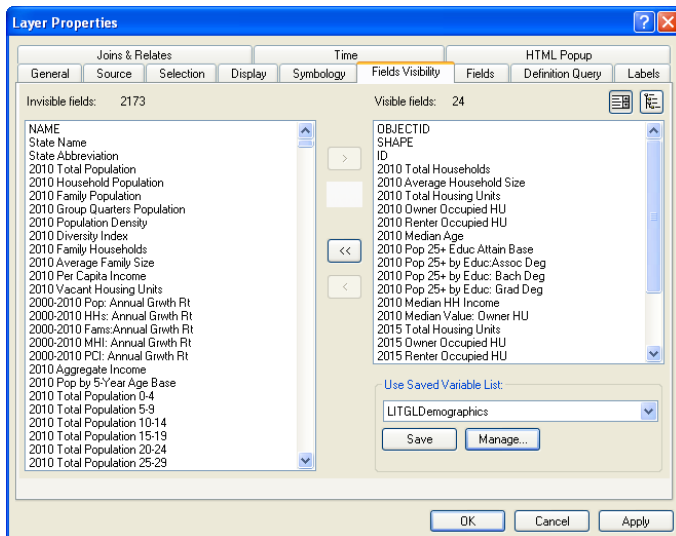
11 Click the *OK* button. You have now designated the attributes for the new dataset.

DESIGNATE FEATURES

You will use a *Select by Location* operation to designate the features.

1 On the menu bar, click *Selection* and then *Select by Location* to open the *Select by Location* dialog box.

2 Select the necessary options to specify that you wish to select features from *Block Groups* that have their centroid in features in the *LITGLMinnStPaul* layer.

3 Click *OK* to close the box and select all the block groups in the *LITGLMinnStPaul* layer.

The map now resembles the one below, with all the block groups displayed as being selected:
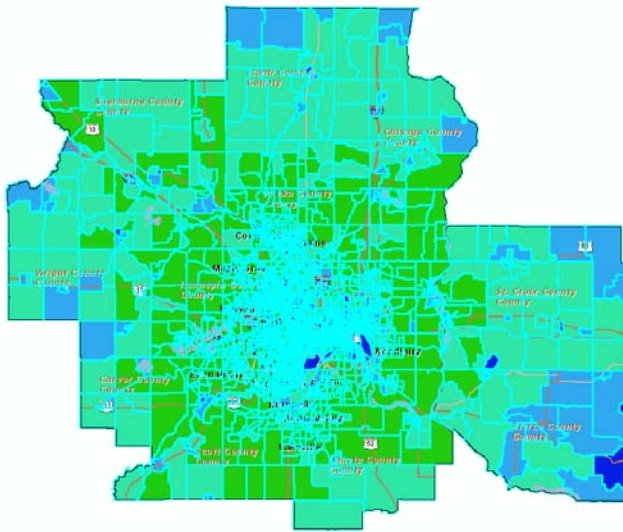
4   Right-click the *Block Groups* layer and click *Open Attribute Table*. When the table opens, notice that it displays only the attributes you designated. Further, the text at the bottom of the table lists the number of selected features.

5   Click the selected button to display only those features. This is the combination of features and attributes you wish to include in the new shapefile. Use the button at the top right of the box to close the attribute table.

6   Right-click *Block Groups layer*, click *Data*, and then click *Export Data* to open the *Export Data* dialog box. In the *Export* box, select *Selected features*. Select the same coordinate system as the layer's source data option.

7   Click the *Output feature class* browse (yellow folder) icon, navigate to the *C:\My Output Data\Projects\LITGL Minneapolis St Paul\Custom Data\ChapterFiles\Chapter3* folder, enter **BGIncEdOwnExp.shp** as the file name, and select *Shapefile* in the *Save as Type* box.

**8**   Click *Save*. The *Export Data* dialog box should resemble this:
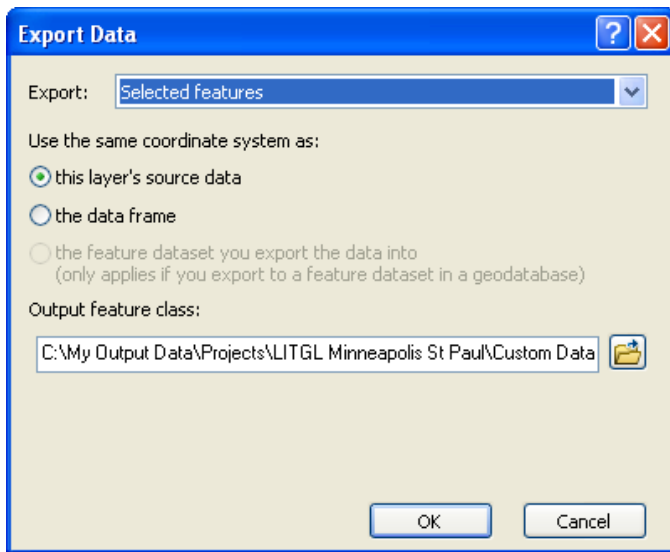
9   Click *OK* to export the selected features and attributes to a new shapefile in the designated folder. Respond *Yes* when given the opportunity to add it to the map as a layer.

MOVE NEW LAYER

The new layer is added at the top of the data frame. You will move it to a better position in the *table of contents* and use it to create a new thematic map displaying the distribution of median household income by quartiles in the Twin Cities area.

1   Confirm that the *List by Drawing Order* button is clicked in the bar at the top of the *table of contents*. Click and drag the *BGIncEdOwnExp* layer down to the first position in the *Demographic Layers* group layer in the *table of contents*.

2   On the menu bar, click *Selection*, and then click *Clear Selected Features* to remove the block group selection.

3   Open the *Layer Properties* window for the *BGIncEdOwnExp* layer.

4   Click the *Symbology* tab. Reproduce the quartile classification settings (*Quantile* classification with four classes) for the household income thematic map you created below. The *Symbology* tab should look like this:
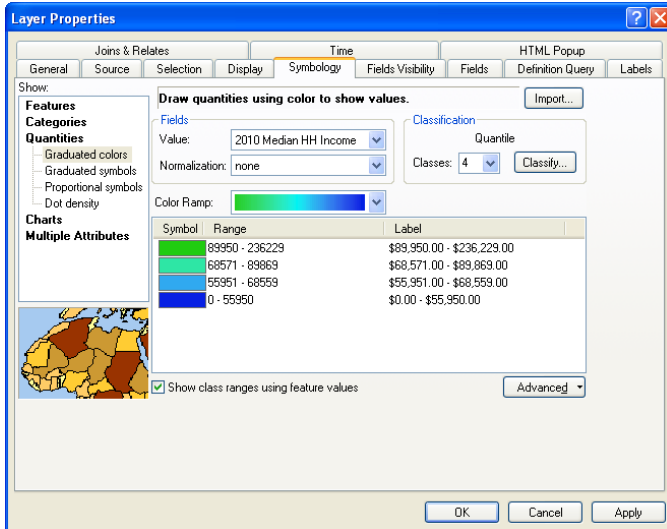
5   Click the *General* tab and enter **Median HH Income by Block Group** as the map title.

6   Click *OK* to close the *Layer Properties* window and apply the settings to the map, which should resemble this:
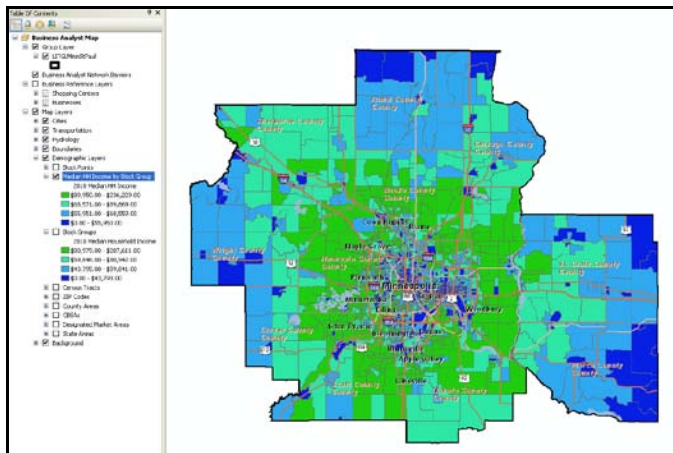
Compare this map to the household income map based on the *Block Groups* layer. Block groups are more evenly assigned to classes, and classification values are different, reflecting a classification scheme calculated solely from Twin Cities area data. This map is more useful to you in identifying the concentrations of upper-income households associated with the green customer profile.

7   Save this layer as a layer file, **BGHHIncome.lyr**, in *C:\My Output Data\Projects\LITGL Minneapolis St Paul\Custom Data\ChapterFiles\Chapter3*.

8   Use the *Save As* command to save your map file as ***LITGLBusinessPlan2.mxd*** in the same chapter 3 folder to preserve your work.

CREATE AND CALCULATE NEW FIELDS FOR THEMATIC MAPPING

This *Median Household Income* map is based on a single data attribute. However, the characteristic of educational attainment is not captured in a single attribute but dispersed over a range of related attributes. This is also true for home-related expenditures, which you also wish to display in a single thematic map. Thus, you must perform calculations involving multiple attributes to produce the required values. To do so, you will add fields to your new shapefile and calculate the attributes required for these maps.

1   Right-click the *Median HH Income by Block Group* layer and then click *Open Attribute Table* to open the layer's data table.

2   Click the *Table Options* button and then click *Add Field* to open the *Add Field* dialog box.

3   Enter ***TotCollDeg*** (total college degrees) in the *Name* field and select *Double* as the data type. When your screen resembles the one below, click *OK* to create the field and close the dialog box.
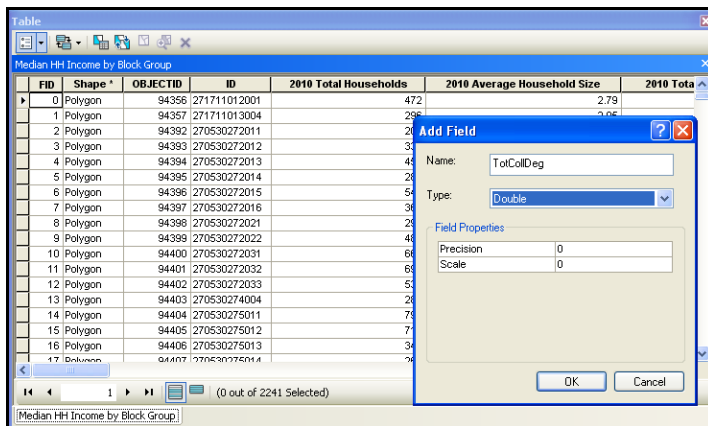

4   Repeat this procedure to create a second new field, ***TotHmReExp*** (total home related expenditures) with a *Double* data type.

5   Scroll to the far right of the attribute table, where you will find the new fields with values of *0* for all features. You will use these fields to calculate the correct values for each block group in the dataset.

6   Right-click the *TotCollDeg* label at the top of that field's column and then click *Field Calculator*. Click *Yes* to the message about calculating outside an edit session. The *Field Calculator* box opens.

The *Field Calculator* box allows you to create an expression that will calculate the values in the new field for each block group. You wish to calculate the total number of people over age 25 with a college degree in each block group. To do so, you must sum the number of people with associate, bachelor, and graduate/professional degrees. You will use the *Field Calculator* box to build this expression.

7   Double-click the *EDASSC_CY* field to add it to the expression. Click the plus (*+*) button (or press the *+* key on your keyboard) to add the operator. Double-click *EDBACH_CY*, click *+*, and double-click *EDGRAD_CY*.

These attributes contain the number of people 25 or older with associate, bachelor, and graduate/professional degrees.

8   When the expression resembles the one below, click *OK* to calculate the values and add them to the attribute table.
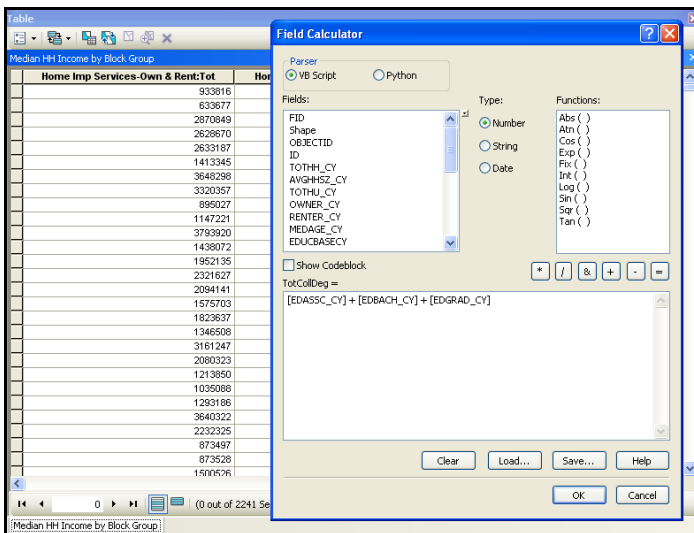
9   Repeat this process on the *TotHmReExp* field, using the *Field Calculator* to build the following expression for this attribute:

`[X4060_X] + [X4080_X] + [X4009_X] + [X3047_X] + [X3048_X]`
(These are the five expenditure categories you designated in the shapefile.)

10 Click *OK* to calculate the field and then close the attribute table.

The calculated fields are ready for use in thematic mapping and other operations. However, the field names are a bit cryptic and may not convey their contents to other users. You will add aliases for both fields to clarify their contents.

11 Open the *Layer Properties* box for the *Median HH Income by Block Group* layer and then click the *Fields* tab. Scroll to the bottom of the attribute list to find the two new fields. Note that the values for *Name* and *Alias* are identical.

12   Click in the *Alias* field for the *TotCollDeg* attribute and enter **CY** (the year of your data) **Total College Degrees**.

13   Repeat this procedure to enter **CY Total Home Related Expenditures** as the alias for the *TotHmReExp* attribute. When you have made these revisions, click *OK*.

The aliases are added to the new fields and will now be displayed at the top of the fields in the attribute table and in the field list on the *Symbology* tab. If you wish to see the *Alias* fields, open the layer's attribute table and scroll to the far right. The new fields may now be displayed in thematic maps.

CREATE MAPS OF EDUCATIONAL ATTAINMENT AND HOME-RELATED EXPENDITURES

The new fields in the shapefile allow you to produce thematic maps depicting *Educational Attainment* and *Home Related Expenditures* both in total and normalized with the proper field for each attribute.

1   Open the *Layer Properties* window for the *Median HH Income by Block Group* layer. Click the *General* tab and enter **Educational Attainment by Block Group** in the *Layer Name* box.

2   Click the *Symbology* tab and click the *Quantities* tab at the left of the *Symbology* screen. Select *CY Total College Degrees* as the *Value.* Click *Apply* to apply the settings and display the thematic map.

The map refreshes behind the *Layer Properties* window to display the new settings. Each block group is now displayed in a color that represents the number of people over 25 in the block group who hold a college degree. Though this is useful, you are more interested in comparing the percentages of people with college degrees by block group.

To do so, you will normalize the thematic map as you did above, using the attribute *CY Pop25+ Educ Attain Base*. This attribute reports the number of people in the block group who are 25 and older and is the value to which all the individual educational attributes add up.

3   Select *CY Pop25+ Educ Attain Base* as the *Normalization* field. Note that the ranges and labels now change to decimals. To display these values as percentages, click the *Label* button just above the decimal values, and then click *Format Labels* to open the *Number Format* window.

Do not click the **Labels** *tab on the* **Layer Properties** *dialog box. If you do so in error, click the* **Symbology** *tab to return to the correct tab.*

4   Select the *Percentage* option in the *Category* box and select *The number represents a fraction* option*.* Adjust it to show a percentage option and click *Numeric Options*. In the resultant box, designate *Number of decimal places* as *1*, and then click *OK* twice.

5   Check the *Show class ranges using feature values* check box near the bottom of the *Symbology* window. Confirm that *Classification* is set to *Quantile* with *4* classes.

6   When the tab resembles the one below, click *OK* to close the window, apply the new settings, and refresh the map.
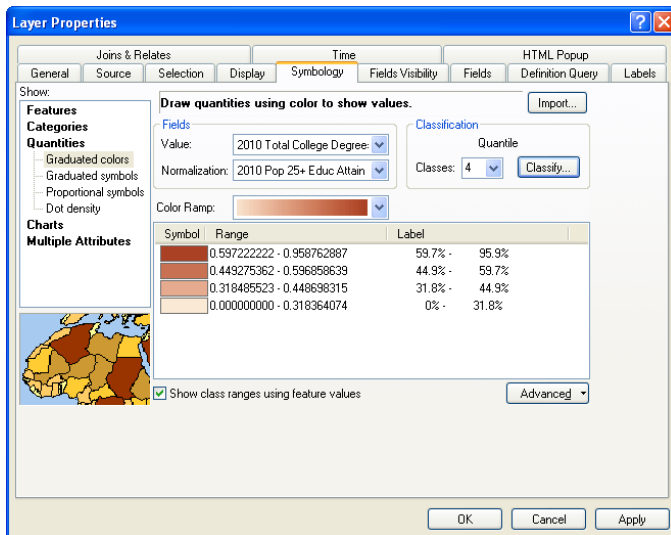
7   Right-click the *Educational Attainment by Block Group* layer, click *Save as Layer File*, and save the file as **BGEdAttain.lyr** in *C:\My Output Data\Projects\LITGL Minneapolis St Paul\CustomData\ChapterFiles\Chapter3*.

You have now designed maps for each of the major population characteristics of the green customer profile. You will complete the thematic mapping task with a map that displays average household expenditures on home-related products and services by block group.

8   Repeat step 1 above by entering **Home Related Expenditures per HH by Block Group** in the *Layer Name* box of the *General* tab and duplicating the settings in the graphic below on the *Symbology* tab. Be sure to select a new color scheme.

9   Click *OK* to apply the settings and display the *Home Related Expenditures per HH by Block Group* thematic map.
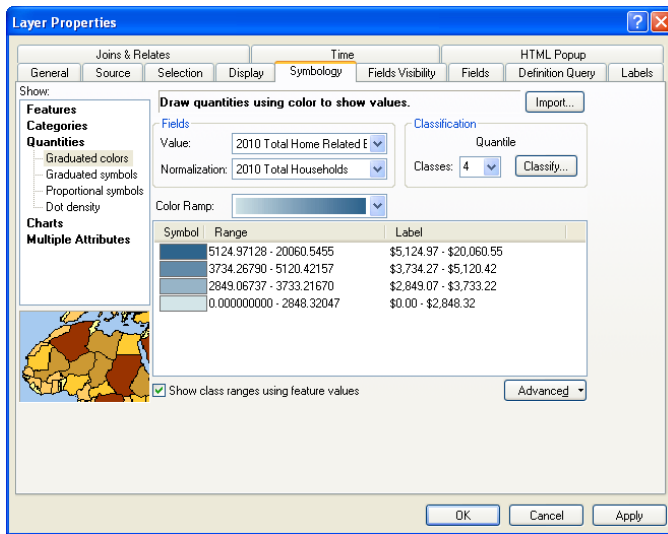
10 Right-click the layer, click *Save as Layer File*, and save the file as ***BGHomeExpHH.lyr*** in *C:\My Output Data\Projects\LITGL Minneapolis St Paul\CustomData\ChapterFiles\Chapter3*.

11 To add any of the layer files you have created to the *table of contents*, click *Add Data*, navigate to *C:\My Output Data\Projects\LITGL Minneapolis St Paul\CustomData\ChapterFiles\Chapter3*, select the layers you wish to add, and click *Add*.

12 Turn the layers on and off in the *table of contents* to view the distribution of each attribute.

You now have a collection of layer files capturing different population characteristics and home-related spending patterns in the Twin Cities area. Use these maps to answer the following question in your project report:

Question 1: *What variations in median household income, educational attainment, and home-related expenditures per household do you observe in this study area? Which parts of the region are most attractive for Living in the Green Lane? Why?*

You will now create maps of retail shopping centers and competing home centers to display in conjunction with your thematic maps.

CREATE MAPS OF SHOPPING CENTERS AND COMPETING HOME CENTERS USING POINT FEATURES

Shopping centers and businesses are displayed as point features in GIS software. Successful retail shopping centers draw significant customer traffic to their locations, increasing their attractiveness as potential sites for *Living in the Green Lane*'s first store. Existing home centers, on the other hand, are direct competitive threats for sales. To advance your understanding of the Twin Cities business environment, you will display the location and relevant information about these point features on your map.

1   Adjust the layers in the *Demographic Layers* group layer to display your original thematic map of household income. Turn on the *Business Reference* group layer and the *Shopping Centers* layer. As this layer is scale dependent, you must zoom to the central region of the study area to display the *Shopping Centers* layer.

2   Continue zooming until this layer becomes visible. If you wish, toggle other map layers to make shopping center locations more visible. Your map should resemble this one, though it may be zoomed to a different region of the market area:
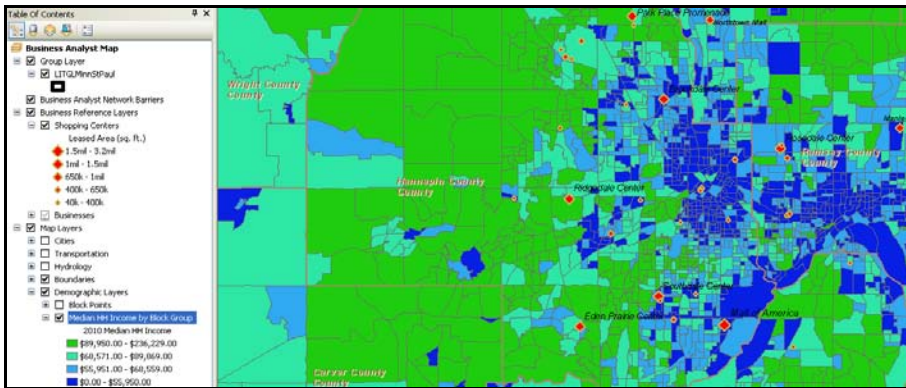

3   Expand the toolbar and click *Add Business Listings* to open the *Add Business Listings* window.

4   Enter **home centers** in the *Search* field, uncheck the *Company Name Only* and *Restrict by first* options, and enter **Home Centers** in the layer name field.

5   When your window matches the one below, click *Go* to perform the search.
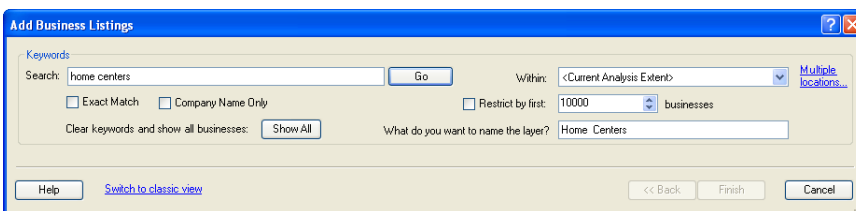
The search results are added to the window, with the selected features displayed in a table and a set of data filters displayed in a column to the left. Turning these filters on and off allows you to customize the business listings you wish to include in your analysis. You may select one option in each filter by clicking the name of that option or select multiple options by checking individual boxes.

6   Scroll down the filter list to *Type of Business (SIC)*. Check the *HOME CENTERS* check box for this filter.

7   When your settings match those in the image below, click *Finish* to add the selected listings to your map in a layer named *Home Centers*.
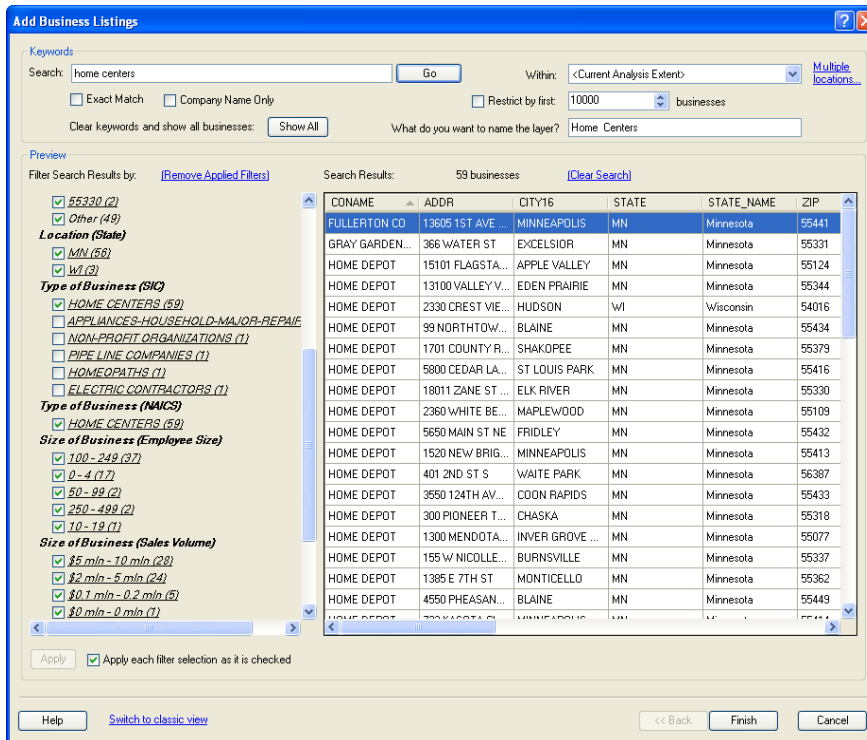

Janice and Steven believe that annual sales are the best measure of the competitive strength of a competing home center. You will adjust the symbology of the *Businesses* layer to reflect that information.

8   Open the *Layer Properties* box for the *Businesses* layer. Click the *Symbology* tab. In the *Show* box, select *Quantities* and *Graduated Symbols.* Select *SALES_VOL* in the *Value* box. Click *OK* if you see a *Maximum Sample Size* message.

9   Click the *Classify* button and choose *3* classes and a *Quantile* classification method. Click *OK*.

10 Click the *Template* button to open the *Symbol Selector* dialog box. Enter **House 2** in the search field at the top of the box and then click the *Search* (magnifying glass) button.

11 Scroll to the bottom of the resultant symbols to locate the *Business* category and the *House 2* symbol within it. Select it and set its color to *Red.*

The *Symbol Selector* dialog box should resemble the one below:
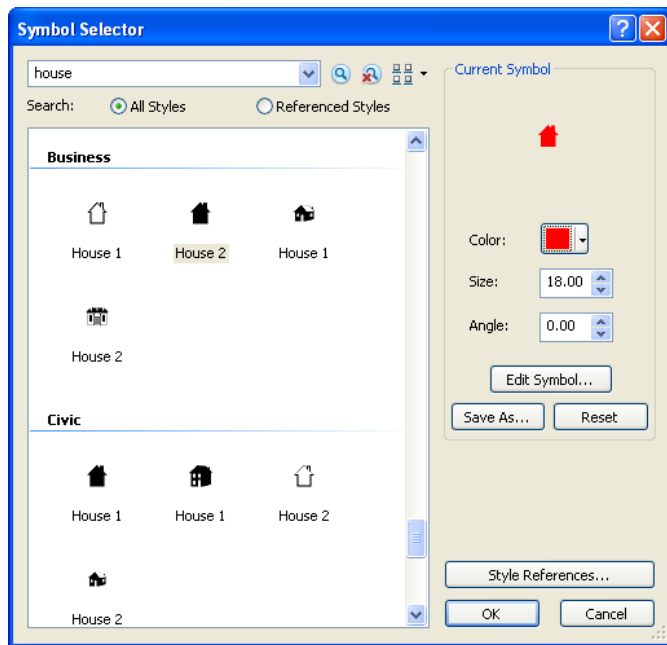
12　Click *OK* to return to the *Symbology* tab.

13　In the *Symbol Size* from and to boxes, set **12** and **18** as the low and high limits. Format data labels to currency and sort the symbols from large to small and the labels from high to low, with the largest symbols and highest values at the top of the legend.

14　 Check the *Show class ranges using feature values* option. Click the *General* tab and enter ***Home Centers by Sales in 000's*** in the *Layer Name* field.

15　Click *OK* to apply the settings and display the map. Zoom in to the center of the map until the *Shopping Centers* layer displays as well. Your map should resemble this:
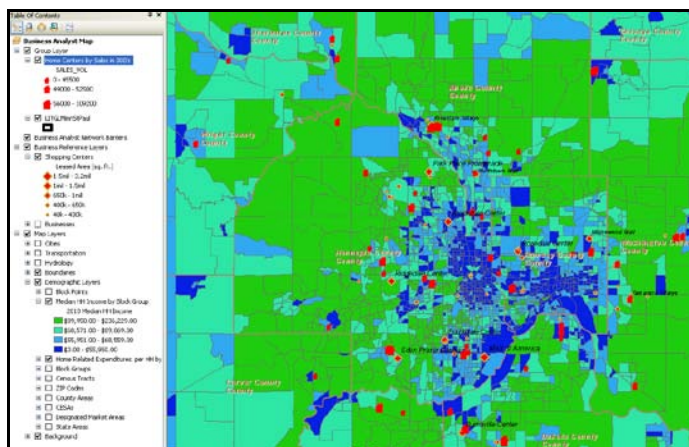
This map displays shopping centers by size of leased area and home centers by volume of annual sales. Integrating these layers with your thematic maps allows you to explore their locations and concentrations of attractive population characteristics simultaneously.

IDENTIFY ATTRACTIVE MARKET OPPORTUNITIES WITH SMART MAP TECHNOLOGY

Each of the thematic maps you have created communicates important information about concentrations of populations relative to one core demographic factor. Your target market, however, is defined by several factors. So your next step is to use smart map technology to seek out regions with households that meet several target market criteria simultaneously.

1   If necessary, turn the *Cities*, *Transportation*, and *Hydrology* layers off. Adjust layer settings so that *Home Related Expenditures per HH by Block Group* is the *only* demographic layer displayed.

2   Right-click this layer and click *Zoom to Layer* to adjust the display to this layer's extent.

3   To open the *Smart Map* tool, click the *Open Business Analyst Window* button on the main toolbar.

4   Click the *Smart Map* tab at the top of the window to open the *Smart Map* wizard and select *LITGLBlockGroupDemographics* in the *Layer name* field. You will find this layer by expanding the *Map Layers* category and expanding *Demographic Layers*. Your screen will resemble the image below:
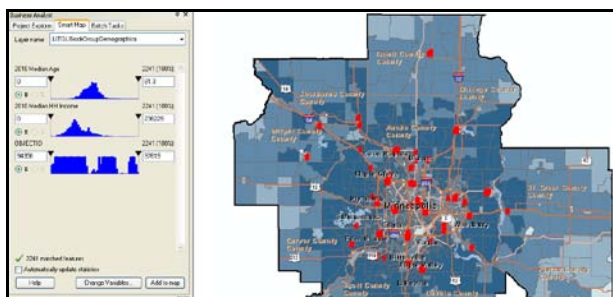

The window displays a list of attributes from the layer in the map. For each attribute, a distribution curve is displayed on a graph with small down arrows at each end. Moving these arrows adjusts the values of that attribute selected in the map. You define the selection range by moving the arrows across the graph.

The precise selection values these settings create are displayed in the text boxes to the left and right of the graph. The number and percentage of features selected with these settings are displayed in the upper right of each graph. The total number of features that meet the selection criteria for all attributes is displayed at the bottom of the window. The map also adjusts to display the selected features.

You will use this tool to identify block groups that match the income, spending, educational attainment, and home value characteristics of *Living in the Green Lane*'s target market.

5 Click the *Change Variables* button to open the *Select Fields* dialog box.

6 Remove the default selected fields and use the arrow buttons to add *CY Median HH Income*, *CY Median Value: Owner HU*, and *CY Total Home Related Expenditures* to the list on the right.

7 When your screen resembles the one below, click *OK*.
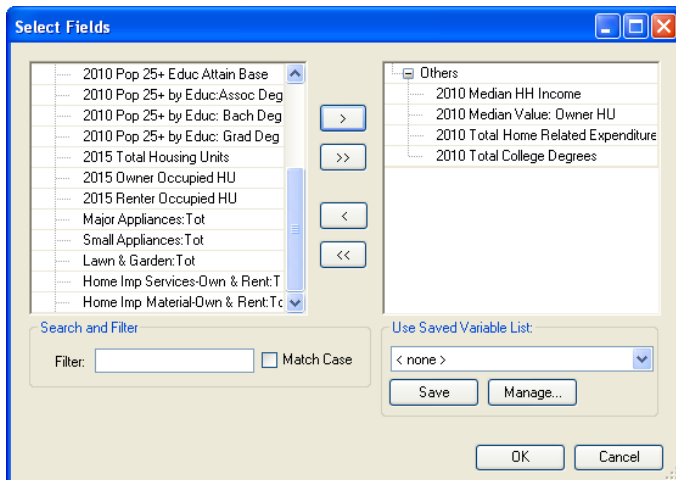
8 Adjust the left arrows for each attribute so that about 50 percent of Twin Cities block groups are selected in each category.

With this setting, the block groups in the top half of the distribution for each of the three attributes will be selected. Note that the map changes to display only the block groups that meet the criteria you define. Your screen should resemble the one below, though the exact percentages and number of selected block groups might vary with your settings.
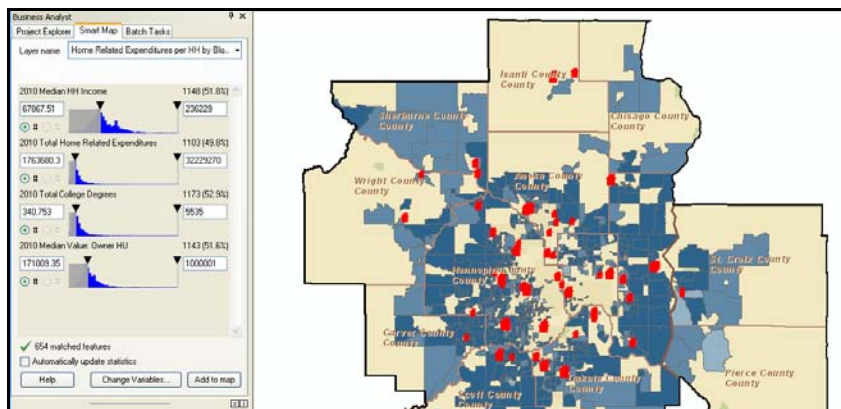
9 Click *Add to map* to add the selected block groups to the map as a separate layer. Slide all the arrows in the *Smart Map* window back to the left of each graph to restore the full layer.

10   Close the main window. Click *Smart Map Search Layer* at the top of the *table of contents* to add it to the map.

Review the *Smart Map Search Layer* relative to your other thematic maps. Use these maps to answer the following question in your project report:

Question 2: *Where in the Minneapolis-St. Paul CBSA are attractive households concentrated? Does this distribution offer concentrations of attractive customers sufficient to support the Living in the Green Lane concept? Why or why not?*

Having assessed the overall market potential for *Living in the Green Lane*, you must now determine if there are specific locations in the market area that would support the firm's first store.

IDENTIFY ATTRACTIVE LOCATIONS WITH DYNAMIC RING ANALYSIS, SITE PROSPECTING, AND SATELLITE IMAGERY

The tools covered in this task enable you to identify areas that appear attractive on a map, order reports that provide specific information about these areas, and examine them visually with satellite imagery. You will begin with dynamic ring analysis.

1   Click the *Open Business Analyst Window* button on the main toolbar.

2   In the *Favorites* icons at the bottom of the window, click the *Dynamic Ring Analysis* icon . This loads a graph displaying selected attributes on the left of the map.

3   Click the *Parameters* button at the bottom of the graph to load the *Dynamic Ring Analysis* wizard.

4   Select *Standard Business Analyst Data* in the data layer box. Remove the default fields from the *Please select the fields* box.

5   Using the drop-down menu in the *Please select the fields* box, select the following attributes and add them to the box:

- *CY Total Households*
- *CY Owner Occupied HU*
- *CY Pop Age 25+ by Educ: Assoc Deg*
- *CY Pop Age 25+ by Educ: Bach Deg*
- *CY Pop Age 25+ by Educ: Grad Deg*

The *Dynamic Ring Analysis* box should look like this:
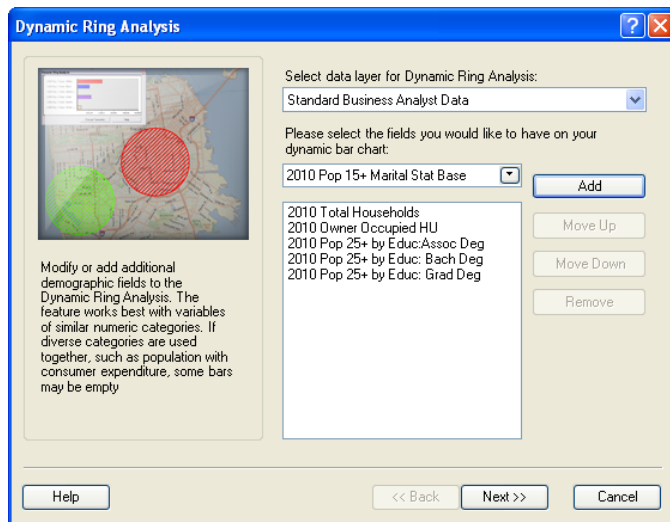
6   Click *Next*. In the resultant box, select the option *Set the threshold field and value*, select *Shelter:Tot* as the threshold field, and enter **150000000** ($150 million) as the threshold attribute.

This is the broadest measure of consumer spending on housing and includes a number of other expenditure categories relevant to *Living in the Green Lane*. Set *Radius* as **2** and the *Distance* unit as *Miles*. With these settings, the *Dynamic Ring* tool will distinguish between those two-mile ring areas in which total expenses on shelter are greater than $150 million and those which fall below this level. This box should resemble the one below:
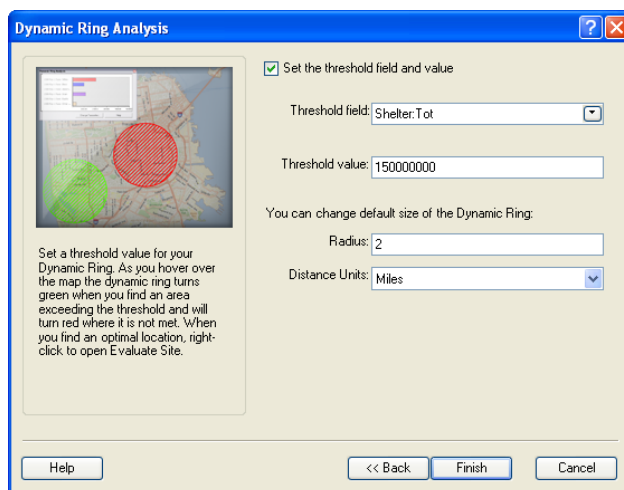
7   Click *Finish* to apply the settings and close the *Dynamic Ring Analysis* dialog box.

8   With the *Dynamic Ring* icon, move around the map, zooming in if necessary to view its features more clearly.

Find a site that is conveniently located relative to the freeway system, near block groups with high levels of home-related expenditures, and relatively close to shopping centers but removed from competitors. This is a relatively complex search (think of writing the SQL statement), but the visual clarity of the map makes it fairly simple.

9   When you have found a suitable location, click it. Depending on where you clicked, your map will resemble this one in structure (but not in location):
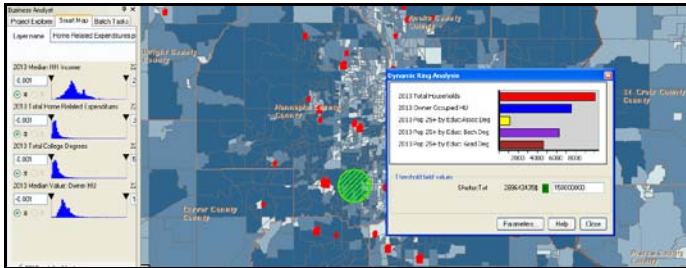
The map displays a hashed circle in a two-mile ring around your chosen site. A red ring indicates that this area falls below the $150 million threshold level of *Total Shelter Expenditures*, while a green ring indicates an area above the threshold. The bar chart to the left displays the number of households and owner-occupied housing units in the area and the number of adults in each of the three educational attainment attributes indicating a college degree.

Consider for a moment the rich data context in which you are working. All the major characteristics of the green consumer profile are represented here, as are consumer expenditures in the categories most relevant to *Living in the Green Lane*. In addition, shopping centers, competing home centers, and the freeway system in the area are superimposed over the thematic map. In short, the various components of the business GIS system combine to create a comprehensive yet easily comprehensible view of *Living in the Green Lane*'s competitive environment.

Continue to explore this environment, sampling several locations for a favorable combination of factors. When you have found a site you like, proceed to the next task.

EVALUATE THE SITE

1   Right-click the site you selected and click *Prospect selected point* to open the *Evaluate Sites* wizard. (This could also be done with the *Evaluate Sites* tool .) Set the options in the wizard to create a single two-mile ring market area around that site.

2   Leave the *Remove Overlap* and *Donut* options unselected and then click *Next*.

3   Name the new trade area **2Mile Ring**. Select *Create reports* and click *Next*. Select the *For Individual Features* option and click *Next*.

4   Select the *Executive Summary Report* and click *Next*.

5   Select the option *View reports on screen*. (If the software does not display the available report templates, click the *Options* button and select *Standard BA Data* as the layer you want to summarize.)

6   Click *Finish* to create the market area, place it on the map, generate the selected report, and display it on-screen.

When you zoom out, your map will resemble this one, though the location will be different:
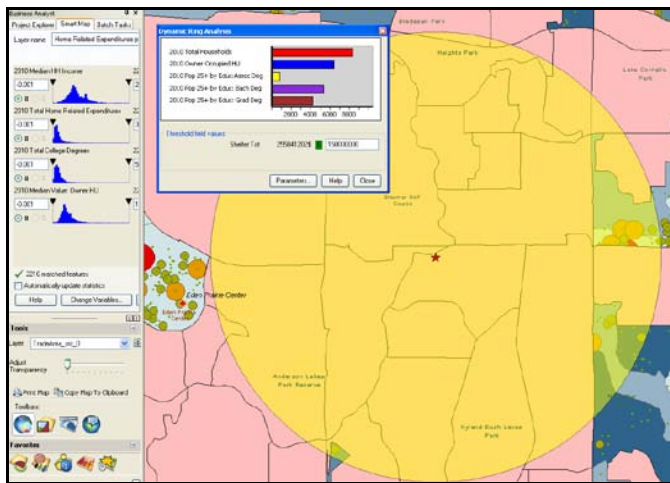
Review the *Executive Summary Report* relative to the desired population characteristics.

7   Repeat this process to identify, if you can, two other potential locations that meet the *Shelter Total* sales threshold.

As you explore areas for potential stores, you wish to supplement these tools with satellite imagery to further enhance your understanding of each location.

8   Close the main business GIS window. On the toolbar, expand the *Maps* drop-down list and click *World imagery* to add a layer of satellite imagery to the map. This layer is added at the bottom of the *table of contents*, so you must turn off several of the upper layers to view it.
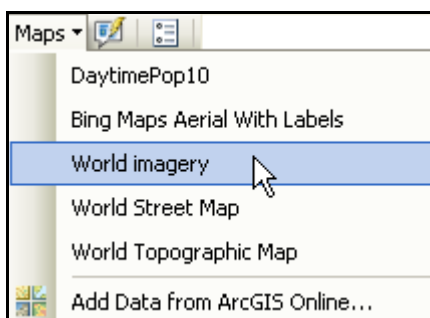
This layer allows you to view imagery for any of the market area, providing an additional perspective on any locations that you find attractive based on the *Dynamic Ring* and *Evaluate Sites* tools.

Use these maps and reports to answer the following question in your project report:

Question 3: *Are there at least three specific locations in the Minneapolis-St. Paul market area that would support the first Living in the Green Lane store? What data in the reports supports this conclusion?*

Submit your work

Submit answers to the following questions:

Question 1: *What variations in median household income, educational attainment, and home-related expenditures per household do you observe in this study area? Which parts of the region are most attractive for Living in the Green Lane? Why?*

Question 2: *Where in the Minneapolis-St. Paul CBSA are attractive households concentrated? Does this distribution offer concentrations of attractive customers sufficient to support the Living in the Green Lane concept? Why or why not?*

Question 3: *Are there at least three specific locations in the Minneapolis-St. Paul market area that would support the first Living in the Green Lane store? What data in the reports supports this conclusion?*

Credits

Data

Data displayed in screen captures of Business Analyst is courtesy of Esri; the US Census Bureau; Infogroup; the Bureau of Labor Statistics; Applied Geographic Solutions, Inc.; Directory of Major Malls, Inc.; GfK Mediamark Research & Intelligence, LLC (GfK MRI); and Market Planning Solutions, Inc.

Instructor resources

Contextual information

This SpatiaLAB is written for business students in an integrated business GIS course at the undergraduate or graduate level. It may be used to replace the exercises in chapter 3 of *Getting to Know ESRI Business Analyst* in labs with Business Analyst Desktop Premium 10 installed. The emphasis is on the spatial analysis of factors that determine the attractiveness of a market area for a specific enterprise relative to its marketing strategy and objectives.

This is a common objective of the environmental scanning and market planning process, especially for startup entrepreneurial firms. Thus, this lab could also be used as a stand-alone exercise in entrepreneurship or marketing strategy courses.

This lab shows how to map demographic and consumer expenditure patterns within a market area as well as the distribution of competing and supporting business entities across the area. It also shows how to identify attractive clusters of potential customers based on a set of defined characteristics.

Upon completion of the lab, students may be required to submit answers to several questions based on their observation of the maps and reports they have created. Alternatively, students may be required to submit a project report covering their work in both the basic and advanced *Business Environment Analysis* SpatiaLABs.

Analysis and visualization tools

Business Analyst Desktop Premium 10 and the *LITGL Minneapolis St Paul* project data file are required to complete this exercise.

Data information

All the data for this exercise is provided by Business Analyst Desktop.

Data sources
Esri® Business Analyst data

Answer key

Question 1: *What variations in median household income, educational attainment, and home-related expenditures per household do you observe in this study area? Which parts of the region are most attractive for Living in the Green Lane? Why?*

The block groups with the highest levels of median household income are in an uneven ring outside the center of the market area, with a bit more concentration in the south and west. They are surrounded by block groups with medium income levels on the outside of the area. Block groups with the lowest levels of median household income appear in the central part of the market area as well its eastern, western, and northern borders.

The block groups with the highest levels of educational attainment are concentrated in a rough horseshoe around the south, east, and west portions of the center of the market area, with some concentration to the southwest. The lowest levels are on the eastern, northern, and western boundaries of the market area, as well as its center.

The distribution of home-related expenditures per household also displays a concentration of block groups in an even ring around the central area, with some concentration to the south and west. Block groups with the lowest levels are more likely to be found at the center and periphery of the market area.

Though not identical, the distribution of the demographic attributes characterizing green customers are remarkably similar. Thus, visual analysis of these data layers indicates that there is a sufficient number of green households in the Minneapolis-St. Paul area to support this enterprise and that they are sufficiently concentrated to support a retail green home center facility.

Question 2: *Where in the Minneapolis-St. Paul CBSA are attractive households concentrated? Does this distribution offer concentrations of attractive customers sufficient to support the Living in the Green Lane concept? Why or why not?*

The Smart Map layer reflects the distribution of the individual demographic layers in that these block groups are concentrated in an uneven ring around the central part of the Minneapolis-St. Paul market area, with some concentration to the south. This distribution supports the hypothesis that these demographic attributes are correlated with each other.

The number of selected block groups and their distribution does offer a clustering of attractive customers sufficient to support the Living in the Green Lane concept. Over 25 percent of block groups in the market area are selected. Their concentrations are clearly defined and sufficiently large geographically to offer several potential locations for a Living in the Green Lane store.

Question 3: *Are there at least three specific locations in the Minneapolis-St. Paul market area that would support the first Living in the Green Lane store? What data in the reports supports this conclusion?*

There are several locations within the market area that meet the dynamic ring threshold, as illustrated by the sample locations displayed below. The first one is to the northwest of the central part of the area, the second to the northeast, and the third to the southwest. This geographic balance in

attractive locations means that not only is there potential for one store but also the area might well support several.
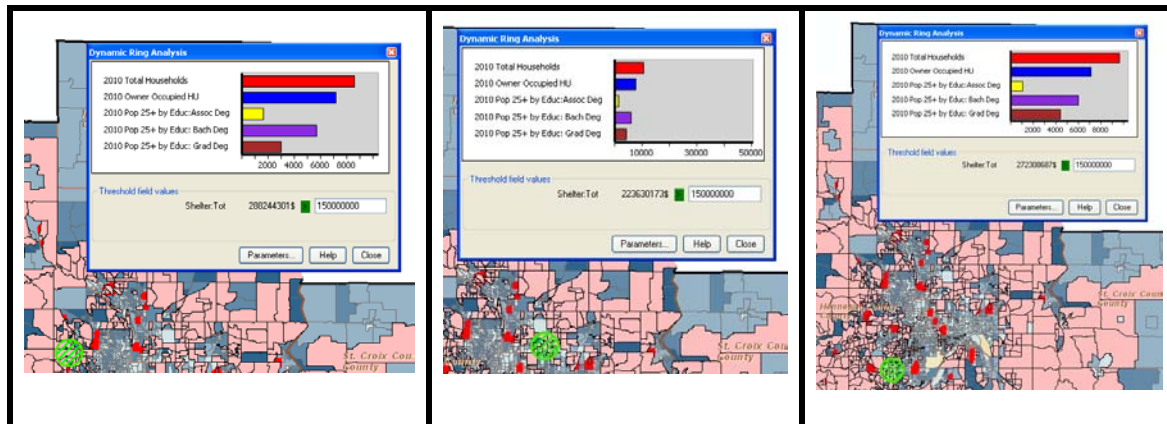
The specific locations students select will also determine the cited content of their reports. They should, however, focus on the characteristic attributes of green consumers and their presence in the selected locations. For example, the reports for all three of the sample sites reveal high patterns of income, education, home value, and homeownership. However, the Sample 1 area has relatively few households relative to the other two, indicating that the reports also reveal differing patterns of attractiveness.

Additional notes

1. This SpatiaLAB updates the student exercises in chapter 3 of *Getting to Know ESRI Business Analyst* (Miller 2010) to use Business Analyst Desktop Premium 10. However, it may be used as a stand-alone exercise.

2. Though this lab can be integrated with the *Basic Business Environment Analysis* SpatiaLAB to create a complete project, it is not necessary for students to complete that lab to work with this one. The initial map in this lab contains the results of the *Basic Business Environment Analysis* procedures, and they are incorporated into the analysis performed here. Thus, although students would benefit from completing that lab, it is not necessary. At your discretion, this can be a stand-alone exercise.

3. Be sure to note that although this exercise is seeking attractive sites, it is not a comprehensive site selection analysis. Other SpatiaLABs cover this application by analyzing the factors in this lab in more detail and adding other considerations to the analysis as well. For example, although students might identify attractive locations, they have not yet determined if retail facilities exist at these locations or what zoning restrictions might apply.

4. Advise students to be particularly attentive to task details in the *Smart Map* application. If their maps have other demographic layers turned on, portions of these maps will appear in the *Home Related Expenditures per HH by Block Group* map, as block groups are removed from this map if they do not meet selection criteria. This means that odd colors not matching any single layer's legend will appear. If the settings are correct, the beige background of the map will appear when these block groups are removed. Be sure students understand that these are the block groups that do *not* meet the criteria. Similarly, if students do not reverse the selection criteria before closing the business GIS window, only the selected block groups will be displayed in the *Home Related Expenditures per HH by Block Group.* Therefore, when

the *Smart Map* layer is turned on, the *Home Related Expenditures* layer will no longer be visible. Reversing the selection criteria will avoid this problem and facilitate the comparison between the *Smart Map* and demographic layers students are instructed to perform.

5. The *Dynamic Ring* tool is a very powerful method for identifying attractive potential locations and their relevant demographic characteristics. Encourage students to adjust the parameters to display different attributes in the *Dynamic Ring* graph. As they do, direct their attention to the importance of selecting attributes of similar magnitude to maximize the usefulness of the graph. A large-magnitude attribute such as *Median Income*, *Net Worth*, or *Home Value* can dwarf small-scale attributes such as *Median Age*, *Diversity Index*, or *Household Size* and render them difficult to compare from location to location.

    This tool can also be adjusted easily to diverse retail markets. Assign student groups to different retail categories and ask them to select the consumer expenditure and demographic attributes most appropriate for this category. Groups can then compare findings for different retail categories to understand the flexibility of this tool more fully.

6. In this lab, the *Evaluate Sites* tool is set to the same two-mile ring used with the *Dynamic Ring* tool. This illustrates the relationship between these tools in the analytic process. However, the *Evaluate Sites* tool also supports drive-time and threshold area trade area models. This offers the opportunity to introduce these concepts to students and stimulate their thinking on the value of each approach in defining trade areas. Both of these approaches will be used in subsequent SpatiaLABs.

Business GIS references

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http://resources.esri.com/businessAnalyst/

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http://www.esri.com/industries/business/community/newsletter.html

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