REGION 2050

Sustaining Quality of Life in the Southern Willamette Valley

November 23, 2004

TO: Regional Policy Advisory Board Members and Alternates

FROM: Tom Schwetz and Lisa Gardner

SUBJECT: Transportation Evaluation Overview

Summary

This memo provides an overview of the elements and issues involved in the evaluation of the transportation impacts of the three Region 2050 alternative growth scenarios. Following a summary of the general issues surrounding the evaluation of transportation impacts, a framework for the evaluation will be outlined, descriptions of potential solution packages will be provided, and an overview of the transportation model and analysis will be explained. If you have any questions, please contact Tom Schwetz (682-4044) or Lisa Gardner (682-6135).

Overview of Regional Transportation Evaluation

A regional transportation system is made up of a variety of means of transportation, often operated by multiple jurisdictions. As well, the system impacts and is impacted by surrounding land uses. It has impacts on the environment and is a key factor in the growth of the region's economy. In addition there are issues of safety, equity, efficiency, and long-term sustainability.

These impacts are affected by the way in which public agencies choose to regulate and make investments in the operation, maintenance, preservation and modernization of the system. These public actions are largely geared toward an attempt to maximize the benefits of the transportation system while minimizing the negative impacts. These impacts and interrelationships make the evaluation of alternative future transportation system performance relatively complex.

In general, transportation impacts have been the same for hundreds of years. The exact nature of the impacts will vary and can be important to understand as they can change dramatically over time. For example, in the late 1800's, major cities in the U.S. faced serious problems with their transportation systems – the state of pavement technology left the condition of the roadways subject to the seasonal variations (snow, ice, mud, dust, etc.); the primary mode of transportation (horse-drawn conveyance) created serious pollution problems, and relied on a fuel source (grains) that required extensive logistics for delivery and was subject to periodic shortages and price fluctuations. Congestion was a typical condition, particularly over bridges. Within 10 years of the end of the 19th century, technological advances allowed the primary means of transportation to be completely replaced in many areas by a new dominating mode of travel – the automobile. The auto, combined with the innovation of electrifying streetcars, appeared to

address the concerns of fuel and pollution, and pavement materials allowed roadways to function at a high quality year-round. Congestion, needless to say, remained a problem; though early on it appeared that the auto would actually provide relief as people were able to put distance between their homes and the central city.

This example illustrates some of the risks inherent in planning for regional infrastructure even over a short period of time. The potential changes in technologies, social behavior, and public policy create uncertainty in any evaluation of alternative futures. To address this uncertainty, it is important to identify alternative solutions that are robust enough to be of use under multiple scenarios. The following sections provide a focus for the transportation system evaluation, outline an evaluation framework, describe alternative transportation strategies, and layout the next steps in the evaluation process.

Accessibility – The Central Element of Transportation System Evaluation

From the standpoint of transportation systems only, accessibility is the key measure of a transportation plan's performance. Accessibility means reaching destinations with relative ease (within reasonable travel time, at reasonable cost, with reasonable choices). For example, neighborhood A in a city might be closer than neighborhood B to a grocery store, gas station, restaurants, doctor's offices, and other goods and services. In this example, the residents of neighborhood A will generally have lower travel time and more choices for travel (car, walk, bike, transit) than a resident of neighborhood B. The residents of neighborhood A have a higher accessibility than the residents of neighborhood B.

On a regional scale, residents of a city will typically have more access to the goods and services they need than someone who lives in a rural area. The city resident will have access to more choices for many goods and services (shopping, medical, recreation, etc.), typically has less travel time needed, and can often take more than one mode of travel to a given destination.

Reid Ewing, a nationally known transportation researcher, offers a useful description of both the importance and challenges of accessibility:

> *"it is the ease of access to other people and facilities that determines the success of a transportation system, rather than a means or speed of transport. It is relatively easy to increase the speed at which people move around, much harder to introduce changes that enable us to spend less time gaining access to the facilities that we need."*

In addition to accessibility, the transportation system needs to have characteristics that make it safe, efficient, environmentally sound, financially feasible, equitable, and sustainable. And in the broader context of public policy, these factors need to be balanced across several elements of public infrastructure and other competing policy issues. However; a useful focus for transportation policy development is to attempt to identify those changes that enable residents and businesses to spend less time gaining access to the goods, services, and markets they need.

The system characteristics described above (safe, efficient, environmentally sound, etc.) are desired characteristics of any public infrastructure system. For example, as considered within the *Region 2050* framework, these characteristics would be evident within the plans and policies

for water, wastewater, and transportation systems. Among these public infrastructure systems, accessibility is the distinguishing characteristic of transportation.. From that perspective the alternative solution packages should be designed to help determine the relative accessibility of different combinations of strategies.

Framework for Evaluation

As described above, the evaluation of transportation alternatives is relatively complex given the multiple interrelated impacts. A useful approach to thinking about transportation system evaluation is illustrated in Figure 1. This framework helps outline both what issues should be measured in an evaluation and the development of alternative transportation solutions.

The objective of the framework is to help Region 2050 policy makers to make choices among alternative transportation solutions and, ultimately, among the alternative growth scenarios. At the center of this framework is the focal issue of accessibility. Strategically, the next question to ask is "what are the key factors or policy variables that the region's public agencies can employ to influence the success or failure of our ability to increase and improve accessibility?" There are at least four of these variables - funding levels, land use controls, the rate of adoption of new technology, and the provision of other public infrastructure.

Regarding funding levels, while only limited increases are likely in the short to mid-term, the Region 2050 processes is an opportunity to outline how the region might strategically employ additional transportation resources. With limited increases the likely outcome, one would anticipate minimal increases in capacity with a focus on the maintenance and preservation of the existing system. Given the existing wisdom and policy direction around this issue varying levels of maintenance and preservation may not need to be a variable tested in alternative solution packages.

Regarding land use controls, in the context of both the strong interrelationships between land use and transportation and recently passed ballot measures, the Region 2050 process is an opportunity to determine the impacts on the region's transportation system of varying levels of land use control. The Region 2050 Alternative Growth Scenarios reflect a range of variation in land use control which helps address this factor. Regional travel is directly affected by the distribution of population and employment in the region. Figures 2 and 3 illustrate the commuting patterns that exist in the region. While this data is from the 1990 census (the 200 census data for intercity commuting is not yet available), it is likely that the general patterns have not changed appreciably. One obvious change that can be expected is in the level of commuting between the Eugene-Springfield area and Coburg, which has increased significantly since the 1990 census.

Tables 1-3 provide data on the population, employment densities, and UGB land areas for each of the three Region 2050 Alternative Growth Scenarios. This data will be used in the modeling done as part of the transportation system evaluation. This analysis will shed some light on the issue of the transportation impacts of the balance of jobs and housing within the region. Differences in these land use variables will affect the location and intensity of market areas in each scenario which will affect the impacts on the transportation system (as measured by vehicle miles traveled, congestion, choice of travel modes, etc.)

While advances in technology are not directly influenced by the region, the Region 2050 process is an opportunity to examine what impacts certain technologies might have on the region's transportation system. Depending on the impacts, the region may choose to be more or less aggressive in its adoption of these new technologies. As illustrated in Figure 1, there are at least two categories of technologies - mobility technologies (both system and vehicle), and 'virtual accessibility' technologies (web-based, etc.). Emerging technologies could have a dramatic affect on people's travel and accessibility choices. Changes in and the rate of market penetration of fuel technologies relative to the costs of existing fuel technologies, for example, could affect the travel costs and travel decisions made by residents and businesses in the region. Advances in both vehicle and system technologies have provided and will continue to provide improvements in system's capacity and safety. Access to needed goods and services using web-based technologies could lead to a shift in the types of trips and level of trip making made by residents and businesses in the region. The provision or location of other public infrastructure (water, wastewater, phone, utilities, schools, etc.) will affect the development patterns in the region. The development patterns will subsequently affect the range of feasible transportation options. While this is an important factor influencing the region's ability to increase accessibility, the Region 2050 Alternative Growth scenarios imply the location of other infrastructure (they assume that the infrastructure will need to follow growth).

Behind these key factors and policy variables, are driving forces and trends that are likely to have an influence. For example, public trust and sentiment will influence the ability of public agencies to raise the level of funding available for transportation. Cultural and social forces will affect the ability to realize compact urban form, and shifts in travel behavior. Demographic changes, for example, the aging population, and the increasing diversity of the general population will have impacts on travel behavior. Other driving forces such as the change in the price of existing fuel technologies, will have affects both on the decision-making of travelers and the rate of development of new fuel technologies. The actual advances in practical or marketable technologies that can be realized in the short run will affect the extent to which those technologies are a factor in the alternative transportation solutions for Region 2050.

Menu of Alternative Solution Packages

There are many strategies available for providing accessibility. Trips can be taken using the automobile, transit, biking, and walking. Goods and services can also be accessed via the internet. Implementation of mobility technologies can increase the throughput of the system, as well as making the system safer. Demand management options provide incentives and disincentives for the use of various modes of travel. Roadways can also be expanded or managed in a way to provide additional capacity. Land use configuration is also an important element of accessibility. Providing for a mix of uses and increased densities in a given area can significantly increase the accessibility of the people living, working and doing business in that area.

Experience has shown that none of these strategies can be solely effective in addressing transportation issues. Rather, a package of all these elements, appropriately balanced needs to be implemented to be effective. Figure 2 illustrates this approach. For purposes of the Region 2050 process, the land use element is what is varied in the Alternative Growth Scenarios. Different

solution packages composed of the other elements in Figure 2 would be tested as part of the transportation system evaluation. The different elements are described in more detail below.

Mobility and Accessibility Technologies

As mentioned previously, model development is a difficult task within a 50 year planning horizon; assumptions are made for a range of inputs, including population and employment growth rates, development patterns, and travel behavior. Complicating the development of these assumptions is the lack of predictability of the evolution of technological innovations. Depending on the evolution of emerging technologies, factors affecting travel behavior and means of transport could vary considerably.

At the same time, it is important to limit the range of technologies within the framework of developing technologies identified today. For example, in 1954 a fifty year plan might have considered assumptions about personal mobility innovations that were predictably futuristic, both in design and propulsion options. The limits of technological innovation potential were not well-defined in the 1950s, and modeling assumptions might have assumed a greater evolution of technology than actually occurred. As it is, the evolution of personal mobility innovations has changed very little institutionally; personal automobiles continue to be the dominant mode of transportation, with similarly public transportation options available today as were available in 1954.

There are a wider range of emerging technologies in 2004 than there were in 1954. In addition to advances in fuel propulsion systems, we have seen the introduction of personal mobility devices such as the Segway, and magnetic levitation rail technologies. Other emerging technologies that will factor into travel behavior and mode choices are high-tech infrastructure such as the internet, personal data assistants, and cellular phones. These technologies will shape the potential for virtual accessibility. Telecommuting from home and telecommuting from regional commute centers are known strategies available since the advent of the internet; emerging technologies have the potential to redefine the concepts of virtual accessibility.

Transit Options

The following specific accessibility options have been identified as appropriate transportation solutions for Region 2050 planning:

(1) Fixed-route transit, similar to existing bus service provided by Lane Transit District
(2) High quality, fixed-guideway transit options, similar to the bus rapid transit strategy included in *TransPlan*, the Regional Transportation Plan for the metropolitan planning area of Eugene-Springfield.
(3) Demand responsive service, similar to the Ride*Source* service currently available for eligible elderly and disabled people
(4) Vanpools and carpools
(5) hybrid fixed-route and demand-responsive systems similar to the *Diamond Express* service currently in operation between the Eugene-Springfield Metropolitan area and the rural community of Oakridge. This service functions as a fixed-route commuter-type service during the peak hours, providing transit service from Oakridge to downtown Eugene in the morning, and transitioning to a demand-response service

during the midday to accommodate access to medical and other services within the metro area.

(6) Commuter services between park and ride locations in satellite communities and urban areas.
(7) Intra-city transportation options
(8) Commuter rail options could be considered if indicated by need (e.g., population and employment levels, roadway congestion) and by the fiscal capacity to provide this option.
(9) others?

Other services can be included on this list. Of significance in considering a range of accessible delivery options is the relationship between population and employment densities and transportation infrastructure performance (roadway congestion or transit ridership) with financial forecasts for the plan horizon. The financial constraint element is significantly tied to the selection of appropriate transportation solutions. In addition to determining the most appropriate accessibility delivery option for the future there needs to be a reasonable assessment of the region's ability to finance the range of infrastructure options being considered.

Bicycle and Pedestrian Options

Bicycle/pedestrian use is sensitive to distances between access points, such as population and employment centers. Bicycle and pedestrian mode choices are dependent on factors such as safety and accessibility. The integration of transit options with the bicycle/pedestrian network increases bicycle and pedestrian access within the system.

Transportation Demand Management Options

As mentioned above, demand management options provide incentives and disincentives for the use of various modes of travel. Employer based programs such as free bus passes, flexible work hours, and carpool incentives increase the use of alternative transportation options such as bicycle, pedestrian, and transit modes. Demand management options will need to be applied in order to expand the capacity of the system infrastructure and transportation network.

Roadway Capacity Options

Roadway capacity can be increased either by increasing the number of lanes along a facility or through the use of signalization, and intersection configuration. Addressing congestion and safety concerns are primary reasons for increasing the capacity of roadways. As indicated above, given the high cost of increasing roadway capacity, it is important to explore the potential of other options to address these concerns and thus, postpone the need for additional roadway capacity. Regionally, routes that are critical for the movement of freight and cross-regional or statewide travel become priorities for investment in increased capacity.

Evaluating Alternative Solution Packages

Alternative transportation solution packages will be developed based on results of from the modeling of a reference case for each Alternative Growth Scenario. These reference cases will model the impacts of the three growth scenarios on the existing transportation network (including projects currently programmed in the State Transportation Improvement Program). These results will provide useful information on points of system failure and the general desire

lines of travel. They will also provide the context for identifying the appropriate mix of strategies described in the previous section. This approach is illustrated in Figure 3.

The alternative transportation solution packages will be modeled and the results will be evaluated using a set of performance measures. A set of specific measures will be developed within the following categories:

Accessibility/Mobility: Reach destinations with relative ease in reasonable time, at reasonable cost, and with reasonable choices. Move people and goods quickly. Includes measures of capacity and congestion
Economic Vitality: Competitive economy with efficient markets and growth potential. Efficient movement of people, goods, ideas.
Effectiveness/Efficiency: Maximize transportation investments over time. Use lower cost alternatives. Optimize utilization and system integration.
Equity: Distribute benefits and burdens fairly.
Public Support/Financial Feasibility: Citizenry would agree with policy direction and/or support funding.
Reliable/Responsive: Dependable service by mode; flexibility or ability to react.
Safety: Reduce risk of death, injury, or property loss.
Sustainable: Meets needs without compromising future. Positively benefits natural and built environments.

Evaluation Criteria

The criteria for the evaluation of the relative impacts of the three scenarios on transportation system capacity and cost is based on the following Regional Transportation Goal and Objectives:

Goal
Develop and maintain transportation systems in the region while improving transportation choice and air and water quality.

Objectives

1. Minimize anticipated increases in congestion and maintain high air quality through a blend of regional transportation approaches that provide alternative transportation options and reduce single-occupant automobile trips.

2. Identify and implement self-supporting financing strategies for maintaining and developing multiple modes of transportation in the region.

3. Maintain and improve intra- and inter-regional mobility, including providing convenient access to commuter services (public transportation, express bus, park and ride, car pools) throughout the region and particularly in areas with high levels of commuting to employment centers. Implementation Action: Increase

public and private transportation access for the transportation disadvantaged, especially in small cities.

4. Encourage the improvement and expansion of mass transit to and within outlying communities.

5. Where feasible, work cooperatively with the private sector to develop and implement incentives to use alternative transportation (taxi providers, shuttle services).

In the matrix below, each scenario will be rated high, medium, or low on each criterion. For example, if a scenario strongly meets a criterion, it will receive a rating of "high" for that criterion; if it does not meet a criterion, the scenario will receive a rating of "low" for that criterion. This first threshold analysis is supplemented, where applicable, by a qualitative and/or geographic-specific analysis.

	Growth Scenario			
Transportation Evaluation Criteria	**Compact Urban**	**Satellite Com-munities**	**Rural Growth**	**Comments**
Accessibility/Mobility				
Economic Vitality				
Effectiveness/Efficiency:				
Equity:				
Public Support/Financial Feasibility:				
Reliable/Responsive				
Safety				

Sustainability				

High = H Medium = M Low = L

Next Steps

This material will be discussed at the Regional Policy Board's November 29th meeting. The Policy Board will be instrumental in reviewing the results of the reference case modeling, and providing direction on the composition of the alternative solution packages. The following are provided as examples of the types of questions the Board might want to consider:

i) How much capacity increase can be saved through the existing ITS technologies?
ii) Is there a scenario where public sentiment and trust is high enough to support major increases in transportation funding?
iii) Is there a scenario where advances in mobility and virtual access technologies are practical and effective enough to offset the need for increases in the capacity of the traditional/current network?

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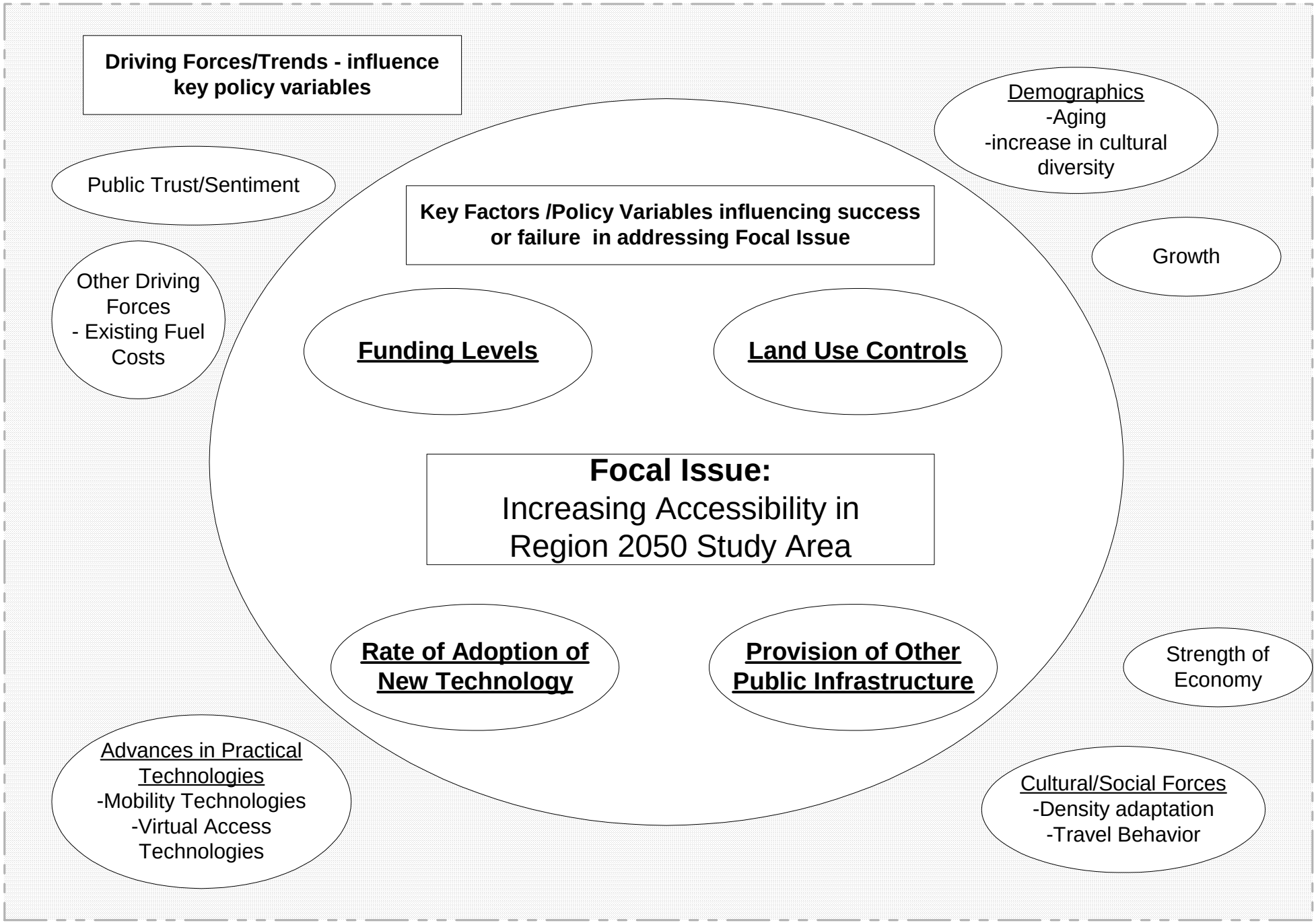


Figure 1 - Framework for Evaluating Region 2050 Transportation Alternatives

Figure 2
Percent of Jobs in Small Cities held by Eugene-Springfield Resident-Workers (1990)

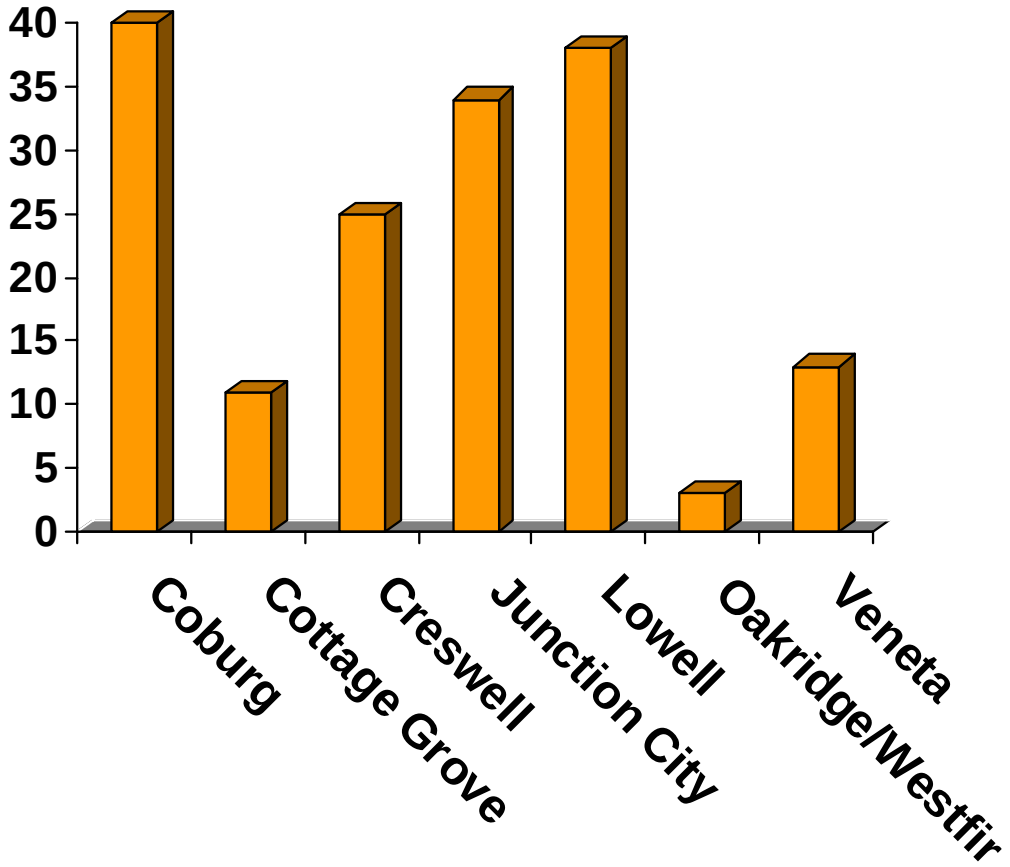
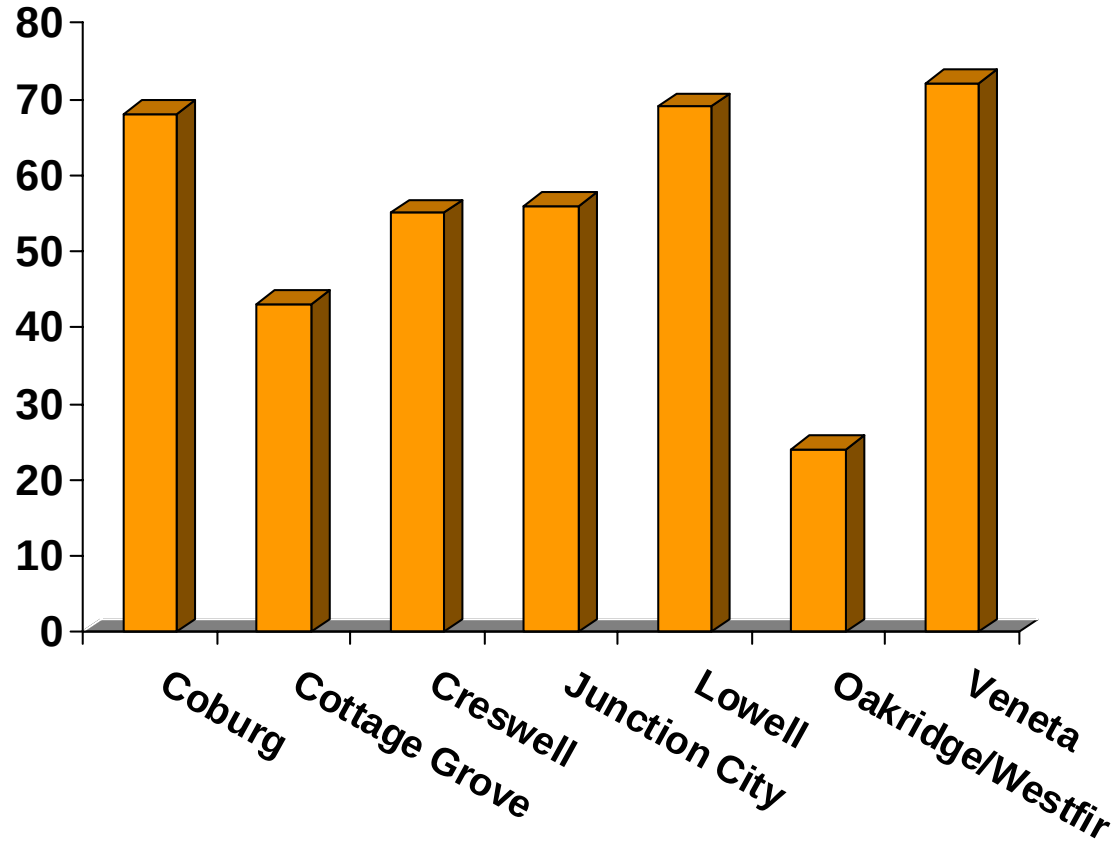


Figure 3
Percent of Resident Workers in Small Cities Commuting to Eugene-Springfield (1990)



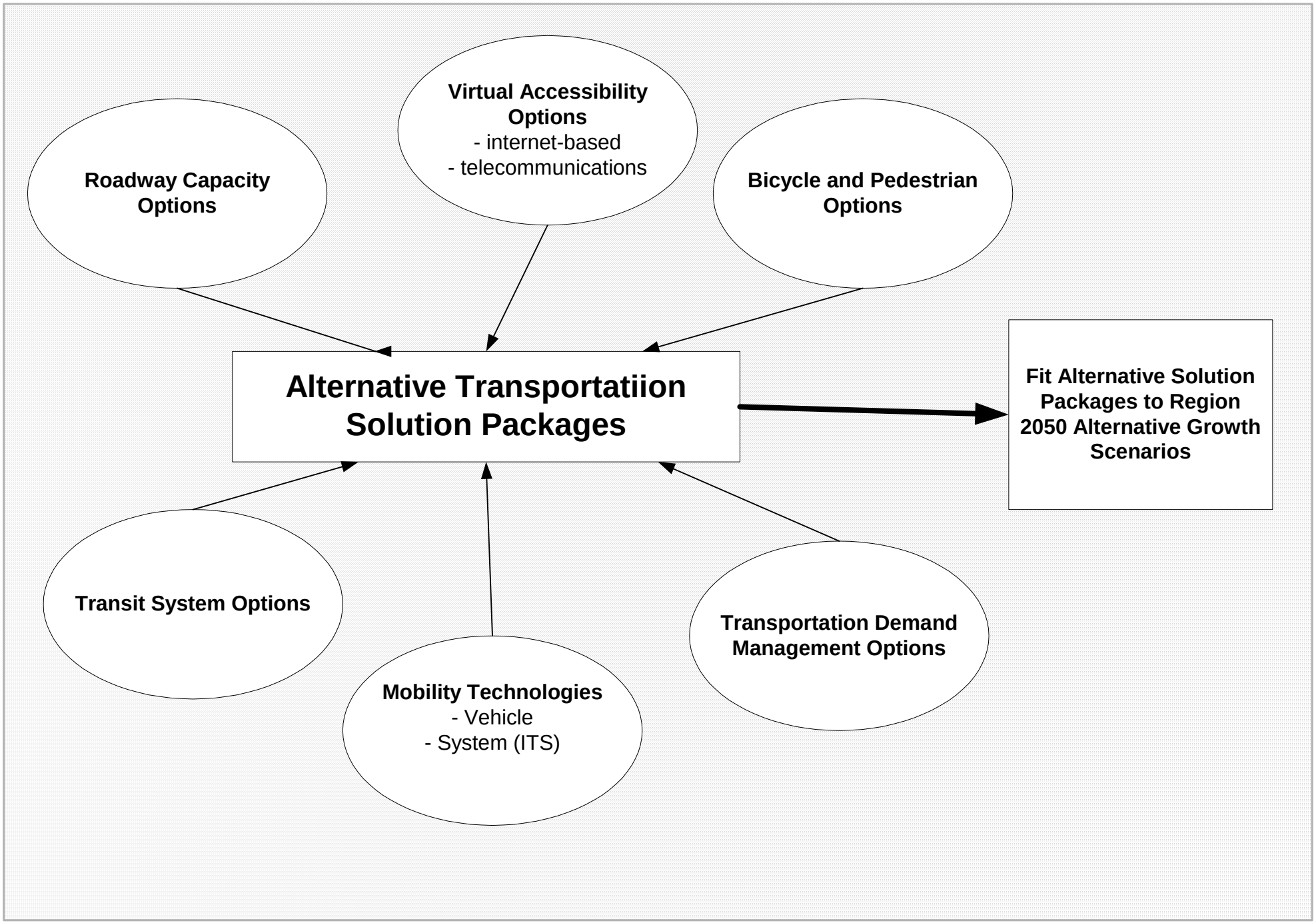


Figure 4 - Elements of Alternative Transportation Solution Packages

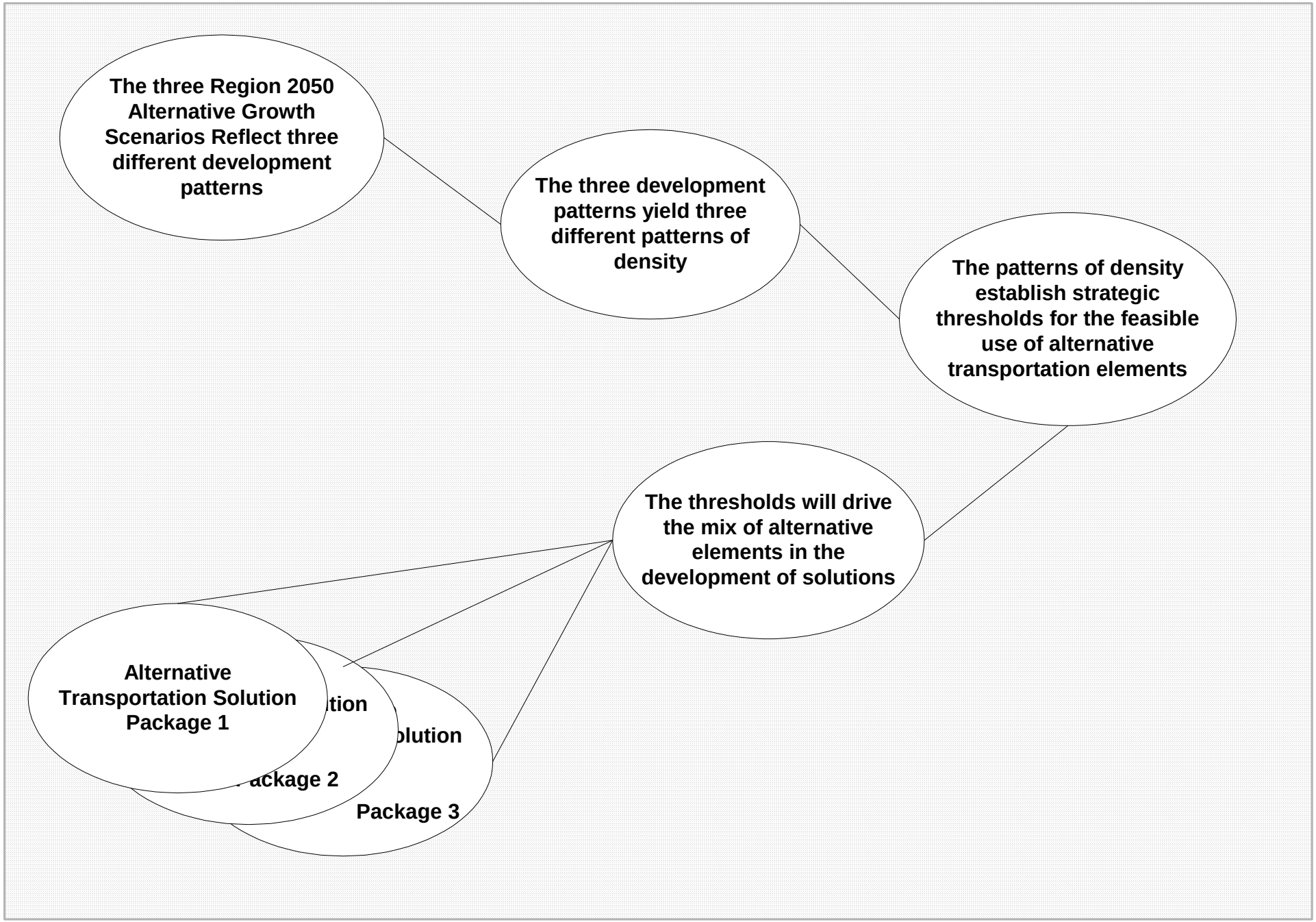


Figure 5 - Assembling Alternative Transportation Solution Packages

Table 1
Population and Housing Densities in Year 2000 and Year 2050 Alternative Growth Scenarios

			Compact Urban Growth Scenario		Satellite Communities Growth Scenario		Rural Growth Scenario	
	2000 Population	2000 Net Units Per Acre	2050 Popu-lation	Net Units Per Acre	2050 Popu-lation	Net Units Per Acre	2050 Popu-lation	Net Units Per Acre
UGBs								
Eugene	160,514	6.0	252,689	7.4	212,248	7.0	193,393	6.9
Springfield	61,989	6.4	112,103	7.1	83,800	7.2	84,102	7.1
Coburg	969	4.8	5,827	8.1	5,984	8.1	5,878	8.2
Cottage Grove	8,890	5.0	16,148	6.7	26,501	6.8	14,723	6.7
Creswell	3,909	4.9	14,920	6.3	22,858	6.8	5,795	5.6
Junction City	5,858	6.3	9,128	6.7	12,524	6.1	8,465	6.3
Lowell	857	3.6	2,368	3.7	2,845	3.6	2,359	3.7
Oakridge	3,246	3.5	7,895	6.1	13,939	5.8	7,136	5.3
Veneta	2,755	4.0	14,110	5.3	24,016	5.9	10,002	5.0
Westfir	287	2.5	546	3.7	564	3.9	544	3.7
Growth Centers								
Pleasant Hill	543	0.4			11,777	6.6		
Goshen	230	0.2			10,180	9.9		
Alvadore	309	0.7			16,027	6.3		
Total UGBs/Growth Centers	**249,274**	**3.5**	**435,734**	**7.1**	**443,263**	**6.9**	**332,397**	**6.8**
Total Rural	**56,733**	**0.4**	**27,766**	**0.3**	**20,237**	**0.2**	**131,103**	**0.5**
Regional TOTAL	**306,007**	**1.4**	**463,500**	**5.3**	**463,500**	**3.1**	**463,500**	**1.7**

Table 2
Employment and Employment Densities in Year 2000 and Year 2050 Alternative Growth Scenarios

			Compact Urban Growth Scenario		Satellite Communities Growth Scenario		Rural Growth Scenario	
	2000 Employ-ment	2000 Emp Per Acre	2050 Employ-ment	Net Emp Per Acre	2050 Employ-ment	Net Emp Per Acre	2050 Employ-ment	Net Emp Per Acre
UGBs								
Eugene	88,743	14.1	117,346	15.1	88,833	13.3	100,307	14.1
Springfield	22,488	7.1	42,092	12.7	39,101	11.4	43,189	12.2
Coburg	3,717	7.9	5,340	17.8	5,293	17.7	5,468	18.9
Cottage Grove	3,305	4.9	10,852	18.8	12,883	16.3	11,247	19.6
Creswell	1,054	5.8	9,686	20.8	14,503	17.7	7,694	19.5
Junction City	3,148	10.8	10,157	10.7	13,367	16.8	11,448	15.6
Lowell	157	6.8	289	19.7	1,135	21.5	930	21.3
Oakridge	711	2.8	3,218	10.0	6,798	10.5	4,960	12.2
Veneta	620	5.2	5,240	19.5	10,207	21.6	5,797	18.5
Westfir	4	0.3	95	7.7	94	7.7	97	7.7
Total UGBs								
Growth Centers								
Pleasant Hill					2,313	22.0		
Goshen					6,853	14.6		
Alvadore					2,937	20.7		
Total UGBs/Growth Centers	**123,947**	**9.9**	**204,316**	**14.6**	**204,316**	**13.9**	**191,137**	**14.2**
Total Rural	**10,684**		**10,684**	**5.8**	**10,684**	**5.0**	**23,863**	**5.2**
Regional Total	**134,631**		**215,000**	**13.1**	**215,000**	**12.5**	**215,000**	**12.2**

Table 3
Land in Urban Growth Boundaries (UGBs) and Growth Centers in Year 2000 and Year 2050 Alternative Growth Scenarios

		Compact Urban Growth Scenario			Satellite Communities Growth Scenario			Rural Growth Scenario*		
	2000 UGB	2050 UGB	Additional Acres From 2000	% Increase From 2000	2050 UGB-Growth Center Area	Additional Acres From 2000	% UGB Increase From 2000	2050 UGB	Additional Acres From 2000	% Increase From 2000
UGBs										
Eugene	28,398	36,457	8,059	28%	31,588	3,190	11%	30,853	2,455	9%
Springfield	11,939	17,480	5,541	46%	13,740	1,801	15%	13,740	1,801	15%
Coburg	451	1,045	594	132%	1,118	667	148%	1,056	605	134%
Cottage Grove	2,226	2,544	318	14%	3,582	1,355	61%	2,380	154	7%
Creswell	994	1,737	743	75%	2,899	1,905	192%	1,201	207	21%
Junction City	1,685	2,219	534	32%	2,390	705	42%	1,909	224	13%
Lowell	412	453	41	10%	573	161	39%	490	78	19%
Oakridge	1,188	1,255	67	6%	2,499	1,311	110%	1,375	187	16%
Veneta	1,386	1,900	515	37%	3,041	1,655	119%	1,562	177	13%
Westfir	169	218	49	29%	218	49	29%	218	49	29%
Growth Centers										
Pleasant Hill					1,235	1,235				
Goshen					1,157	1,157				
Alvadore					1,704	1,704				
Total UGBs/Growth Centers	**48,849**	**65,309**	**16,460**	**34%**	**65,745**	**16,896**	**35%**	**54,785**	**5,937**	**12%**