Movements in Land-Use Regulations

FINAL REPORT 507(2)

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16. Abstract

"New economy" undercurrents combined with the changes instituted by Growing Smarter and Growing Smarter Plus in Arizona will work to accelerate the push for self-contained neighborhoods that possess large parcels of open space, farmland and recreational and/or environmental treasures. Yet, traveling requirements will not decline. With the importance of networking between the nodes escalating, and with the open space element of Growing Smarter Plus expanding the area between the nodes, traveling needs will still experience exponential growth.

When tested with statistics gathered from three Arizona communities, the percentage of potential travelers that hit the streets of our communities does grow exponentially. And, while a measure of self-containment affects the rate of that growth—so does the adopted land use doctrines of a community.

Overall, more open space, the continued need to travel between the nodes for networking, the need to move goods due to the globalization of retail and manufacturing, and the declining costs of transportation that is implied by technological advances, will all work to increase the number of miles traveled. Thus, just as communities are now searching for ways to ensure that the benefactors of new development cover the costs of providing public services, soon travelers will be pressured to cover the costs of providing transportation services.

Hence, all these trends suggest that while we will be traveling more in the future—we will still be traveling more economically and intelligently.

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METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
in	inches	2.54	centimeters	cm
ft	feet	0.3048	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
	AREA			
in^2	square inches	6.452	centimeters squared	cm^2
ft^2	square feet	0.0929	meters squared	m^2
yd^2	square yards	0.836	meters squared	m^2
mi^2	square miles	2.59	kilometers squared	km^2
ac	acres	0.395	hectares	ha
	MASS (weight)			
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
	VOLUME			
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.0328	meters cubed	m^3
yd^3	cubic yards	0.765	meters cubed	m^3

Note: Volumes greater than 1000 L shall be shown in m^3.

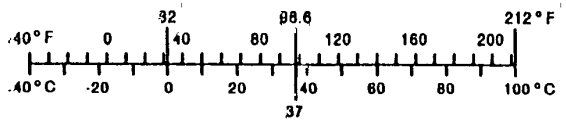
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
	LENGTH			
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
yd	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
	AREA			
mm^2	millimeters squared	0.0016	square inches	in^2
m^2	meters squared	10.764	square feet	ft^2
yd^2	kilometers squared	0.39	square miles	mi^2
ha	hectares (10,000 m^2)	2.53	acres	ac
	MASS (weight)			
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1000 kg)	1.103	short tons	T
	VOLUME			
mL	millimeters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m^3	meters cubed	35.315	cubic feet	ft^3
m^3	meters cubed	1.308	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

These factors conform to the requirement of FHWA Order 5190.1A

*SI is the symbol for the International System of Measurements



EXECUTIVE SUMMARY

As part of a visionary assessment of development, the Arizona Department of Transportation wanted to look at futuristic trends in four different areas that could affect transportation needs of the future. Phase 1 of this project looked at the so-called "New Economy" and what those new rules meant for economic development and transportation. This second phase looks at the passage of Growing Smarter and Growing Smarter Plus in Arizona and how the resultant Comprehensive Plans percolating from communities will affect transportation. Phases 3 and 4 will look at the changes in tourism and transportation technology and the effects on travel.

The findings of Phase 1 suggested that community planning, inter-governmental cooperative alliances, commitment to education and telecommunications systems and innovative transportation systems would become vital attributes to a community's successful economic development. Not surprisingly, Phase 1 also mentioned that these are also the attributes of a community's "Smart Growth" Plan as well. Hence, the integration of these aspects of economic development with many aspects of community planning is quickly approaching. And, states and regions that recognize this connection will be the ones that grow with the highest level of sustainability in an economy under ceaseless transition.

At the same time, technology is fostering the proliferation of what has been referred to as "Edge Cities", "community nodes", or "urban villages". All of these concepts suggest that in the future, our communities and neighborhoods will be striving to be more self-contained. Chances are higher that we will be living, working, shopping all from within our own communities in the future. This factor will help to ease the furious increases in the demands for transportation that planners had experienced over the last decade.

These undercurrents combined with the changes instituted by Growing Smarter and Growing Smarter Plus in Arizona will work to accelerate the push for self-contained neighborhoods that possess large parcels of open space, farmland and recreational and/or environmental treasures. Yet, traveling requirements will not decline. With the importance of networking between the nodes escalating, and with the open space element of Growing Smarter Plus expanding the area between the nodes, traveling needs will still experience exponential growth.

When tested with statistics gathered from three Arizona communities, the percentage of potential travelers that hit the streets of our communities does grow exponentially. And, while a measure of self-containment affects the rate of that growth—so does the adopted land use doctrines of a community.

Overall, more open space, the continued need to travel between the nodes for networking, the need to move goods due to the globalization of retail and manufacturing, and the declining costs of transportation that is implied by technological advances, will all work to increase the number of miles traveled. Thus, just as communities are now searching for ways to ensure that the benefactors of new development cover the costs of providing public services, soon travelers will be pressured to cover the costs of providing transportation services.

Hence, all these trends suggest that while we will be traveling more in the future—we will still be traveling more economically and intelligently.

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Much of transportation planning has to do with the here and now. Transportation specialists are bombarded with information regarding traffic counts, maintenance levels and the number of accidents on the highways. Rarely do transportation specialists find the time to ponder questions such as ”What will transportation patterns look like in 5 or 10 years?”

Yet, through this report, the Arizona Department of Transportation has made the effort to put aside the here and now and ponder the visions down the road. As part of this visionary assessment of economic development, the Arizona Department of Transportation wanted to look at futuristic trends in the four different areas that will affect transportation needs. Phase 1 of the project looked at the so-called “New Economy” and what those new rules meant for economic development and transportation. This second phase will look at the passage of Growing Smarter and Growing Smarter Plus in Arizona and how the resultant Comprehensive Plans percolating from communities will affect transportation. Later, Phases 3 and 4 will look at tourism and Intelligent Transportation Systems and their future implications for transportation. Yet, all of the changes evolving in these areas are so interconnected that the findings in Phase 1 need to be repeated and elaborated upon in this phase, Phase 2.

Within Phase 1 a consensus was drawn up that stressed that the communities of the greatest economic development opportunities in the future were those that would possess the following characteristics:

- High-quality communications infrastructure
- Presence of an economic “gardening” planning process
- Innovative networking alliances within government that increase efficiencies and lower costs
- Entrepreneurial networking and venture capital organizations
- Capital-intensive, global, teacher-guided educational systems
- Cheaper, quicker, smarter transportation systems

Thus, community planning, inter-governmental cooperative alliances, commitment to education and telecommunications systems and innovative transportation systems are important attributes to a community’s successful

economic development. Not surprisingly, as mentioned in Phase 1, these are also the attributes of a community's "Smart Growth" Plan as well. Hence, an integration of these aspects of economic development with aspects of community planning is imminent. And, states and regions that recognize this connection will be the ones that grow with the highest level of sustainability in an economy under ceaseless transition.

So, the questions of importance to a transportation specialist become: how will these new community planning processes that merge economic development with planning and zoning change transportation needs? And, is there a rule of thumb for traffic flows that emerges from an appraisal of a community's comprehensive plan? Both of these questions will be addressed in this long-term profile of community planning in Arizona.

II. THE UNDERCURRENTS IN THE ECONOMY AND COMMUNITY PLANNING

Technological innovation, networking and connections, connections, connections are the harbingers of success in dealing with the current economic undertow. While a short-term slowdown in growth may give the appearance of making these "New Economy" issues non-issues, quiet undercurrents are incessantly building. Only when the aftermath of this slower business cycle fades away, will we again be bombarded with an entourage of new technological undercurrents.

Interestingly, these undercurrents are also changing the face of community planning and land-use principles. The states and localities that are the quickest to recognize these changes will be the communities that excel in "Smart Growth" and smart transportation planning in the future.

A. ANOTHER "NEW ECONOMY" MERGER: ECONOMIC DEVELOPMENT AND COMMUNITY PLANNING

As mentioned in Phase 1 of this project, community "gardening" will become more symbolic of community economic development programs. Economic development officials will need to take the time to assess a community's natural attributes and work "the soil" to grow industries that are economically viable. When this process is successfully united within the community planning process, more sustainable and palatable community development will occur. This process can help to assure a community's residents that by working on maintaining their collective identity while shaping the community's future growth—growth can become something to embrace. And, this smarter type of growth will occur without top-down management or drawing urban rings around the community.

A great analogy lends itself from the Career Planning fields. When an individual enters the workforce, he or she must assess his/her own passions and skills—his/her identity-- and yet still connect those passions and skills to the occupations that present the best economic return. A community must perform the same exercise. Hence, the community planning process should attempt to follow a three-step process such as the following:

FIGURE 1 PART 1: ASSESSING A COMMUNITY'S DESIRES

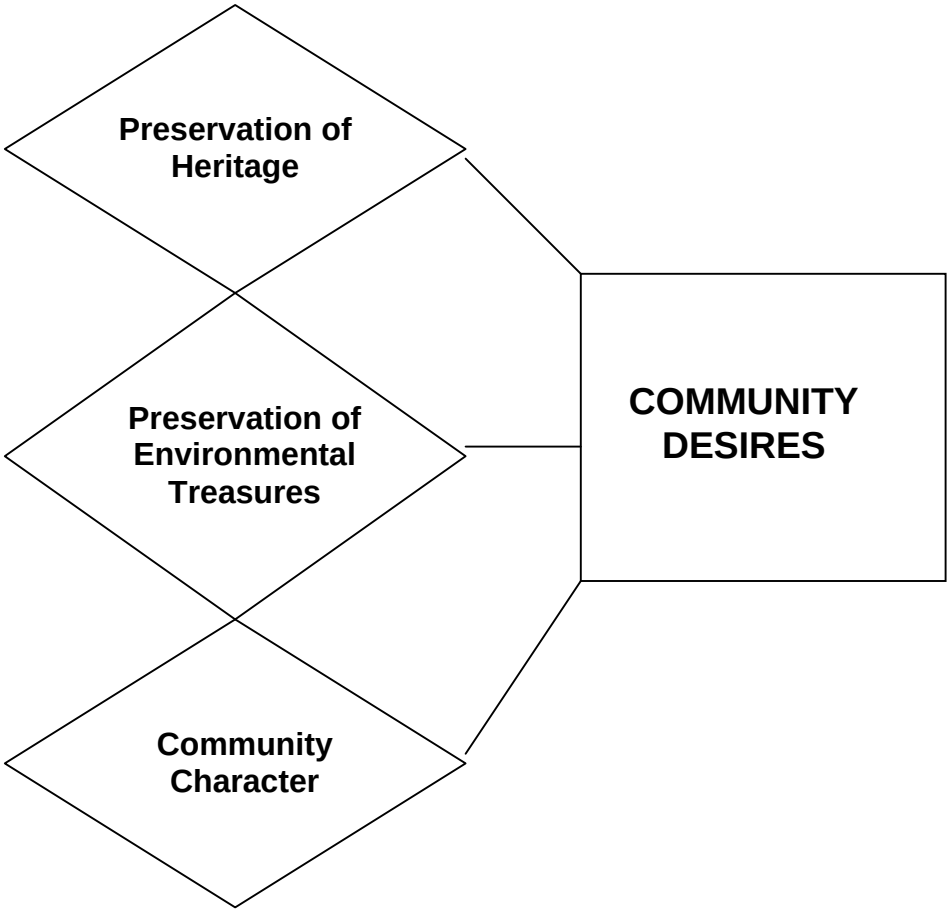


FIGURE 2 PART 2: DETERMINING THE COMMUNITY'S ATTRIBUTES

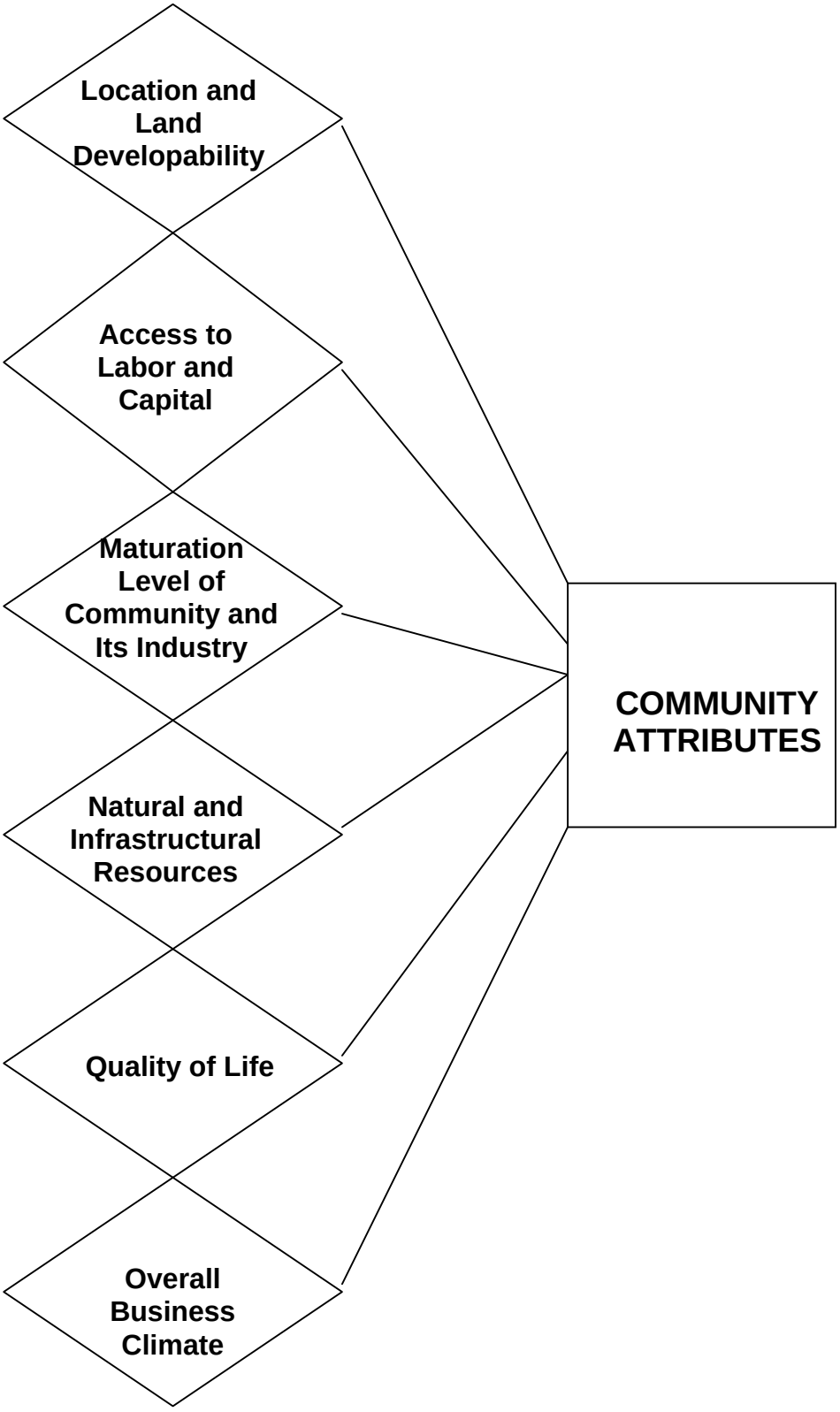
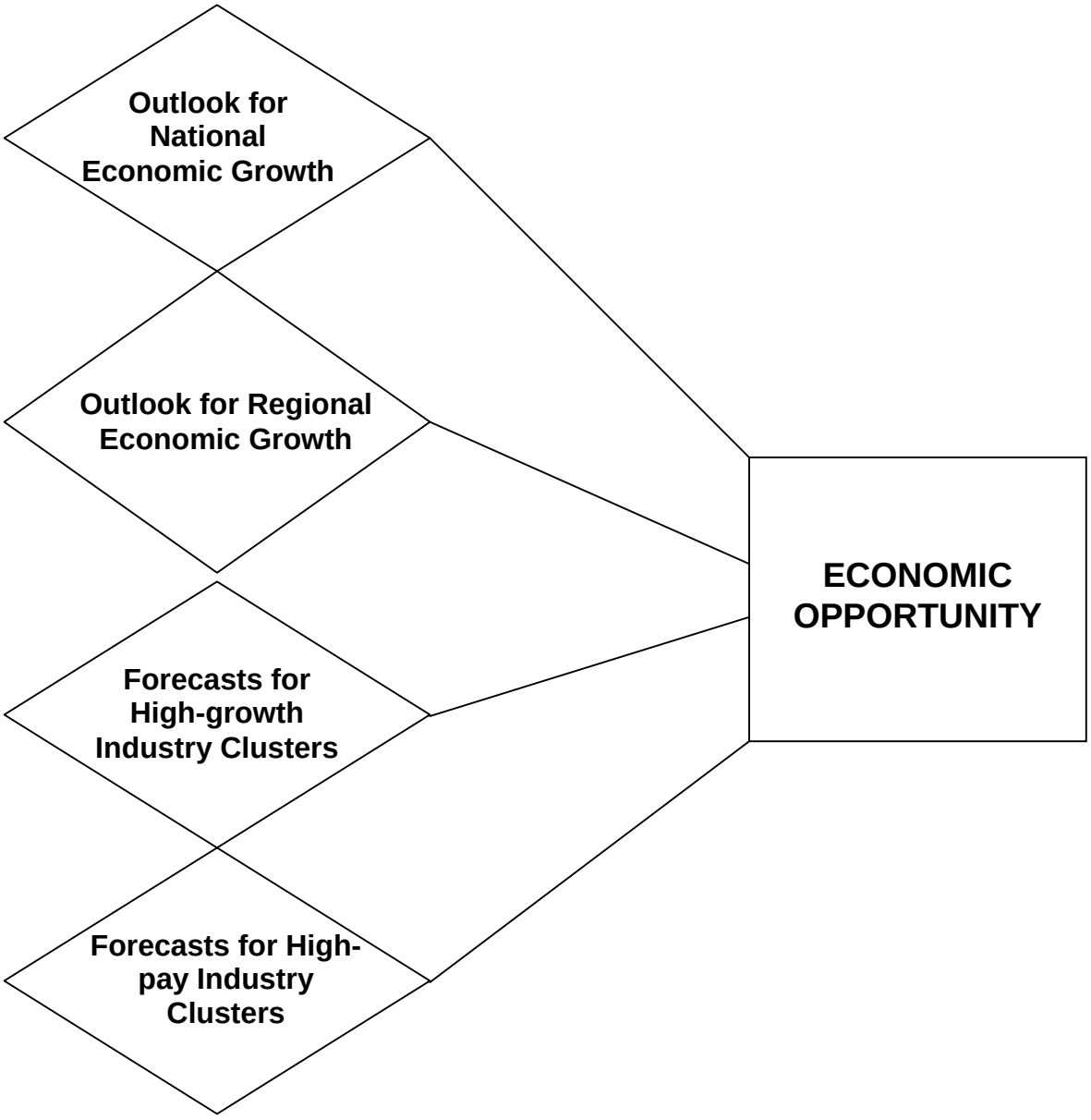


FIGURE 3 PART 3: ANALYZING CURRENT AND FUTURE ECONOMIC CONDITIONS



After a community analyzes and measures these aspects, a balancing act occurs. Just as in career planning, choices have to be made. The act of balancing a scale provides a great graphic example. Just as in career planning, if a new entrant into the workforce has the passion and skill to become a troupe dancer but the average troupe dancers in Arizona earn substantially less than the average worker, then the individual must decide if their level of passion and talent will outweigh the economic and financial impediments in the future.

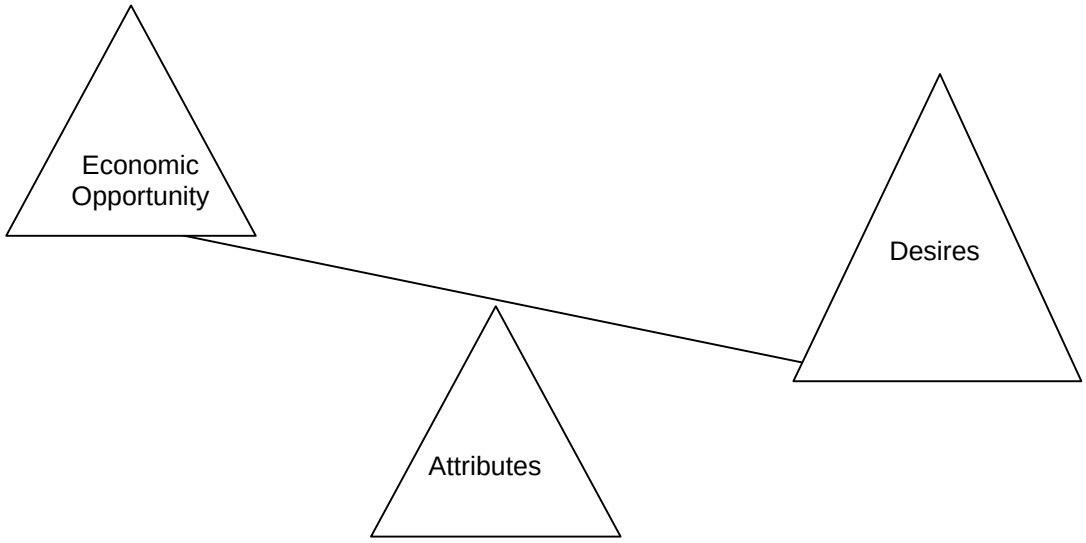
With community planning, the scale is constructed almost identically to that individual planning for his/her future. First off, the community may have

many desires: to protect its heritage and historical landmarks, to preserve the environmental ambiance they grew up with, and to safeguard its community character. Yet, at the same time, the economic foundations that once allowed the community to do this are now drastically different. In fact, some communities are just starting to feel the effects of the universal laws of growth and decay. Many laws in science build upon the fact that the rate of change in a population is proportional to the magnitude of the current population. Yet, in today's society that relationship is not constant. Instead, it is constantly in flux. Consequently, communities can be faced with a growth rate that is skyrocketing exponentially as baby boomer in-migrants become attracted to the area because of its charming heritage, landmarks and environment. Or, a community may be hit with an exponential function of decay when its industrial foundation becomes outdated and its residents are forced to look elsewhere for work. Hence, many communities are at planning crossroads. With the repercussions of error now reaching exponential proportions, understanding this "balancing of the scale" analogy could make, or break, the community's future.

There are three scenarios that typically occur when a community finds itself at such a crossroad: 1) the community propels its economy only to find that it has lost its heritage, environmental treasures and/or character, 2) clings to its heritage only to find its residents struggling to make a living or 3) takes time to analyze the situation and then purposefully balance between its treasured heirlooms and the economic realities necessary to do so.

As mentioned, the most common position of the scales is for communities to desire more than the economics could ever support. And, the community scale will resemble that which follows:

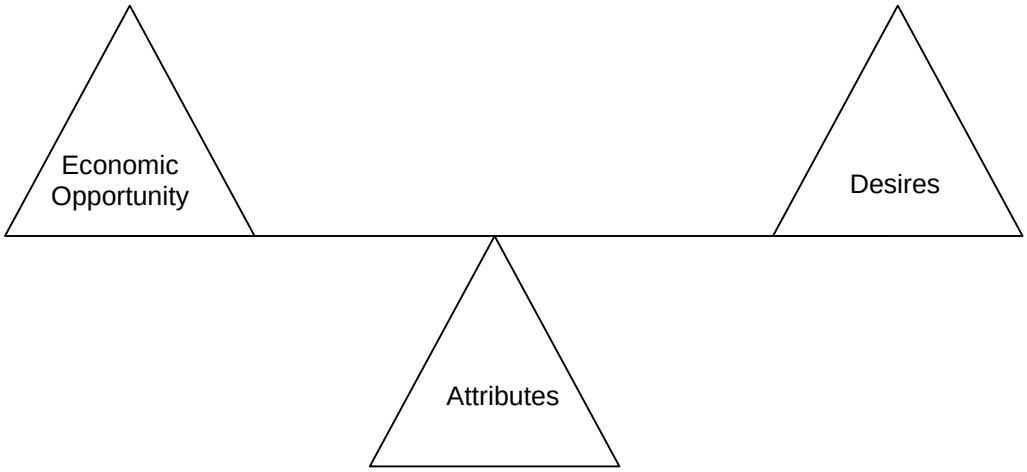
FIGURE 4 PART 4: COMMUNITY PLANNING BALANCING EXERCISE



Hence, a community can purposefully seek balance in one of two ways. First, the community could target or prioritize its desires by analyzing the aspects

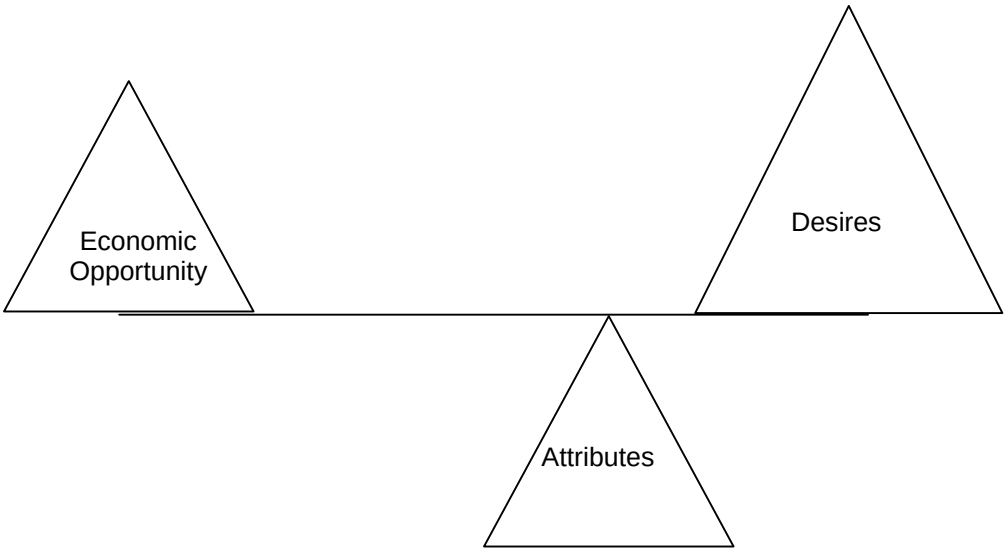
of its heritage, landmarks and environment that they are determined to fight for. This exercise lowers the burden of a community's desires and creates a preservation list to help focus a community's strategy.

FIGURE 5 STRATEGIC FOCUS OF COMMUNITY'S DESIRES



Or, the community can work on expanding its attributes such that it graphically moves the base of its scale to change the balance between desire and the economic opportunities. In the case of our troupe dancer, a dancer who is renowned throughout the world for his/her finesse would undoubtedly obtain greater compensation than the economics would have originally dictated.

FIGURE 6 STRATEGIC POSITIONING OF COMMUNITY'S ATTRIBUTES



Of course, all of this analysis is similar to the “soil analysis” function in economic gardening. Still, a community would need to “till the soil” by drawing up policies or initiatives that work the best to make the soil fertile. And, sometimes despite all the positive intentions and great work, many policies need to be continuously “weeded” or fine-tuned to achieve the desired harvest.

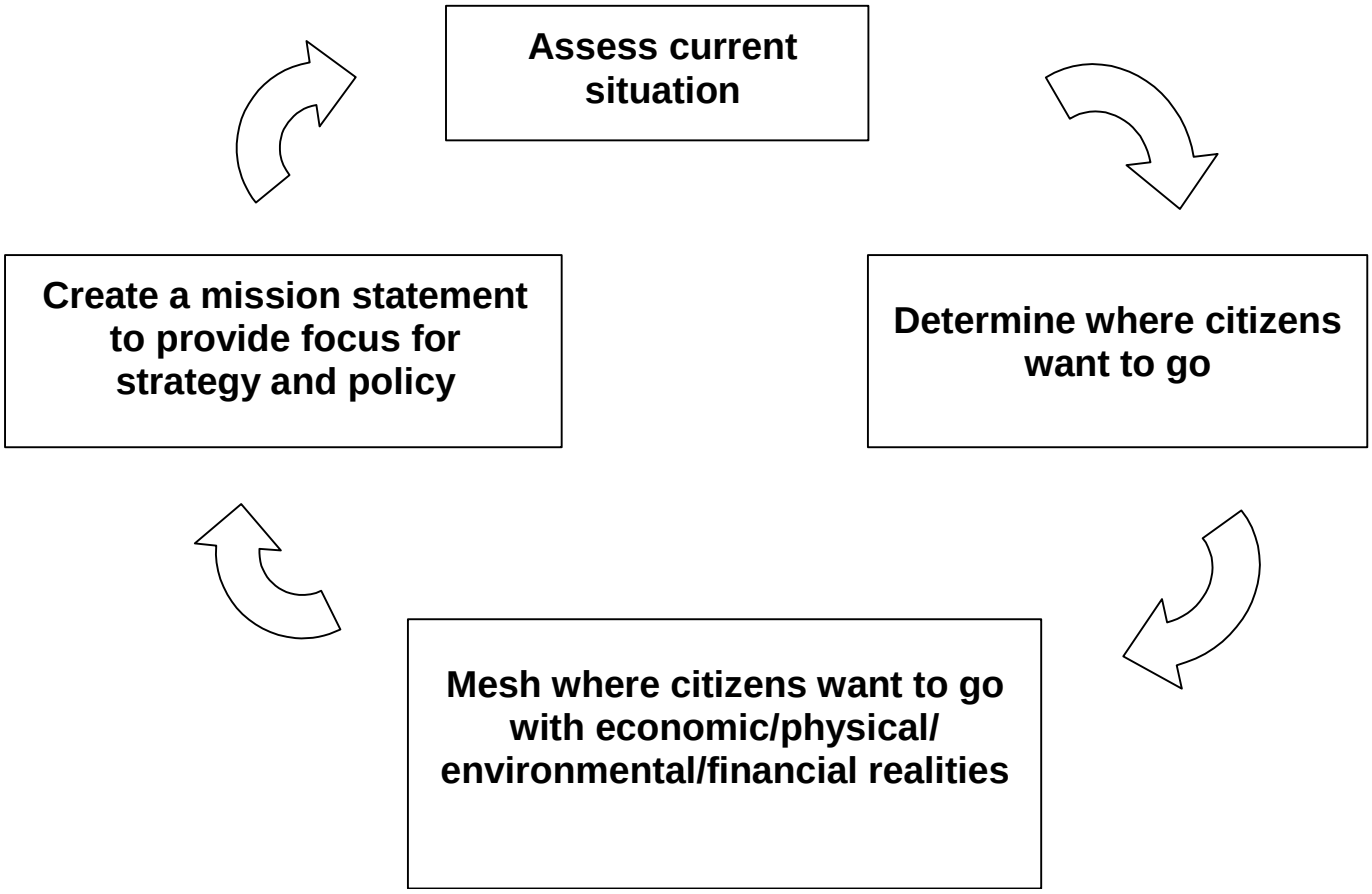
Many of these weeds pop up in the breach between the “planned” zoning of a community and actual zoning practices. While this battle reflects many other facets than just economics and community planning, the other aspects are simply too complex for a report such as this. Nonetheless, the trend is for this weeding process to become a more incessant practice in the future. Thus, to constructively excel within this weeding process, strong allegiances between the people, its government and its organizations will become imperative.

B. NEW COMMUNITY PLANNING PROCESS DICTATES CHANGING ROLES FOR GOVERNMENTS, ORGANIZATIONS AND CITIZENS

According to public policy experts David Osborne and Ted Gaebler, one of the best indicators of an innovative governmental entity in the future will be one that fosters and reflects the entrepreneurial spirit of its economy. Thus, it will be known for its “steering” ability-- strategically focusing the efforts of its private/public sectors as opposed to “rowing” or doing the work itself. And, this outstanding government entity will be known for monitoring results and refocusing efforts wherever and whenever the desired results are not being obtained.

This new arrangement for government implies that not only is the government to steer and monitor, but also to make certain its policies have a “buy-in”—even if it represents a tentative one—from all the stakeholders involved. According to Bruce W. McClendon, the Director of the Planning and Development Division of Orange County Florida, because “the public is becoming increasingly disillusioned about the failures of government”[1] and at the same time becoming more knowledgeable and sophisticated, planning needs to become a more participatory process. As stated in Phase 1 of this project, any individual armed with the technology of today can amass an attack on policies by e-mailing hundreds of other like-minded individuals. He also stresses that this buy-in of the comprehensive plan increases the pride and ownership of its residents. Thus, the “New Look” for community planning process can be illustrated as the following:

FIGURE 7 PERPERTUAL-MONITORING GOVERNING SYSTEM



The key idea that should radiate from this illustration is the circularity of the process. The necessity of this characteristic in planning and zoning comes from the "New Economy" cliches of adaptability, creative destruction and decentralization. Any community planning procedure that can not be quickly harmonized to an ever-changing high-tech environment or the ever-changing ideas of its citizenry will be doomed to failure. In fact, many land use experts agree that any new zoning system will need to be more reflective of the dynamism in the real-estate markets and yet still avoid subsidizing new growth. This will predestine some radically new ideas in zoning.

What these governmental undercurrents are doing to land use planning is interesting. Governments are being held accountable for the results of land-use zoning changes, not just for the zoning change itself. Thus, a new generation of zoning practices is unfolding. One system is known as performance zoning. Some of these performance-zoning systems use statistical measurements for the impact of a development. Some measurements that have been suggested are: estimated water consumption and sewage discharge, traffic counts, nuisance

effects such as air, noise or water pollution emitance and percentages of open space. Another technique, studied by Corey Cox of Planning and Research Incorporated in Scottsdale Arizona, is known as the "Adequate Public Facilities Ordinance". This method allows communities to delay approval of developments until the minimum levels of service for water, sewer, drainage, streets, and sometimes even schools, fire and police protection, parks, sidewalks, paths and transit are in place[2]. Other performance-zoning systems combine these measures with a measure of the degree that the development fuses with the community's comprehensive plan. The one thing all of these new systems have in common is the idea that the 21st century approach of land-use regulation should be one of "refereeing" or "calling the fouls". This system would focus simply on controlling the negative spillovers of certain land uses[3]. Beyond that, communities will be compelled to let the private market determine types of land uses.

Thus, this weeding process can be expected to curtail many of the transportation problems in the future. As the worthiness of projects becomes appraised by the negative impacts on all dimensions of the community, transportation bottlenecks will be identified much earlier in the community development process in the future.

C. TELECOMMUNICATIONS AND EDUCATION PREEMPT OTHER INFRASTRUCTURES

This "New Economy" is all about transforming communications infrastructures. The Internet, wireless communications and "dumb" computer chips placed in everything from refrigerators to autos will change the way we all do life. Hence, a lack of access to this connection will mean a slow death to a community unless its inaccessibility is made as a purposeful, marketing decision. (In actuality, some communities will be able to market their inaccessibility as a tourism niche for the many of us who will be over-stimulated by high-tech.) However, all involved decisionmakers should be certain that this inaccessibility decision is made with strategic fortitude—not out of incognizance or technological resistance.

For a while this undercurrent was flamboyantly embellished with every plug for a dot-com- yet silently, it has also been invading "Old Economy" industries from cereal manufacturers to consumer products companies. In fact, General Mills has tested a website to create customized cereals for their customers and Kimberly Clark now uses scanning information software to detect the arrival of flu season in towns all across the country! As an indicator, wireless devices and Internet appliances replaced new PCs as the stars of the show at the last Comdex Trade Show. Additionally, Europeans will soon find not only navigational systems but Internet access available in their autos. These changes are not just affecting the private sector either; Michigan has begun considering a "Cybercourt" for some civil litigation cases. Locally, Kartchner Caves'

computerized sensing devices monitor humidity, temperature and carbon dioxide levels, Phoenix-based Intesource revolutionizes grocery procurement over the Internet and Scottsdale's Apriva is working to provide wireless equipment to small businesses for scanning credit cards. Soon, the Internet will automatically alert suppliers when a company is low on inventory and our refrigerators will alert us through our Internet shopping sites that the last of the milk was consumed this morning. Hence, this connectability is affecting every aspect of lives. And, as a result, it will also affect every aspect of our residents' ability to make a living and to compete for jobs with other global residents.

Consequently, if a community is not "connected" through either high-speed broadband or wireless connections, its prospects for economic development will diminish exponentially. Also, if a community has built itself upon economic development policies that attract highly routine and easily automated positions, the probability is high that technology will lead to the automation and eventual elimination of these positions[4]. As stated by Joseph Coates, president of a research firm in Washington, D.C., telecommunication issues have to be addressed throughout a community's comprehensive plan just as much as water resources[5].

No matter how much a community beautifies and upgrades their commercial district or improves its transportation infrastructure, if it does not assess and address the issue of connectability—its economic future will not be as beautiful. In this technologically propelled economy, an assessment and vision of telecommunications infrastructure needs just as much attention as water.

The same argument can be made with education. McClendon, the planning director in Florida, can be eloquently quoted as saying, " A skilled population is the most valuable resource a community can have in our post-industrial economy. Planners need to contribute to the community's knowledge base and promote the development of 'human capital.'[6]"

In addition, phase 1 of this report discussed the overwhelming consensus among nationally renowned authors that education would become more capital-intensive in the future. With the advent of such high-tech educational systems, Cox' review of Adequate Public Facilities Ordinances becomes even more potent. As school facilities become even more capital-intensive, community planners need to address how to meet the INCREASING levels of educational services that are required by "New Economy" schools. Also, communities need to address how to assure that their working residents are able to continually retool their skill levels and gain the knowledge needed in more participatory systems.

D. TWENTY-FIRST CENTURY TRANSPORTATION

While phase 4 of this project for the Arizona Department of Transportation will research the outlook for Intelligent Transportation Systems, already the indications are that transportation technologies will make personal transportation more inexpensive and MORE EXTENSIVE. Thus, transportation specialists will be more effective by appropriately pricing transportation services rather than attempting to discourage transportation. In fact, John Charles of the Cascade Policy Institute included a policy of market-based pricing of infrastructure in his "Controlling Spillover" Smart Growth Initiative.

In addition, the ever-expanding global transportation requirements of a community need to be addressed. As one expert was overheard saying, "The airplane may become the car of tomorrow." A community will need to plan for open global transportation. Joseph Coates, the researcher from D.C., can be quoted as saying, "planners should seek to position their communities to take advantage of the opportunities that a more global economy provides." Could Wickenburg, Arizona take advantage of the cowboy appeal in Asia and hence, increase its economic base, by marketing authentic cowboy gear from its Desert Caballeros Museum over the Internet? Many small, primitive villages are doing just that. By embracing this new high-tech market and offering exclusive wares to anyone around the globe, they are reaping more revenue than they could have ever dreamed of. Communities of the future will need to plan for this globalization process.

E. OTHER FACTORS AFFECTING THE COMMUNITY

Is the community aware that retail revenues may be relinquished to Bangladesh or Sao Pablo in future? Unless your corporate citizens are adept at focusing on unique market niches, Internet shopping could make the local florist or card shop redundant. Are community planners incorporating these trends? Are there transition policies in place —policies that help encourage "New Economy" ideas while preparing residents for the "New Economy" blows to their old way of life?

III. THE UNDERCURRENTS IN ARIZONA LAND-USE CODE

A. WHAT DOES GROWING SMARTER PLUS DO?

In order to confront sprawl in Arizona, Growing Smarter and Growing Smarter Plus were introduced into the statutorial portfolios of community planning. These programs introduced four sets of changes to community planning and zoning in Arizona.

1. General Plan Changes

The first set of changes deals with the General Plans or Comprehensive Plans released by municipalities. The City of Phoenix presents a great summary of the changes introduced by Growing Smarter in 1998 and Growing Smarter Plus in 2000 as part of their Comprehensive Plan. According to this summary, the two plans adopted five new elements to the general plans of "mid-sized", "large" as well as the fastest-growing "smaller-sized" communities:

1. **Growth Area Element:** Identify areas **suitable** for the growth of infrastructure and more "efficient" multimodal transportation, allow the creation of service area boundaries.
2. **Environmental Planning Element:** Analyze and mitigate the environmental impacts of all other general plan elements.
3. **Open Space Element:** Inventory existing and planned open space, project future needs, create strategies to increase open space and recreational areas linking those with other communities in the region. Acquire open space through the Arizona Preserve Initiative process and assure access to private lands adjacent to public open space.
4. **Cost of Development:** Identify mechanisms to finance the infrastructure and public service needs of new development. Allow infill exceptions and assure that fees cover the "fair share" of the costs.
5. **Water Resources:** Evaluate current supplies and address how future needs will be accommodated.

2. Land Use Changes

The second set of changes introduced by Growing Smarter and Growing Smarter Plus are in land-use enabling legislation. Now, when a community is faced with a land-use amendment it now has more checks and balances to assure that the change confers with the community's plans. The land-use changes are as follows:

1. The Land Use Element of the community's comprehensive plan must be coordinated with the State Land Department's conceptual land-use plan. Historically, the State Land Department sought the highest return from land holdings as required by statute. Growing Smarter and Growing Smarter Plus encourages the sales of State Trust Land to mesh with a longer vision of land use.
2. The community must insure that any rezoning conforms to the Land Use Element of the comprehensive plan.
3. The community must either receive permission to designate any private land classified as future open space or allow for an alternative land use of 1 dwelling unit per acre.
4. The community must define the stipulations that create a major amendment to the Land Use Element and hold hearings for those changes at only one time every year.
5. The community must establish a takings hearing officer process.
6. The community must require notification of adjacent and affected property owners in rezoning cases.
7. The community must provide affidavits disclosing facts about lot splits.
8. The community must identify specific programs and policies to promote infill or compact development.
9. The community must maintain a broad variety of land uses.

3. Public Participation Changes

The introduction of public participation was intended to provide early and continuous exchange of information—both ways-- regarding any planning proposals. This component allows written and open public comments and requires transmittal of the plan to all other interested parties at least 60 days prior to adoption. Lastly, the plan must be ratified in totality by a majority of the voters at the next general election. This process is required to be repeated at least every ten years.

In addition, once a year, all major amendments must be presented to the public at a single hearing during the calendar year.

4. Protection of property rights

In order to designate private land or state trust land as open space, the municipality must have the written consent of the landowner. Otherwise, it must provide a viable alternative designation allowing one residential dwelling unit per acre. In addition, any major amendment must allow for a citizen review process

that notifies and embraces comments from adjacent land owners and other affected citizens.

B. GROWING SMARTER PLUS AND LAND USE PATTERNS

1. Spiderweb of Networks

During VisionEcon's perusal of the literature, one of the most interesting and comprehensive looks at development and transportation was uncovered from none other than a scientist! James A. Trefil, a Robinson Professor of Physics at George Mason University, turned his scientific observations to the evolutions of development in his book, A Scientist in the City. He discusses the "Rule of 45" –the rule that says that most people will not travel more than 45 minutes to work or shop—and the effects that transportation breakthroughs have had on the circumference of this traveling area. According to Trefil and Joel Garreau, the author of Edge Cities, information technology has now enabled the city to turn into a "spiderweb" of networks. Each of the nodes in the network represents the movement of jobs closer toward the workers in outlying areas. As the network around each node becomes too cumbersome, a new node is spawned. Thus, transportation technologies and cyberspace technologies now connect these nodes! In essence, the Internet could make Coolidge an "Edge City" of Phoenix.

Nonetheless, this spiderweb network does not relieve the strain on the transportation system. Trefil uses examples of how traffic to the center core increases nonetheless, if the center core remains a vital node in the network. In fact, he can be quoted as saying; "The emergence of the city as a network of centers rather than as a single center surrounded by residential areas poses critical problems for the people responsible for transportation planning.[7]"

He also stresses that the essential technology for an edge city is a smart highway. Because each edge city reinforces and is reinforced by the other edge cities, people must be able to move around between edge cities during the day. "Salesmen and contractors have to visit their clients, executives have to get to the airport. Without this kind of mobility, edge cities simply would not function.[8]"

Aggregating all this information on community development with the changes instituted by Growing Smarter Plus, creates the following truisms to describe land-use patterns in Arizona.

2. Spiderweb Nodes Connected by Roads, Phones and the Internet

The economic basis or role of a node in a community will be dependent upon its location and the adequacy of its communication and transportation infrastructure. While the following figure gives a pictorial of the "ideal" in a "New Economy", many communities already have other land-use patterns in place.

Nonetheless, over time, the pressures will build for all communities to transform to a version of the model that is represented in Figure 8.

In this “New Economy”, the areas that have a more direct route to a globalized system of transportation will tend to develop as industrial-based nodes or warehouse distribution centers that facilitate the movement of goods from land to air (or sea) and visa versa. These areas are represented in Figure 8 as the dark ovals.

The areas that develop in the outer-most regions of the communities will tend to house businesses that can locate anywhere. These areas will tend to bestow low-tax, low-cost locations with quality access to communications and labor. In “New Economy” circles, these businesses are known as knowledge-based businesses. They are represented as the dark gray circles.

The inner-most area nodes will provide facilities that are accessed by the totally within the community. This could be retail, entertainment or public facilities. These are represented as light gray circles in the diagram.

FIGURE 8 NODES IN COMMUNITY LAND PATTERNS

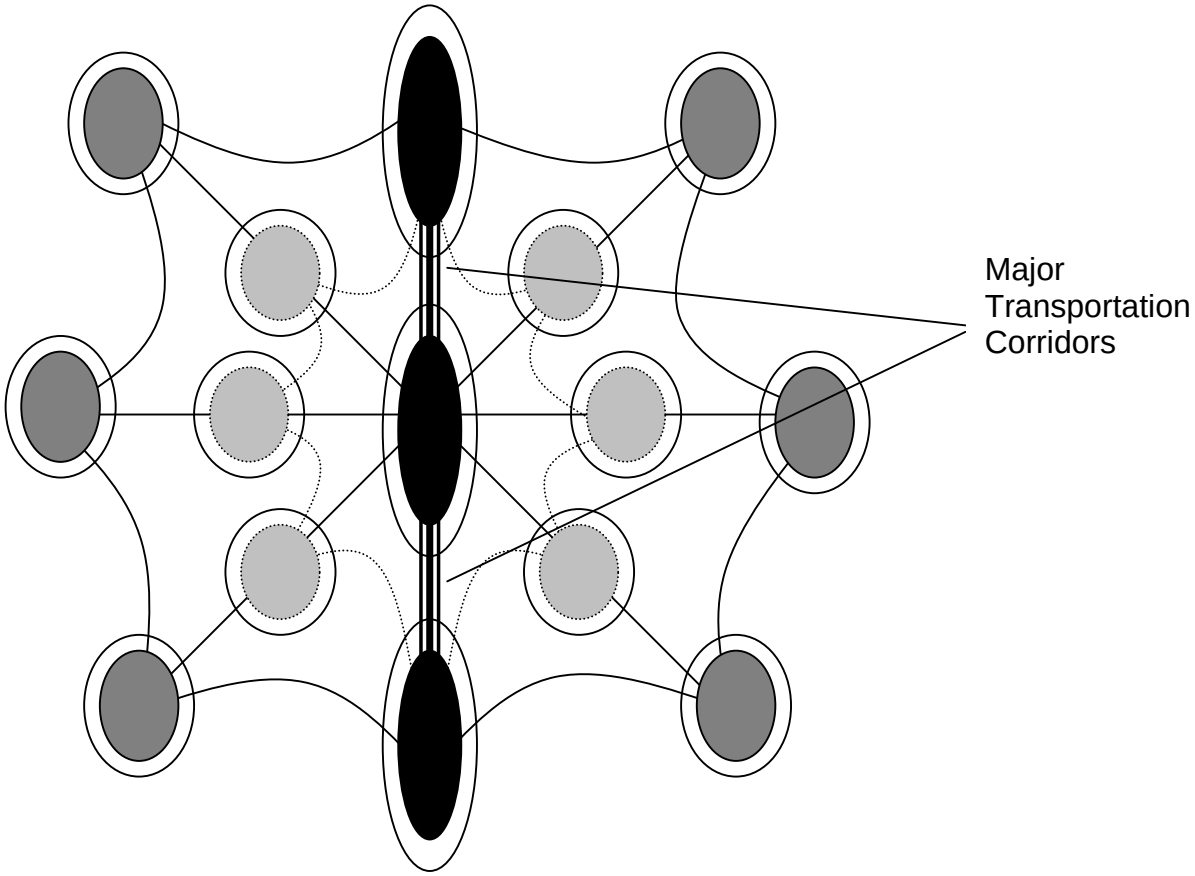


FIGURE 9 COMMUNITY NODE WITH AN INDUSTRIAL BASE

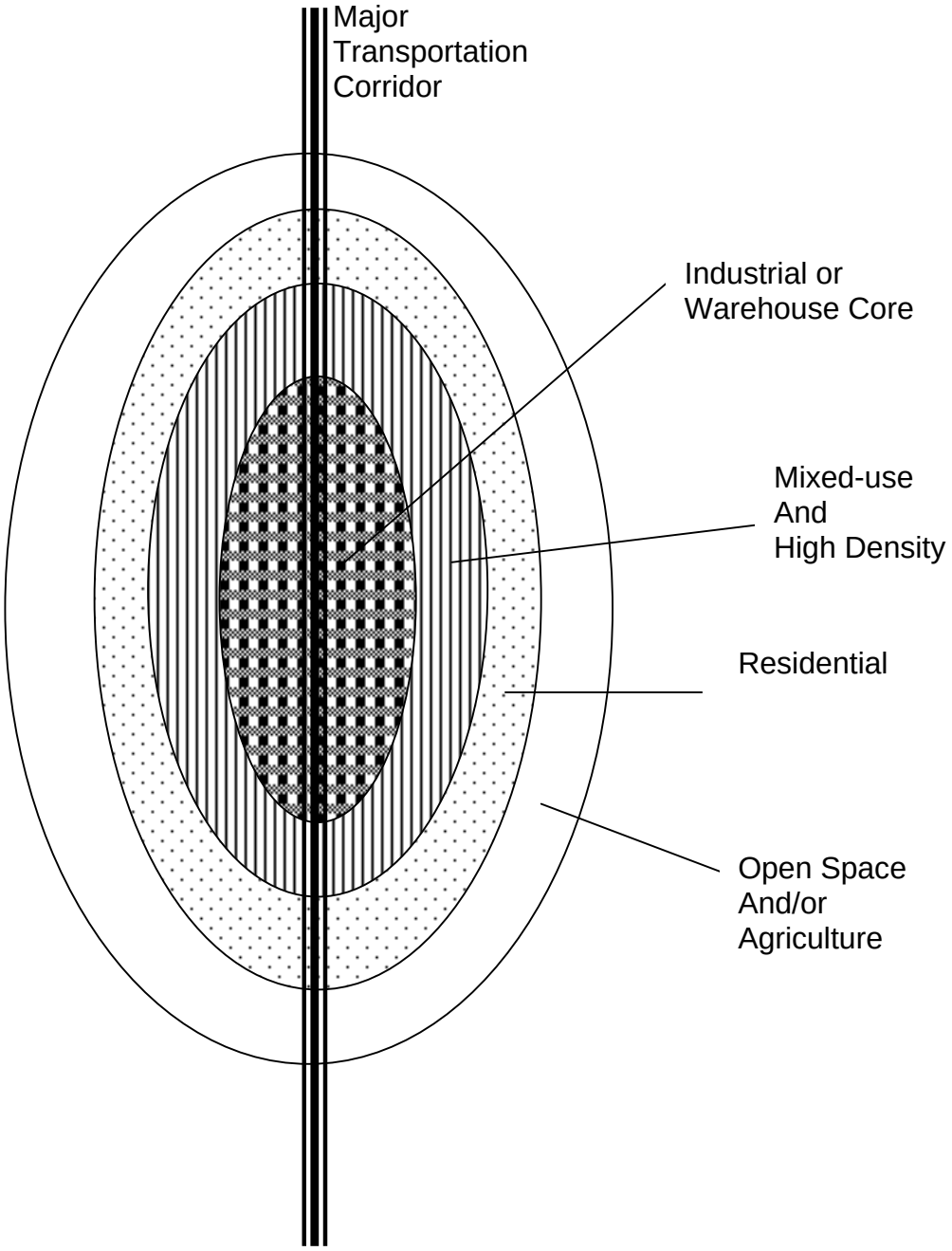
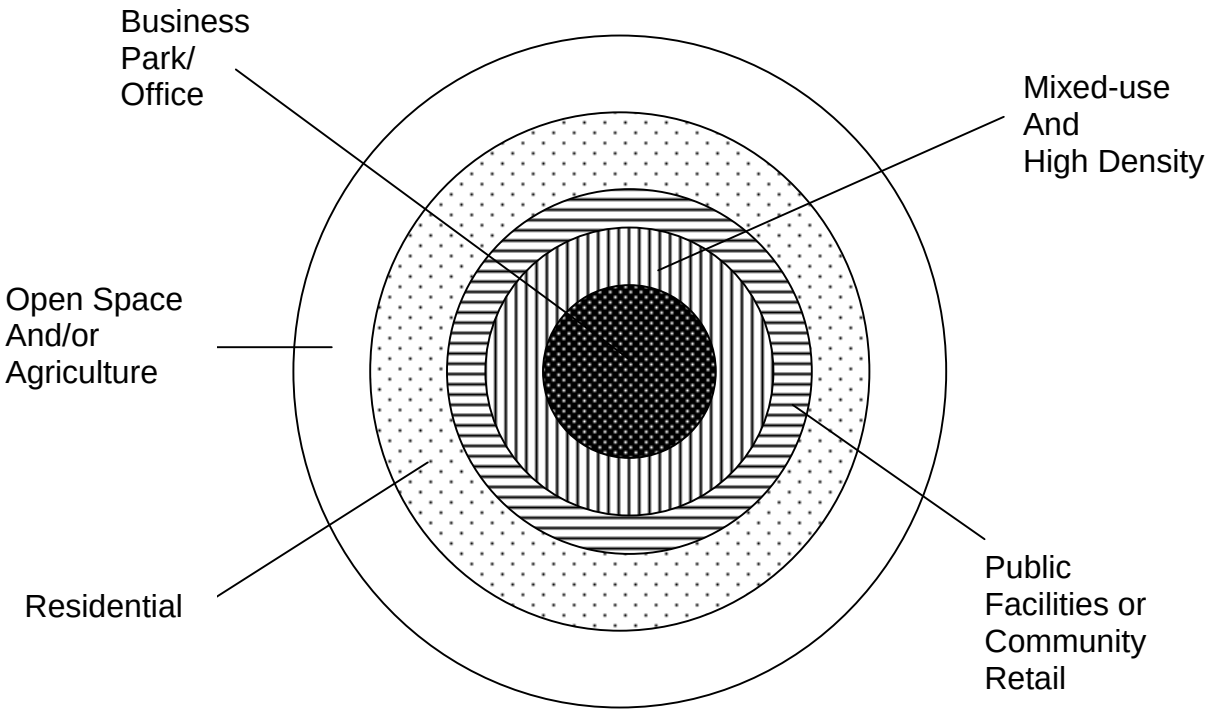


FIGURE 10 COMMUNITY NODE WITH A KNOWLEDGE BASE



Later, VisionEcon will test this theory and its relevance to Arizona. By reviewing the general plans of the cities of Phoenix and Peoria, it was obvious that both cities were on the same wavelength as Trefil. Both of these plans appeared to represent substantial investments of resources and technical finesse-- from an economist's point of view. While the city of Phoenix used the term "Urban Village" instead of "edge city", and Peoria used "commercial nodes" instead of community node, both recognized the importance of condensing employment, retail and community needs within a core.

C. WHAT DOES GROWING SMARTER PLUS DO TO TRANSPORTATION?

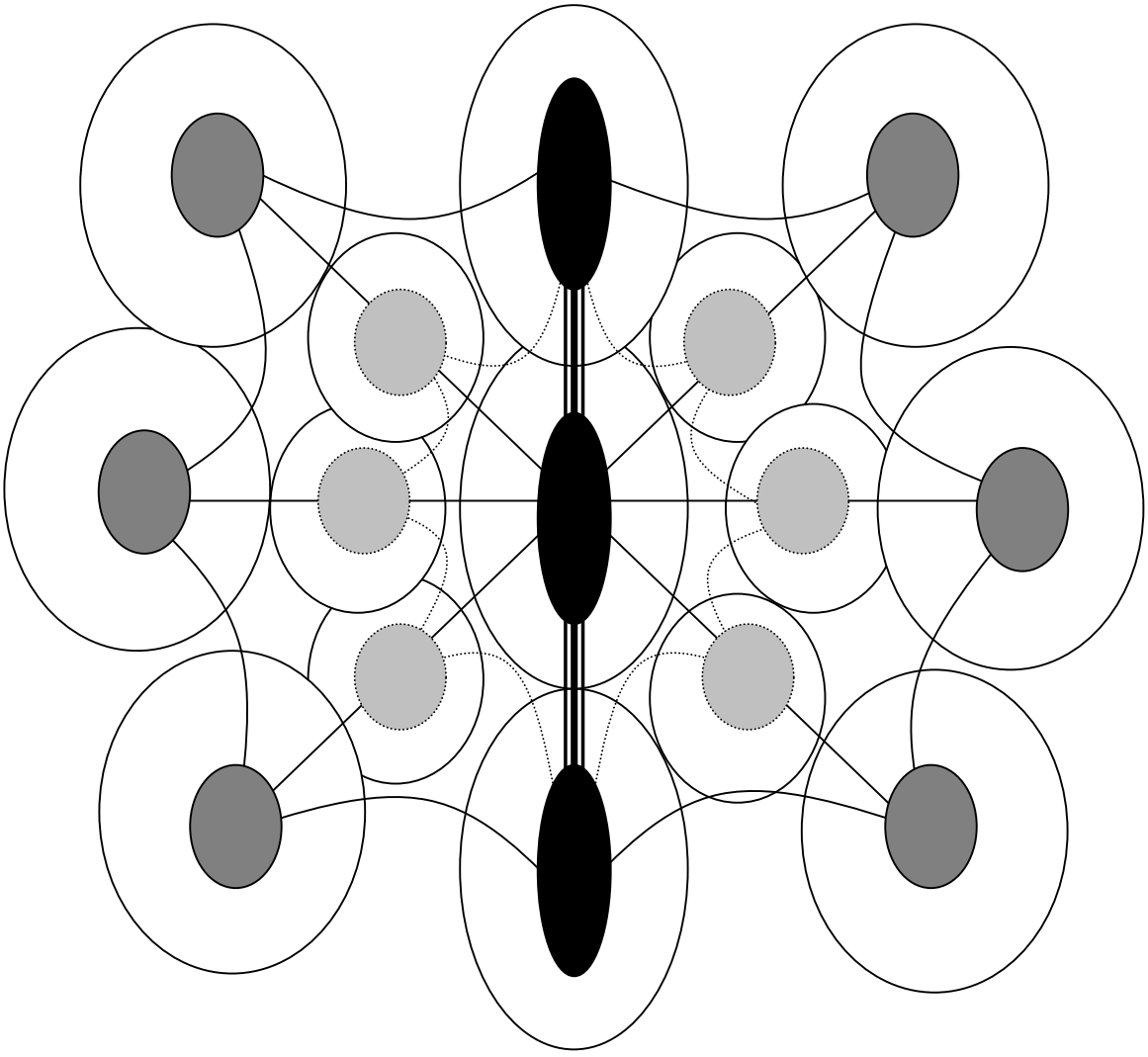
1. More Open Space

Six out of the nine planners surveyed by VisionEcon stressed that one change was eminent with Growing Smarter Plus—Growing Smarter Plus <u>will produce more open space</u>. Kirk Haines of the Peoria Parks and Recreation Department summed it up tritely by claiming that communities will now have "mega open spaces" that are connected and linked to other communities. While the dissenters in the survey did not reject this fact outright, they emphasized that

while Growing Smarter Plus was striving to encourage more open space, many communities will discount this pressure. For instance, Tom Guice of the City of Prescott hinted that their new general plan appears to have two messages: (1) Larger lot sizes, and (2) more planned area development. Sallie Bender of the County Supervisors Association and Gordon Taylor of the State Land Department both alluded to the idea that some communities may be reluctant to change their current land use plans and thus, they too will disregard the push for more open space.

Regardless, for recreational and aesthetic purposes, an increase in open space allotment is welcomed by the general public. But the impact on transportation could be just the opposite of what was intended. When a community still has available land, requiring more open space around each community node actually increases the distances covered by the transportation system. The following representation takes the ideal land-use pattern for a community from Figure 8 and increases the area of open space and agriculture.

FIGURE 11 MORE OPEN SPACE IMPLIES MORE SPACE BETWEEN NODES



One of two things will happen. On one hand, if a region or a community has an abundance of available, developable land—the distances between the nodes increases due to the larger percentages of open space. On the other side, however, are regions or communities without this abundance of land. In these instances, the vacant or underutilized land will now command a higher value due to the decline in land available for development. This higher value or price works to slow the demand so as to balance out this demand with lower levels of supply. In most communities in Arizona, land is plentiful. So, the first case will most likely be the one most experienced in communities here.

Thus, in the future, Arizonans will be traveling farther to their intended destinations -- since acres of open space must be transcended in order to get to the final point of destination! Of course, this logical progression will only occur if a community has not planned the location of open space so that it does not

hinder the trek from home to the most common points of work, or from home to the locals' favorite shops. Again, if the community has the planning tools to incorporate all of this information—their residents will not become more auto dependent. If the community does not have the tools-- their residents will be traveling even more than induced by technological advances in transportation alone.

From this representation it becomes apparent that it is not just "growth" alone that increases the needs for personal transportation. As technology moves to lower the costs of transporting and as open space creates more chasms between destinations, we will be traveling even more. Sooner or later, "Smarter Growth" will simply acknowledge that just as individuals place a higher value on single-family homes with backyards, individuals also will continue to place even more value on personal transportation. Thus, "Smarter Growth" policies will begin to acquiesce to adequately pricing the value of this transportation as opposed to attempting to change it.

2. A Rule of Thumb for Traffic Flows

To get an idea of what Growing Smarter Plus will do to this greater-distance theory in Arizona, VisionEcon investigated the relationship between some economic and land use indicators and the ensuing traffic counts within a community. VisionEcon developed a simple "rule of thumb" for transportation planners by examining the transportation relationship between Peoria, Glendale and Phoenix. The application of a simple rule of thumb allows transportation planners who do not have access to extensive data sets and meticulously-constructed models to still create an estimate of future flows.

The first gauge used in the rule of thumb estimates the amount a community is self-contained. In essence, the more a community's residents work and shop within the same node—the lower its transportation demands. Hence, this gauge attempts to mathematically categorize that self-containment. It looks at the share of a community's population to that of its all of its neighbors, and compares that ratio to the community's share of total retail sales and employment. For instance, looking at Peoria, since it is a "young" town, in terms of its stage in the maturation process for a community, its share of the population is much higher than its share of the retail sales and employment in the three-community locality. Thus, this gauge suggests that its residents work and shop elsewhere. As the community works to change this mix, the transportation flows between Peoria, Glendale and the major job center of Phoenix will lighten. This gauge works to incorporate the "here and now" of traffic counts.

The second gauge measures the visions of the future by looking at land use. Using the same logic, by comparing the percentage of land classified as residential to the percentage of land classified as industrial or commercial in the

comprehensive plan, a planner can distinguish whether the traffic loads will change in the future.

The final gauge measures the magnitude of “travelers” within a community. In Peoria, for instance, while its labor force is a small percentage of its population, many of its travelers fit into two other categories: first, active seniors or second, parents of active children. Consequently, a planner would need to measure the size of the labor force plus these other two categories of active travelers in the community.

These three gauges unveiled the following relationship for transportation planners: the percentage of potential travelers that may be found on a community’s streets grows exponentially. And, the rate at which it grows is reflective of a combination of two things: (1) the percentage of population unserved by the community’s retail and employment opportunities and (2) the ratio of residential to business land use classes.

Thus, as community planners work to encourage more “new urbanism” developments where home, work and shopping opportunities are all condensed, the percentage of potential travelers on the streets will taper off. Yet, this relationship is dynamic. As other characteristics of the population change and as transportation costs vary so will the gauges that change the rate at which the traveling population grows. But, for the life of Growing Smarter, the rule of thumb found in the Appendix will serve as a quick and easy projection tool.

IV. CONCLUSION

Decisionmakers all around the nation are being bombarded with transformations like never before. Thus far, this series of reports through Arizona's Department of Transportation has dealt with two dimensions of changes experienced in the way we live and travel. First, the economic environment has been transformed. The phrase "New Economy" tries to characterize an economic system where the creation of ideas carries greater value than the physical blending of atoms in a manufacturing setting. With knowledge and ideas of utmost value, telecommunications and educational infrastructure become of utmost importance to a community. Also, when that knowledge is shared through the networking of organizations within a community, an increase in living standards is perceived by all involved. Ironically, this increase in living standards and the increased needs for networking imply even more travel for the average citizen in the future.

The second dimension of change has come in the form of community planning. The worlds of economic development and community planning are now commingling. No where else is that commingling more obvious than in Arizona's new crop of comprehensive plans. With Growing Smarter Plus, communities are now looking at the connections between economic growth and land use planning. They are learning that in order to preserve important aspects of a community—you need the financial resources from economic growth. Yet, if economic growth is not carefully planned— it will be too late to preserve anything.

In addition, the "New Economy" trends of decentralization and accountability of government are pushing community planning to become more open to public participation and more resolved to monitoring the end results or outcomes of that planning. In the end, any community planning procedure that can not be quickly harmonized to an ever-changing high-tech environment or the ever-changing ideas of its citizenry will be doomed to failure.

Consequently, technology is fostering the proliferation of what has been called "Edge Cities", commercial nodes, or as coined by the City of Phoenix, "urban villages". All of these concepts suggest that in the future, our communities will be striving to be more self-contained. Chances are higher that we will be living, working, shopping all from our own communities in the future. Nonetheless, we will still be traveling more. The desire for more open space, which increases the distance between commercial nodes, and the continued need to travel between them, as well as the globalization of retail and manufacturing will all work to increase the number of miles traveled. Thus, just as communities are now searching for ways to ensure that the benefactors of new development cover the costs of providing public services, soon travelers will be approached to cover the costs of providing transportation services. As one

policy expert said, "…when you confront citizens with their preference for raising revenues… user fees win hands down.[9]"

In terms of transportation, Americans have become accustomed to "free rides" on the highways, and until the costs of this service are reflected in the reality of our personal budgets—we will continue to overburden our highway systems and any advanced transportation systems of the future.

APPENDIX

		Peoria	Glendale	Phoenix
	Traffic Gauge Number 1:			
1	Share of Population	6.6%	13.3%	80.1%
2	Share of Taxable Sales	4.9%	15.5%	79.6%
3	Share of Employees	2.6%	8.2%	89.1%
4	**Share of Population Unserved**	**2.8%**	**1.4%**	**-4.2%**
	Traffic Gauge Number 2:			
	Land Use Categories (According to GP)	**Percentages of Acres**		
5	Residential	44.9%	na	53.5%
6	High Density Residential	1.0%	na	2.4%
7	Mixed Use	1.2%	na	5.2%
8	Business park or Industrial	3.3%	na	8.4%
9	Retail/Office	2.9%	na	5.3%
10	Public/Quasi-public	0.9%	na	5.7%
11	Open Space/Agriculture	45.7%	na	19.5%
12	**Ratio of Residentials Share to Commercial/Industrial Share**	**6.2**	na	**3.0**
	Traffic Gauge Number 3:			
13	Population	108,364	218,812	1,321,045
14	Labor Force	32,531	110,582	724,740
15	Seniors	19,549	22,508	145,232
16	Households with children	14,783	30,171	166,357
17	**Potential Travelers**	**66,863**	**163,261**	**1,036,329**
	Maximum Traffic Counts (Most recent data available)			
18	Street Traffic available from Cities for 1999	57,016 Bell Road 83rd to 87th	43,800 Bell Road 83rd	67,500 Bell Road 23rd to 19th
19	Highway Traffic available from ADOT for 1997	56,048 101 Grand to T-bird	74,310 101 51st to 35th	176,262 I-17 Glendale to Northern
20	**Ratio of Street Traffic to Potential Travelers**	**85.3%**	**26.8%**	**6.5%**
	Ration of Highway Traffic to Potential Travelers	**83.8%**	**45.5%**	**17.0%**

Formulas:

Gauge 1: Measure 4 = Measure 1- (Average of Measures 2 and 3)

Gauge 2: Measure 12 = (Sum of Measures 5, 6, 11) / (Sum of Measures 7, 8, 9)

Gauge 3: Measure 17 = Sum of Measures 14, 15, 16

Measure 20 (Projected Percentage of Potential Travelers on the streets) = exponential [(.7 * Measure 12) + Measure 4 (expressed as a decimal)]

Measure 18 (Projected Traffic Counts) = Projection for Measure 20 from above * Projections for Measure 17

Estimates Using Suggested Formula

	Peoria	Glendale	Phoenix
Ratio of Traffic to Potential Travelers	78.9%	na	7.8%
Estimated Traffic Counts	52,755	na	80,834

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