Workplace Transportation Improvements

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Geographic Information Systems (GIS) has many special characteristics that enable it to be an effective technological tool for assisting in deciphering previously difficult industry questions or scenarios through enabling access to real-time communication and processing of information. GIS is capable of supporting businesses in all types of industries and various magnitudes. By utilizing GIS capabilities an industry may improve its business features through real-time interfacing producing more accurate data recording and more efficient geographic management generating improved business process efficiency inevitably leading to cost savings. Increasing numbers of companies are becoming aware of the economic and strategic value associated with GIS. GIS allows unlimited capabilities such as mapping locations, quantities, densities, and change. This remarkable tool can also be related to productivity and cost savings outside of a direct business location. GIS spatial data has improved transportation efficiency for many agencies; this improvement should translate to workplace vanpools. Many workplace vanpool situations have been left mainly to employee discretion for setup and continued vanpool group maintenance. GIS could provide much needed assistance to produce an effective and helpful vanpool program.

The Center Business (CB) is located in Norco, California offers a vanpool program for its employees. There are over 1,700 employees working at CB. Approximately 30 employees utilize the vanpool option. The nominal vanpool participation is not due to lack of interest but rather lack of knowledge and program organization. After reviewing a general consensus from the employees at CB, if the vanpool process was improved it is highly likely that the number of participants would increase. In CB's vanpool program vans are provided for employee use and employees are able to form vanpool groups as needed. If an employee would like to form a

vanpool group they gather the names of participants and submit the request to Human Resources. If approved an agreement is signed by the group lead person and a van and gas card are issued. Each group is led by one central point of contact. The group lead is in charge of maintaining awareness of the van's location, balancing the agency issued gas card, and conducting scheduled vehicle maintenance appointments as required. There is no other platform or database associated with this employee vanpool program. Some of the current complaints regarding CB's workplace vanpool process are that many employees are not aware of how to initiate a new vanpool group or how to join a current vanpool group due to not being aware of others that may want or need to vanpool except by word of mouth or happen stance. Employees are not aware of the geographic locations of their co-workers therefore vanpool groups are merely built upon groups of coworkers whom sit near each other at work rather than geographically desirable groups of vanpool riders. It appears that the vanpool program at CB could benefit from a revamping. Vanpool improvements could be made through implementation of a GIS database containing pertinent vanpool data about each participating employee. If the employees were able to access a database with general coworker information such as the residential location, preferred departure times, and number of seats in each van, to name a few, this would greatly increase the effectiveness of the vanpool program and improve employee contentment.

In order to create a productive and useful vanpool program utilizing the amazing tools from GIS, the following features would need to be included. The below chart displays the necessary layers and attributes that would be needed to create an exceptional vanpool database through GIS and spatial data.

Vanpool Spatial Data Layers and Attributes

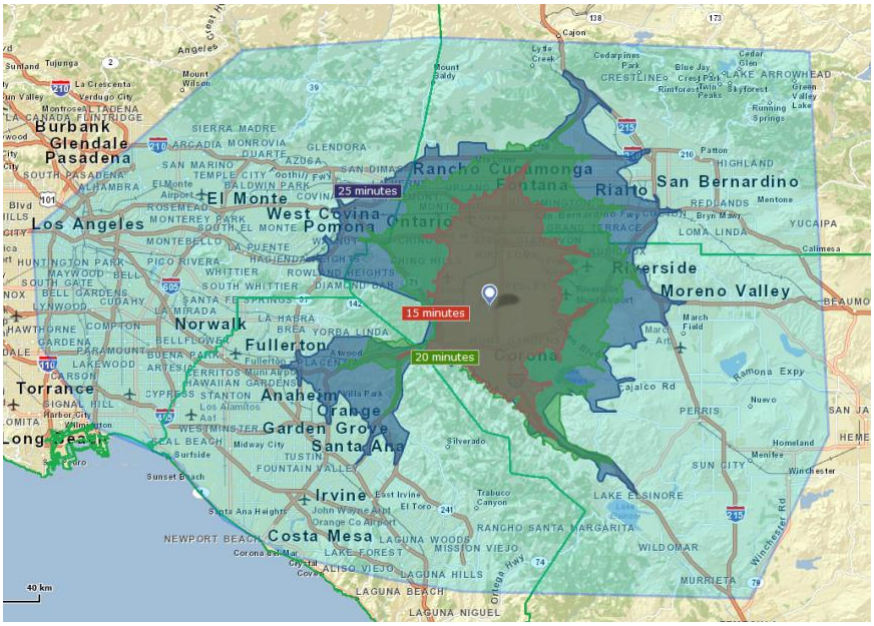
Layer 1	**Residential location/address**	
	Attribute 1	Number of possible vanpool participants at each address
	Attribute 2	Is the neighborhood publically accessible?
	Attribute 3	Preferred departure time of each person at each address
	Attribute 4	Number of seats in each van
	Attribute 5	Gas station locations
	Attribute 6	Fast food restaurant locations
Layer 2	**Vanpool approved parking lot locations**	
	Attribute 1	Are there parking lot fees?
	Attribute 2	Does the lot have a security detail?
	Attribute 3	Parking lot hours of operation
	Attribute 4	Number of parking spots in each lot
	Attribute 5	Typical parking lot traffic/number of spaces typically used
	Attribute 6	Parking lot street entrance locations
	Attribute 7	Parking lot speed limit
Layer 3	**Streets and freeways**	
	Attribute 1	Estimated trip duration time from parking lot to business location
	Attribute 2	Estimated return trip duration time from business to parking lot
	Attribute 3	Speed limits
	Attribute 4	Typical traffic flow
	Attribute 5	Number of cities freeways pass through
	Attribute 6	Number of lanes

The above list contains beneficial aspects for each participant to be aware of in order to form or join a vanpool group. Layer one would display each participant's location by address. Other useful information, or attributes, included in this layer would be the number of vanpool participants at each address, public accessibility to the neighborhood, and the number of seats available in each van. Preferred departure time would also be an included attribute list to assist all participants in agreeing upon a compromised time that would work best. Lastly for layer one, gas station and fast food locations would also be included for convenience and easier attainability. Layer two would display nearest and most convenient vanpool approved parking lot locations so that each group would be able to meet at a preferred location. This layer would include attributes such as parking fees, security detail information, hours of operation, parking

lot street entrances, the speed limit, number of parking spots, and the typical amount locational traffic. Layer three would display street and freeway layouts for the group to best map their route to work. Layer three would include attributes for speed limits, number of lanes in the road, and typical traffic flow in order to map the most expedient course. Other useful attributes that would be included in layer three are estimated trip duration to and from work and the number of cities in between each location. The above information added into a GIS database would create a very efficient and productive vanpool program.

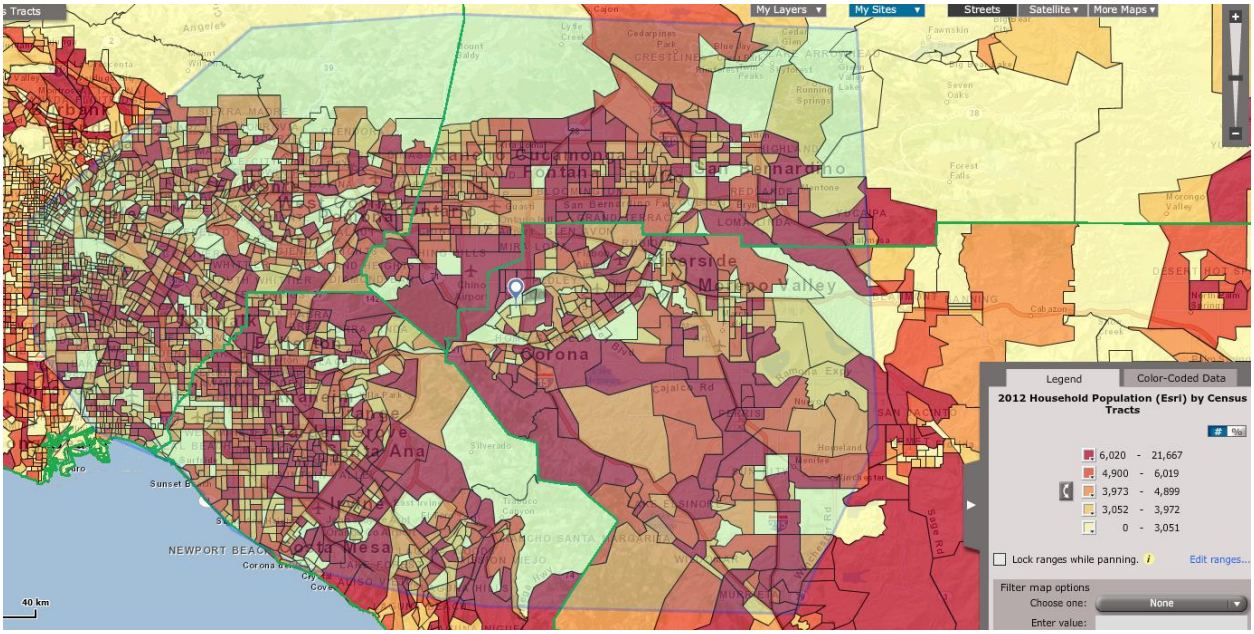
The below map displays the location of CB in Norco California; shown by the pinpoint site on the map. The outlining areas shown in red, green, and dark blue display the drive time radius' beginning with the red inner most area showing a drive time distance of fifteen minutes, the center green color coded area displays a twenty minute drive time, and the third dark blue outer area shows a twenty-five minute drive time radius. The large surrounding polygonal light blue shaded area includes all of the residential locations showing the distances CB employees commute.

CB Employee Residential Area Polygon



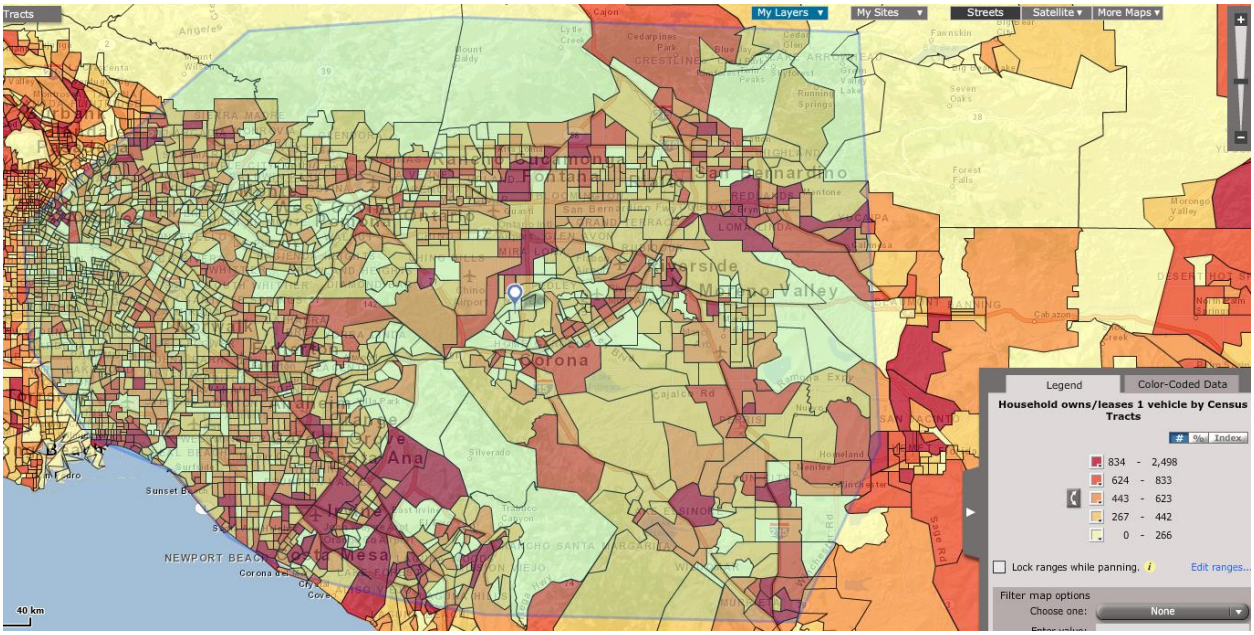
Implementation of the aforementioned GIS capable vanpool database would be costly but the benefits can be seen through application of Esri Business Analyst Online (2012) mapping features. The below map displays the population of all of the households near CB; it is easy to see the Southern California area near CB has a very dense population. This dense population produces massive amounts of time consuming traffic creating stress for the drivers and polluting the environment. This dense population shows the need for a diversely capable vanpool program.

2012 Household Population



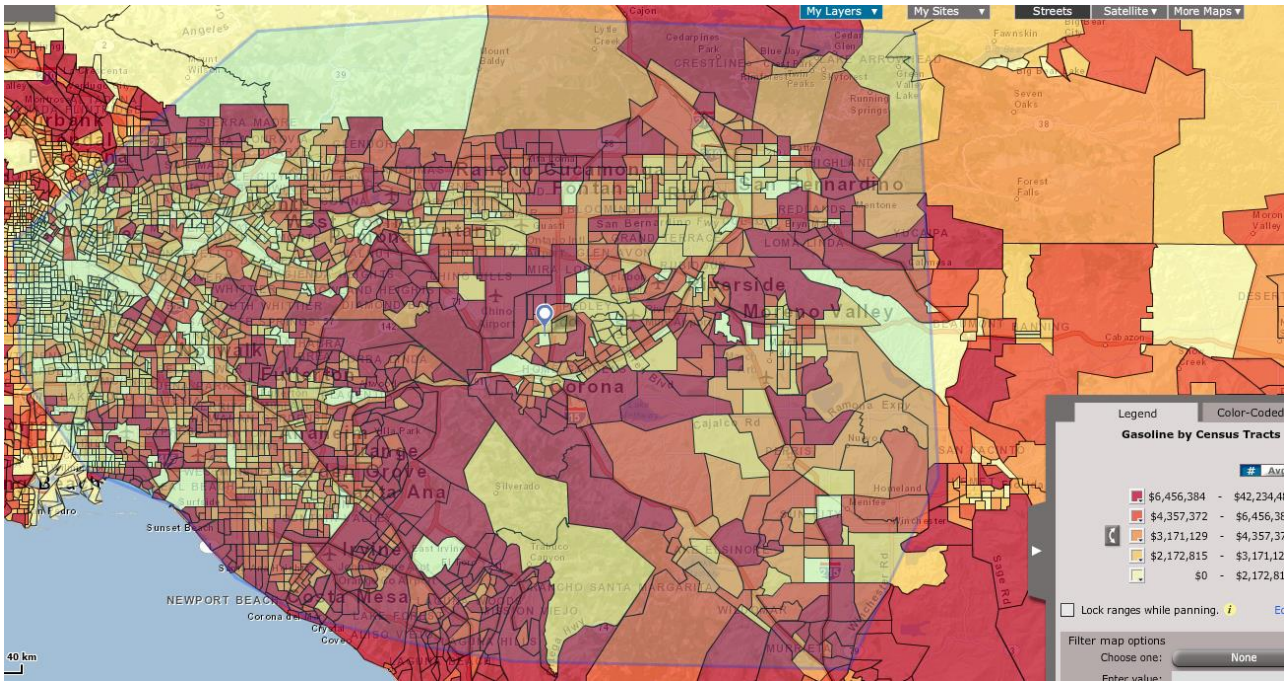
This map (below) shows households in Southern California that own or lease only one vehicle. A vanpool program would be very useful for these people who only have access to a single vehicle. The option of vanpool transportation has the possibility to be a life changing opportunity for the households displayed below.

2012 Household Owns/Leases 1 Vehicle



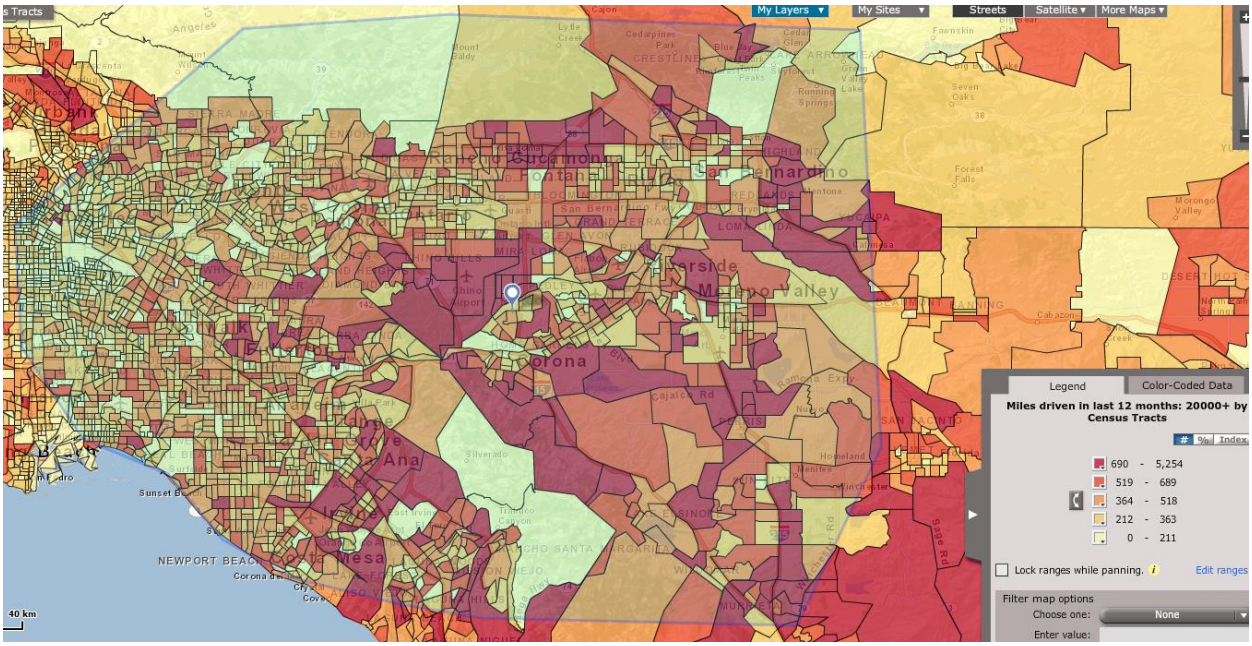
The below Esri Business Analyst Online (2012) map displays the amount spent on gasoline in 2012 in the Southern California location. From this map one can determine that the cost savings in decreased gasoline usage through the implementation of a useful vanpool program would be astonishing.

2012 Gasoline



There are a large number of people that commute in the Southern California area, the below map displays miles driven in the last twelve months in mileage amounts of 20,000 miles or more. The California population is steadily increasing a will commuters thus traffic. The freeways located in these areas will soon become unbearable to drive on. Commuters will soon be spending a large portion on the roads traveling to and from work; their work day will be noticeably extended due to time spend in traffic. This concern can be partially alleviated through vanpooling.

2012 Miles Driven in Last 12 Months: 20,000 +

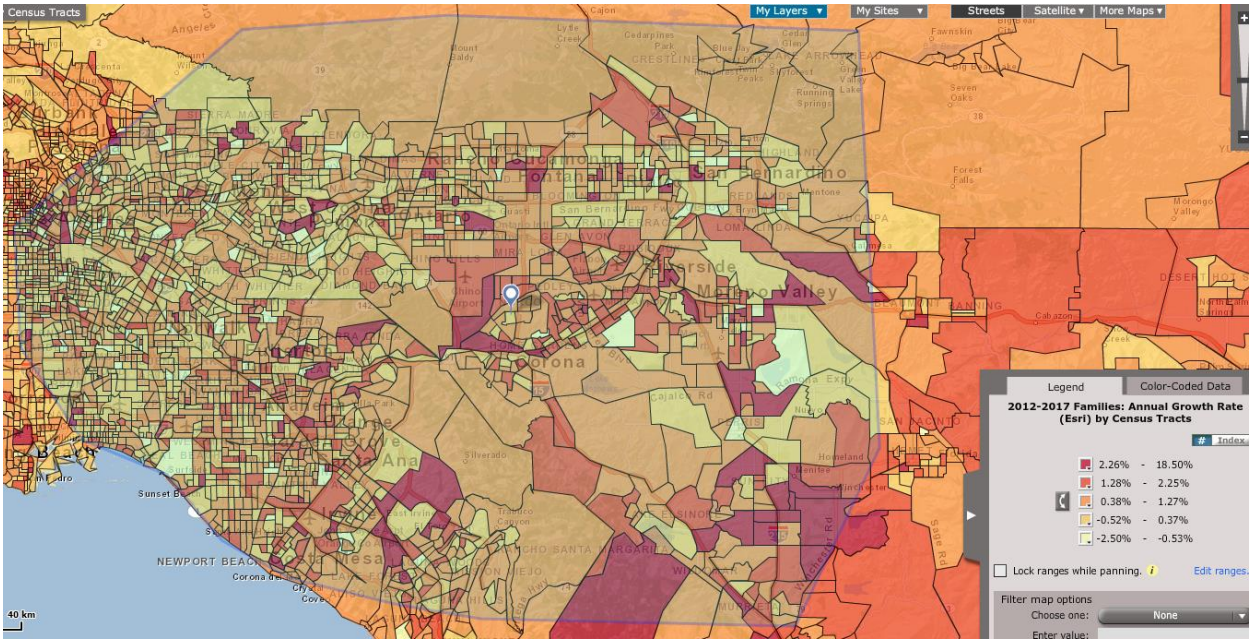


CB would benefit from a vanpool database program utilizing GIS spatial data through monetary organizational benefits from environmental programs and better business benefits. A GIS vanpool database would allow for better environmental standards for the company. CB would see a cost savings through many features such as positive publicity by offering a useful vanpool program that gives many benefits to the employees, tax incentives, employee retention by showing their importance to the company through employee desired and

useful programs such as vanpool. The vanpool program would also offer employee incentives for loyal usage, through various types of compensation such as gift cards. CB along with other companies could also make use GIS in the future by mapping transportation improvements over the next two years and longer. CB can gain business advertising and likely state assistance for offering employees sustainable programs at work.

The below Esri Business Analyst Online (2012) map displays the expected annual growth rate of families from now through the year 2017. Southern California currently has a high population and this figure is growing. The current benefits of a useful vanpool program are a luxury that will appease employees, create employer cost savings, and positive publicity for the company. In the future a vanpool program will be a necessity in our growing society in order to keep freeways from becoming gridlocked with traffic and to help the environment through less pollution.

2012-2017 Families: Annual Growth Rate



Business programs improved by spatial analysis through GIS have insurmountable possibilities. If a business is unable to meet salary increases, vanpool benefits may assist in covering the differential in pay by giving employees a tax-free vanpool benefit option, in turn often supplying employees with more money than a salary increase would have (Best Workplaces for Commuters, 2005). Employee morale and appeasement are not the only advantages seen from an improved vanpool process. The agency may also benefit from monetary compensation. CB would be able to take advantage of tax incentives and City and State funded programs offering financial benefits to businesses for environmentally supportive efforts. GIS spatial data can provide much needed assistance to produce an effective and helpful vanpool program that would benefit the employer as much as the employees.

Reference

Best Workplaces for Commuters. (2005). *Transit and Vanpool Benefits: Implementing Commuter Benefits as One of the Nation's Best Workplaces for Commuters*. United States Environmental Protection Agency Office of Air and Radiation.

Esri Business Analyst Online. (2012). ArcGIS. Retrieved from: http://bao.esri.com/