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16. Abstract Megaregion interest has grown strongly in the last decade and is now seen by a growing number of planners as offering effective contributions to problems such as modal congestion, development disparity, and air pollution that individual metropolitan areas or cities cannot resolve individually. Megaregion planning presents an alternative way of mitigating metropolitan problems of large-scale transportation systems, green infrastructure, and economic development and has attracted a number of transportation advocates since 2000. Central questions addressed in this report include how this approach might change freight planning in Texas, what benefits and costs are associated with its adoption, and what characteristics might be of specific interest to TxDOT. The work was structured to give the Department a comprehensive literature review, take directions of interest from the Project Monitoring Committee, undertake preliminary analysis, and present these to a workshop audience comprising TxDOT planners, Metropolitan Planning Organization staff, transportation providers, public transit agencies, and federal officials. A major recommendation is a program of future work that complements TxDOT freight planning, especially at the state transportation planning level.		
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Megaregion Freight Planning: A Synopsis

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Executive Summary

Texas contains the largest network of state and local highways in the United States, arguably beginning in the 1930s when rural earth roads were incrementally replaced by all-weather gravel and paved surfaces[1]. The current system efficiently serves a diverse group of users, from those in private automobiles to a wide variety of freight using large commercial vehicles. Additionally, a network of freight rail lines, primarily owned by the BNSF Railway and Union Pacific, provides customers in the state with alternative, efficient, long-range freight transport service. The well-documented consequences of population growth now concentrate population and economic performance within defined corridors that are challenging the traditional systems of transportation planning. The focus of much of urban transportation planning has been on facilitating mobility—the efficient movement of people. Freight, for a variety of reasons, has been largely ignored. This report seeks to examine the role of freight in megaregional research to date and make recommendations to the Texas Department of Transportation (TxDOT) on whether statewide planning can be improved through the adoption of key aspects of the topic.

Texas utilizes a system of planning for future transportation needs that includes the input of multiple metropolitan planning organizations (MPOs), councils of government (COGs), and local planning authorities to aggregate a series of long-range statewide plans, one of which specifically addresses transportation. Although this system has worked reasonably well in the past, corridors of statewide or national importance are under increasing pressure from both types of users in the form of increased demand and encroachment on right-of-way (ROW), which limits opportunities for corridor enhancement. The latter is primarily due to the state's legacy of largely allowing the market to determine land uses, with no statutory land use authority granted to counties.

The ability of TxDOT to maintain existing infrastructure, build new roads and bridges, and provide funding for public transportation is increasingly threatened. Funding, traditionally sourced from fuel and registration taxes, is falling in real terms and the shortfall effects are evident in toll road construction. Megaregional planning has become a topic of discussion when evaluating potential improvements to local and metropolitan planning techniques. It offers a wider planning horizon to MPOs, COGs, and local and state entities when planning for a variety of public goods, including not only transportation, but also areas such as water planning, electricity provision, and emergency evacuation procedures. Planning on a scale larger than that undertaken by MPOs could improve efficiency by eliminating areas of duplication by, for example, allowing and nurturing a programmatic system of information sharing that all MPOs can access, or by illustrating the link between a transportation corridor and the economic health of the jurisdictions surrounding that corridor.

This report, commissioned by TxDOT, is an exploratory study that aims to determine the areas (primarily within the freight planning structure) that could be strengthened by adding a megaregional component, as well as exploring the governance, delineation, benefits, and disincentives to megaregional freight and corridor planning. The actual implementation of megaregional planning will be addressed in future studies. This study was primarily qualitative

[1] This paving project was colloquially termed "pulling the farmers out of the mud" and justified by an economic cost-benefit study on the delivery of rural mail.

and carried out utilizing interviews and workshops with stakeholders from a variety of public and private sector entities in Texas.

This report finds overwhelming evidence to support some level of megaregional integration into current state transportation planning. The strong growth in state population since 2000, which is predicted to continue to 2030 and beyond, is a key driver in this conclusion, as a majority of the state population will cluster along Interstate 35 and along the U.S.–Mexico border. Following are this report's recommendations:

1. Define the megaregion using the quality, quantity, or capacity of modal freight systems as the primary criterion.

2. Position megaregional planning to promote corridor protection, preservation, and expansion while bridging inconsistencies between statewide plans and local and MPO plans.

3. Explore the concept of load-centering freight within metropolitan areas via intermodal ports, utilizing megaregional criteria to determine optimum terminal locations.

4. Create, via TxDOT and/or the Association of Texas MPOs (TEMPO), a standing megaregional committee with a goal of identifying projects or initiatives essential to freight mobility that will benefit multiple MPOs.

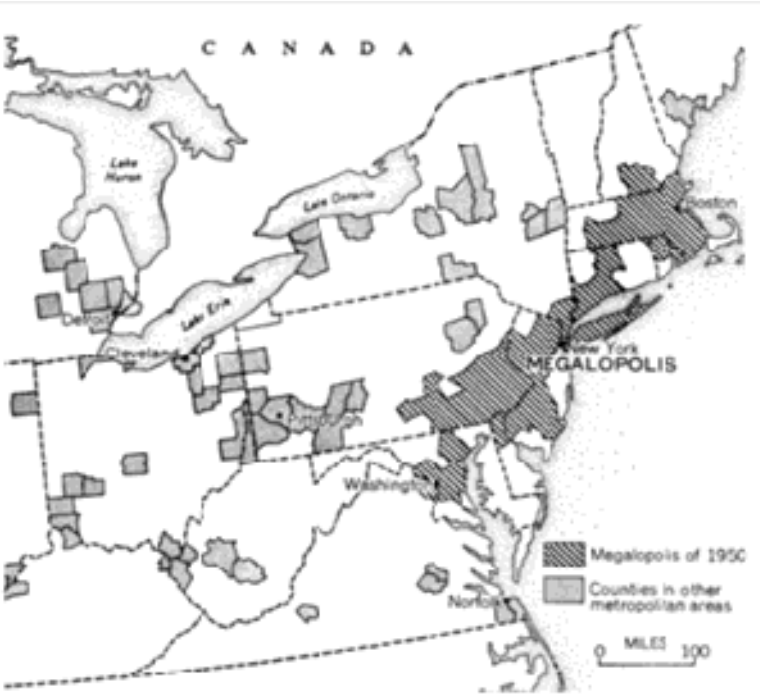
5. Utilize findings from the legal review to determine megaregional initiatives that can be pursued within the current frameworks of both state and federal codes, as well as identify changes that can be made to these codes to explicitly give local jurisdictions the power to plan and procure funding for megaregional projects.

6. Determine the viability of achieving benefits beyond those gained within the freight sector, based on synergistic megaregional interdisciplinary planning issues.

This report presents a detailed synopsis of the current state of megaregional planning, particularly in the United States, and the feedback and participation of a large group of stakeholders who debated aspects of the subject, especially those elements that impact TxDOT and MPO freight planning. This report, together with ongoing Volpe Center work on translating a step-by-step megaregional framework, strongly argues that TxDOT should include some aspects of megaregions in future statewide multimodal planning studies.

Chapter 1. Introduction and Background

The idea of using megaregions as an effective framework to define and plan the spatial layout of a city or group of cities is not new, but is currently undergoing a renaissance after a period of initial academic dormancy. Clusters of cities in geographic regions have been examined in various ways since economic industrialization, yet arguably the first attempt to identify a large, interdependent region linked by ties outside its metropolitan boundaries was made relatively recently by the French geographer Jean Gottmann. Gottmann's 1961 book, *Megalopolis: The Urbanized Northeastern Seaboard of the United States,* focused on the continuously inhabited urban corridor between Boston and Washington, D.C. (see Figure 1.1) and the proposal that economic, transportation, and communication linkages made these metropolitan areas a single functioning region. Gottmann's research also identified two other emerging U.S. megalopoli, namely the approximate areas between Chicago and Pittsburgh, as well as the California coast between San Francisco and San Diego. He argued that fostering integration along economic, transportation, and communication channels in this region would further economic growth, as well as the quality and quantity of their industrial specializations (Gottmann 1961).



Source: Megalopolis (1961)

Figure 1.1: Gottmann's Megalopolis

The impact of Gottman's work faded quickly following publication, and the idea of megaregional planning did not receive much attention in the United States until almost four decades later, when scholars began to recognize that the geographic conditions that Gottmann referred to when describing the Northeast in the early 1960s were beginning to manifest themselves in other parts of the United States. The potential economic importance and role of

megaregions in driving economies was given significant backing in the *New Economic Geography* model, pioneered by Paul Krugman in the 1990s. A significant book by Fujita, Krugman, and Venables in 2001 entitled *The Spatial Economy* combined regional planning and economic geography concepts in a way that positioned freight networks as central elements of megaregion planning (Fujita 2001).

Internationally, regions with higher population density and more rapid urbanization, which are making the transition from cities to megaregions, provide more evidence of the value of capturing freight movements. The Pearl River Delta in Southern China is quickly becoming an integrated economic amalgamation of formerly discrete regions. In the United States, Southern California regions are continuing to merge, with the lines between Greater Los Angeles, the Inland Empire, and San Diego County becoming more blurred with each passing year. These and other examples of areas that have outgrown their traditional geographic boundaries led geographers, demographers, and planners to consider different approaches to delineate and govern these growing regions. The megaregion treatment was one of these approaches.

1.1 Current Delineations of Megaregions

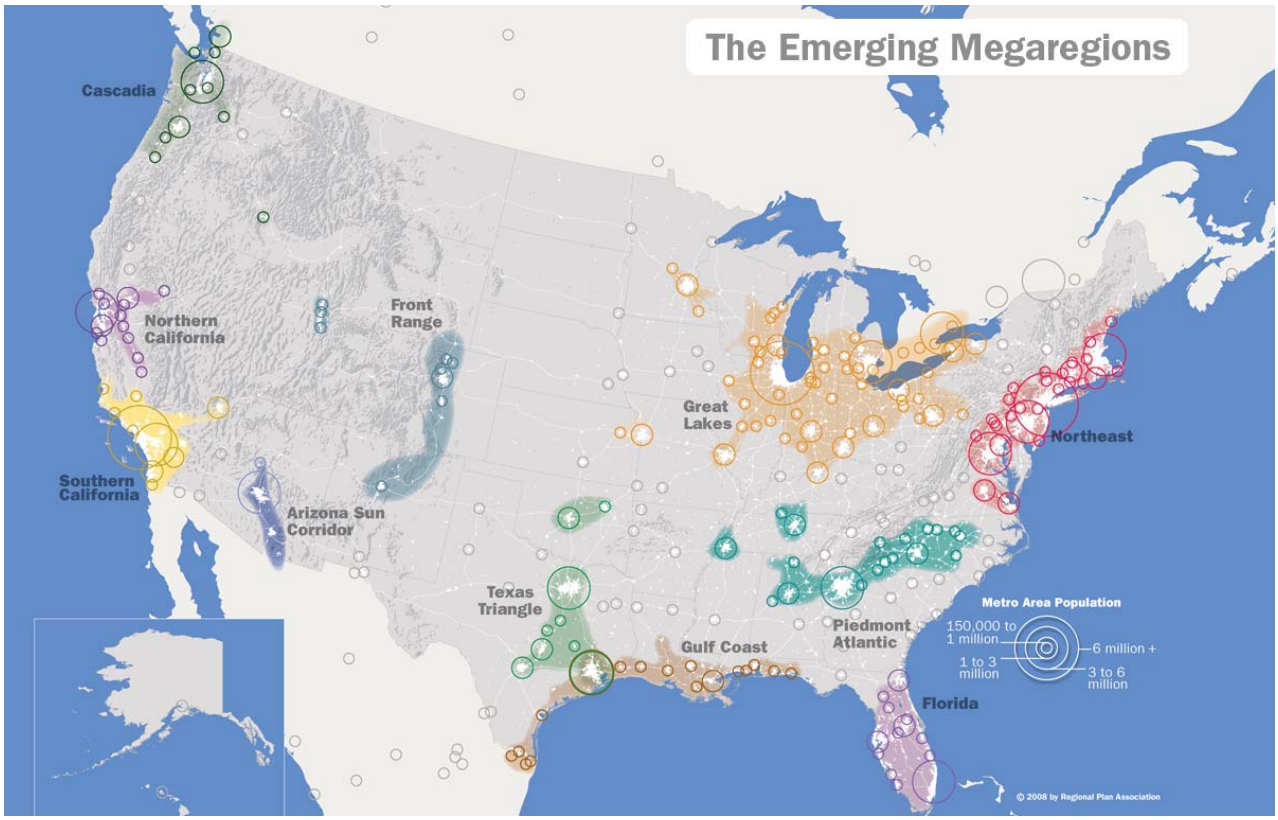
The study of megaregions, as a whole, is still not widely recognized outside academia. This obscurity could be attributed to the relatively early stage of megaregional research, especially on freight issues. The topic is a broad one but summaries of the most well-known megaregional delineations are included in the literature review in Appendix A. This chapter briefly summarizes several established definitions.

1.1.1 America 2050

America 2050, a national initiative to address development issues, defines the relationships that create megaregions as involving the following criteria:

- Environmental systems and topography
- Infrastructure systems
- Economic linkages
- Settlement patterns and land use
- Shared culture and history

America 2050 has been successful in promoting their specific definition of megaregions (Figure 1.2) and has primarily used the concept as part of an appeal for increased funding for research and implementation of high-speed rail passenger systems in the U.S.



Source: America 2050

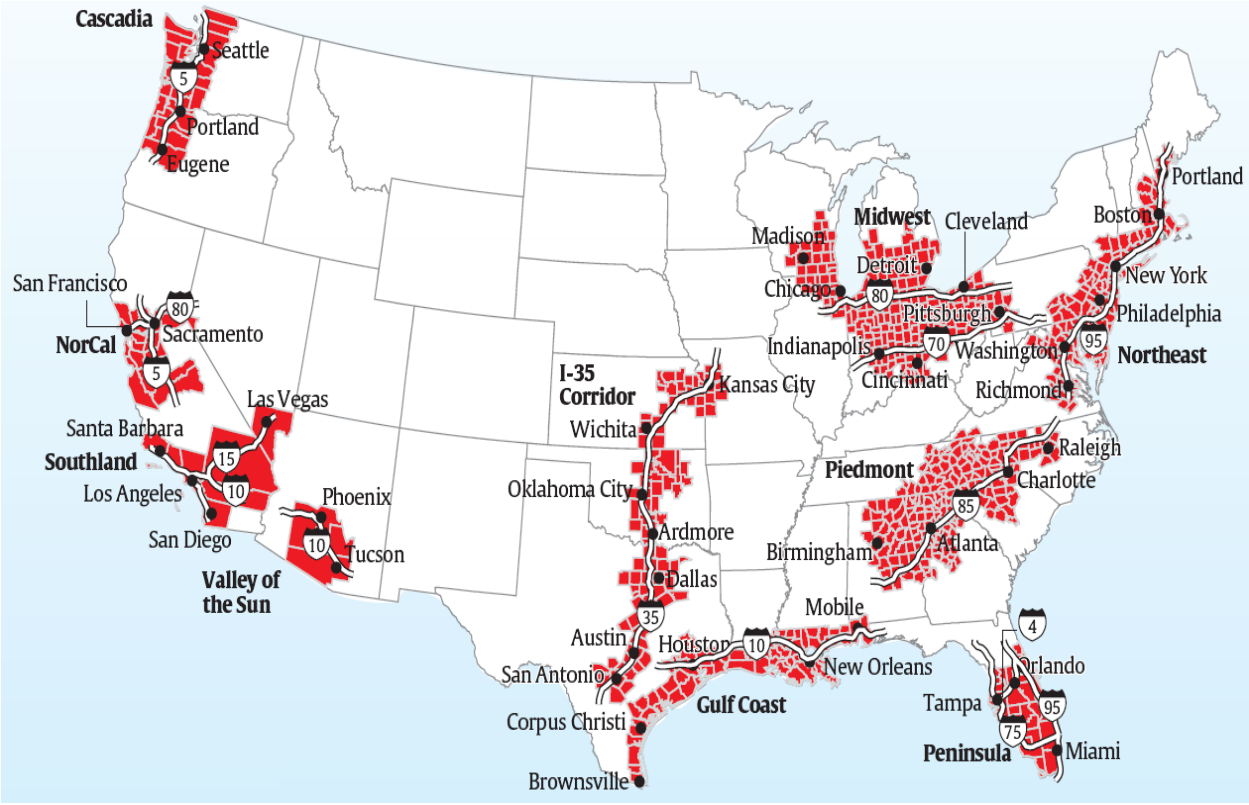
Figure 1.2: America 2050 Definition of Megaregions

1.1.2 Lang and Dhavale

Robert Lang and Dawn Dhavale delineate their megaregions in a slightly different manner than America 2050. Their criteria for megaregions, largely following conventions set in defining census geographies, include the following:

- Combines at least two metropolitan areas
- Projected population of at least 10 million by 2040
- Derives from continuous metropolitan and micropolitan areas
- Constitutes an organic cultural region with a distinct history and identity
- Occupies a roughly similar physical environment
- Links large centers through major transportation infrastructure
- Forms a functional urban network via goods and service flows
- Creates a usable geography that is suitable for large-scale regional planning
- Lies within the U.S.
- Consists of counties as the most basic unit

These criteria are more detailed than those used by America 2050, and as a result, some megaregions present in the America 2050 map are absent in the map developed by Lang and Dhavale (Figure 1.3). Specifically, the Front Range megaregion is completely. This omission is likely due to it falling short of an estimated 2040 population threshold of 10 million—the entire state of Colorado is only projected to reach a population of 8 million by 2040 (Colorado Demography, 2010). Another difference is that these megaregions specifically must lie in the U.S. This requirement eliminates parts of certain megaregions in America 2050's map. The metropolitan areas of Vancouver, Toronto, and Tijuana are all omitted in Lang and Dhavale's mapping. Given the level of economic integration seen across North America, limiting megaregions to one country may eventually be proven shortsighted.



Source: Federal Highway Administration (2007)

Figure 1.3: Lang and Dhavale's Definition of Megaregions (Virginia Tech)

1.1.3 Florida

Another often-used definition of megaregions is that devised by Richard Florida (Figure 1.4). Florida's conception relies principally on the idea that light patterns that can be seen from space are good indicators of economic contiguity, speculating that the proximity and intensity of these patterns can be taken as an indicator of the level of economic interconnectedness. Despite its simplicity as compared to other methods of megaregional delineation, megaregional borders defined by Florida match up quite well with the megaregions defined by America 2050. In one way the Florida approach is more useful in allowing an observer to quickly see what areas within a megaregion are urban versus rural. It also has a simple, non-quantitative methodology that may

be easier to relate to and understand for the public and can be (and is) applied to multiple regions worldwide.

Source: Richard Florida, 2007

Figure 1.4: Richard Florida's North American Megaregions

However, this approach also has weaknesses, the most significant of which is the fact that, in the 21st century, a strong correlation no longer exists between light and economic development when comparing across nations or continents. For example, the light pattern of Delhi, India closely resembles that of New York City, but that does not mean that Delhi is as economically developed as New York. In both high and middle income countries, the light patterns are primarily a proxy for population, not a measure of economic strength. A full literature review is presented in Appendix A.

Chapter 2. Domestic and International Scan

2.1 Overview

The literature review highlighted a small but growing stream of academic literature discussing megaregions, including Catherine Ross's 2009 book *"Megaregions: Planning for Global Competitiveness."* This newly found focus on megaregional research has not been limited to North American scholars, but has expanded across the globe. Examples of megaregional study from other areas of the world include a European perspective from *Regionalisation, 'Virtual' Spaces and 'Real' Territories: A View from Europe and North America* (Herrshel, 2009) as well as an Asian perspective given by Xu and Yeh in *Governance and Planning of Mega-City Regions: An International Comparative Perspective* (Xu and Yeh, 2010).

A central objective of the study was to conduct both domestic (U.S.) and international scans to gather information on megaregional activities. Researchers reviewed the websites of multiple planning groups to identify related activities, including new reports and studies. Interviews were conducted with a cross-section of public sector agencies to gather input on any megaregional activity, and to ascertain the level of knowledge surrounding this term. Table 2.1 lists the interviews conducted with public sector agencies. The main list of questions developed to guide these interviews is provided in Appendix B.

Table 2.1: Public Sector Interview List

Name, Title, Agency	Date
Chandra Bondzie, Lead Planner Freight, Houston Galveston Area Council	May 2011
Maureen Crocker, Executive Director, Gulf Coast Rail District	May 2011
The Hon. Ed Emmett, Harris County Judge	May 2011
Rebekah Karasko, Transportation Planner, North Central Texas Council of Governments	May 2011
Howard Lazarus, Director of Public Works, City of Austin	June 2011
Neil Maxfield, Managing Director Asset Development, Denver International Airport	May 2011
Rob Spillar, Director Transportation Planning, City of Austin	June 2011
Charles "Muggs" Stoll, Transportation Director, San Diego Association of Governments	May 2011
Lily Wells, Port of Houston Authority	May 2011

A pilot test of the initial set of questions was undertaken with staff at the Economic Development Office of the City of Austin, Texas. The purpose was to ensure that the questions were appropriate to initiate dialogue and allow productive discussions on the topic. The outcome resulted in changes to some questions and their wording to eliminate bias. These questions were then modified for each agency to reflect the differences in perspectives.

The researchers also reviewed term papers that were developed in Dr. Talia McCray's and Lisa Loftus-Otway's Community and Regional Planning Graduate Seminar on Planning for Megaregions at The University of Texas at Austin in spring 2010. Students were required to each examine a megaregion and review activities taking place on the transportation front, as well as

review any governance, regional planning, or other activities that had a megaregional focus. These summaries were used to develop short synopses of the megaregions given in Table 2.2.[2]

2.2 North American Megaregions Scan

Figure 1.2 in Chapter 1 showed the 11 main megaregions identified by America 2050. Table 2.2 presents the primary characteristics for the identified U.S. megaregions.

Table 2.2: Megaregional Characteristics

	Primary road link(s)	Common water resources	Single state	Transportation links?	Economic links	Cultural linkages?
Arizona Sun Corridor	IH 17/IH 19	Yes	Yes	Yes	Construction	Yes
Cascadia	IH 5	No	No	Yes	Diversified	Yes
Florida	IH 75/IH 95	No	Yes	No	Tourism	Yes
Front Range	IH 25	No	No	Yes	Diversified	Yes
Great Lakes	Multiple	No	No	No	Diversified	Yes
Northeast	IH 95	No	No	No	Diversified	Yes
Northern California	IH 5	No	No	No	Technology	Yes
Piedmont Atlantic	IH 85	Yes	No	No	Diversified	Yes
Southern California	IH 5	Yes	Yes	No	Entertainment, Aerospace	Yes
Gulf Coast	IH 10	No	No	Yes	Petroleum, Energy	Yes
Texas Triangle	IH 35, IH 45, IH 10	Yes	Yes	No	Diversified	Yes

The next section discusses the identified megaregions in the U.S. and activities that have been conducted to date regarding transportation planning in the megaregional context.

2.2.1 California—Northern and Southern Megaregions

Two megaregions have been identified in California: Southern California and Northern California. The Southern California megaregion encompasses one of the most economically, socially, and geographically diverse urban regions of the world, including the cities of San Diego and Los Angeles. The megaregion stretches from Ventura County in California to the state of

[2] With thanks to our Spring 2010 inaugural class of students: Ali Christoph, Danny Fox-Baker, Ana Gomez-Sanchez, Analissa Icaza, Donovan Johnson, Katherine Kortum, Jeff Loskorn, Taylor Mansfield, Eleni Harris-Pappas, Maggie Sims, and Jennifer Zankowski.

Baja California in Mexico, and includes the inland agricultural centers of Kern and Imperial Counties. The western boundary of the Pacific Ocean stretches for over 250 miles, and includes dense urban cities, a national park, military bases, environmentally sensitive areas, and some world-famous beaches. Arizona and Nevada form the eastern boundary of this megaregion. The urban agglomeration is home to over 22 million people. From a freight perspective, the San Pedro Bay Ports of Los Angeles and Long Beach are the critical core of this megaregion, both as the largest ports in North America, and because the bulk of containerized trade entering the U.S. comes through these two ports. The rail lines of Union Pacific (UP) and Burlington Northern Santa Fe (BNSF) also begin their transcontinental routes from the San Pedro Ports. This megaregion is also crisscrossed by major interstates and urban freeways and is well known for chronic congestion and poor air quality. The Texas Transportation Institute's *2010 Urban Mobility Report* listed the Los Angeles-Long Beach-Santa Ana metropolitan area as the third-most congested city of very large cities in America (Shrank et al., 2010).

In Southern California, planning on a megaregional scale has historically been performed on a state level via the California Department of Transportation (Caltrans). However, in recent years the traditional top-down approach to transportation planning in California has been problematic due to a number of factors, including explosive growth, a decline of economic competitiveness, and a steady growth of bureaucracy related to administering and planning the state's multiple large metropolitan areas. In the absence of a strong state government, local jurisdictions and metropolitan planning organizations (MPOs) have become the drivers of innovation in transportation in California.

As a result, the state has seen new ideas implemented such as "blueprint planning," which aims to integrate both local and regional goals and objectives for transportation, land use, and the environment (Tietz and Barbour, 2007). The use of public-private partnerships (PPPs) in California is also continuing to gain steam in the face of weak economic indicators and the accompanying decline in revenue to state and local governments. The PPPs address revenue shortfalls in a way that is intended to accomplish specific goals with the help of the private sector and ease the burden on the taxpayers as a whole. Strategic use of PPPs will help the state mitigate the structural shortage of revenue that it now faces.

Charles "Muggs" Stoll, Director of Land Use and Planning at the San Diego Council of Governments (SANDAG), expressed what many other planners and decision-makers have expressed—that California needs governance, not new government, to plan for megaregions. Mr. Stoll expressed support for a Caltrans-centered solution for megaregional governance, which may play well in an area of the country where state government still holds a large amount of influence in transportation affairs. Tietz and Barbour consider the resistance to new governmental entities as detrimental because no potential entity could reasonably administer a region or group of regions that exist under current political boundaries. They hypothesize that new political boundaries would have to exist, and that some of the powers currently held by local and state governments could be lost to a potential megaregional government. Defining a megaregion in California could prove challenging given these conditions and the fact that no consensus exists on whether Northern and Southern California are one megaregion or two separate megaregions.

The Northern California megaregion comprises the cities of San Francisco, Oakland, San Jose, and Sacramento, as well as their respective surrounding areas. Geographically, this region is built around significant watershed, with both the Sacramento and San Joaquin Rivers flowing from their headwaters in the Sierra Nevada and Klamath Mountains, respectively, into San

Francisco Bay. The region is generally affluent, as the San Francisco Bay Area has the highest per capita gross domestic product (GDP) of any metropolitan area in the nation (U.S. Department of Commerce, 2011). However, there are pockets of poverty within the Oakland and Sacramento regions. The Northern California megaregion has over 14 million people. High housing costs, long commutes, and pervasive, farmland-destroying sprawl are issues that this megaregion faces.

The San Francisco Urban Research Association (SPUR) began work on defining this megaregion in 2005–2006. They mapped four key features to determine the boundary: travel times, population growth and land consumption, environmental features, and pre-existing government-defined regional groups (Metcalf and Terplan, 2007).

Based on these maps, SPUR defines the Northern California megaregion with both a core and sphere of influence. The core area combines the primary urban areas around San Francisco Bay with the greater Sacramento region and includes the nearby commuting counties in the Central Valley, Central Coast, and the Sierra Nevada Foothills. The sphere of influence extends south to the Fresno area, east into the lightly developed Sierra Nevada counties and Reno, and north beyond Santa Rosa and past Ukiah.

The Metropolitan Transportation Commission of San Francisco has adopted SPUR's concept of a core with spheres of influence and utilized it within their GIS (geographic information system) database sets. In March 2010, the Oakland Chamber of Commerce, Port of Oakland, and City of Oakland hosted the 2010 Northern California Megaregion Summit, where business, government, labor, and community representatives convened to discuss goods movement infrastructure development (Oakland Chamber of Commerce, 2010). The goal behind this summit was to create a regional dialogue about goods movement, infrastructural development, and maintenance that will be required to keep the Northern California megaregion competitive.

Potential Lessons for Texas: Blueprint planning seen in California could potentially have some positive effects in Texas. The greater integration of local and regional plans beyond simple aggregation could lead to stronger planning practices with respect to land use, corridor protection, and environmental concerns. Also, MPOs in both California and Texas have expressed in interviews that they are averse to the idea of adding any additional layers of government or bureaucracy but would prefer that the existing state transportation authorities, including MPOs, take the lead in the potential expansion of megaregional planning.

2.2.2 Front Range

The Front Range megaregion, ranging from Northern Colorado (sometimes even defined as southern Wyoming) to Northern New Mexico, is one of the smallest yet fastest growing megaregions. However, it is currently struggling with demands placed upon it by rapid growth, especially in the Colorado portion of the segment running along Interstate 25 between Boulder and Pueblo. Northern New Mexico is experiencing strong growth as well, but not of the magnitude seen in Colorado.

Because this megaregion spans multiple states, it is essential to examine the current initiatives being explored and carried out by each state to improve transportation access across the entire megaregion. New Mexico, with a long legacy of unsuccessful regional planning and governance initiatives, has begun to undertake serious regional efforts under the leadership of Governor Bill Richardson. Richardson's vision to bring regional passenger rail service to New Mexico was brought to fruition in 2006 with the opening of the New Mexico Rail Runner Express commuter rail serving the Greater Albuquerque area. Interstate 25 in this corridor is

increasingly congested, and the commuter rail serves as an effective alternate mode for Albuquerque residents and visitors. Governor Richardson has been a champion for expanding the level of awareness of the need for more comprehensive long-range transportation planning.

In Colorado, regional cooperation has a much stronger legacy and is further along than it is in New Mexico. The Metro Mayors Caucus is an example. Founded in 1993, 32 mayors of Denver area municipalities have joined efforts to provide a regional voice in seeking to address key regional issues, including transportation. Additionally, the Metro Denver Economic Development Corporation seeks to develop a regional competitive advantage that aims to attract economic growth to the Denver metropolitan statistical area (MSA). The Denver Regional Council of Governments undertakes the traditional role of an MPO. Finally, the Regional Transit District of Denver promotes rail and has authority to pursue private financing to build transit improvements.

Megaregional cooperation has been seen in the Front Range area via the completion of commuter rail projects in both the Albuquerque area and the Denver area and the desire to expand these projects to create a megaregional rail system. This rail system, dubbed the "Ranger Express" is proposed to initially serve the Front Range region of Colorado, with later extensions to New Mexico and Cheyenne, Wyoming. Megaregional cooperation on the Front Range is widespread and pervasive, and will likely greatly shape the area's future.

Neil Maxfield, Managing Director of Asset Development at Denver International Airport (DIA), noted that the airport takes a strong role in planning, including intersecting with the economic development department out of the City/County of Denver regarding the positioning of Denver as a region for business opportunities. The airport is precluded from targeted planning outside of its boundaries under federal rules and Federal Aviation Administration (FAA) guidelines. However, airports are required to complete FAA-mandated Airport Master Plans, which determine development directions for the airport property, additions and improvements, and other developmental matters. Denver recently completed a new Airport Master Plan, expected to be authorized by the FAA in late 2011, and is now developing a Commercial Master Plan for their site. As part of this, they have been working with regional stakeholder partners, such as the economic development division, and with Colorado's DOT and the City and County of Denver (who are the airport's owners) to ensure that the airport will be positioned as a partner for any proposed commercial development that would impact freight. The airport also takes a proactive role in both the regional planning process and the statewide transportation planning process. The airport was forced to move from its original home at Stapleton in the central Denver area due to inadequate runway separation, lack of room to grow, pervasive weather delays, and an administrative judgment that found the airport had become a nuisance to the surrounding community due to aircraft noise. As a result, the airport is extremely aware of the importance of proactive planning to get ahead of any problems, and to set the tone and direction for any future development. As an example, new airspace plans are ensuring that takeoff departure procedures (DPs) will follow existing highway rights-of-way, and will route over industrial areas to minimize aircraft noise to residential or other sensitive land uses.

One other interesting component that came out of the interview with the DIA is the consideration of how different agencies and entities may actually intersect within and outside of their identified megaregion. For example, DIA noted that they serve a large constituency of passengers who are travelling to/from Wyoming, Nebraska, South Dakota, and Kansas. Thus, in some ways the Front Range megaregion, from an air connectivity perspective, may not accurately reflect the reality of passenger flight movements.

Potential Lessons for Texas: The Front Range case study offers guidance in how to improve regional planning in a state that is growing rapidly and has strong property rights like Texas. However, the Front Range megaregion is significantly smaller in population than either of the delineated Texas megaregions. While struggling with balancing growth pressures and environmental concerns, the component governments of the Front Range megaregion are thinking ahead. When Texas makes the decision to consider a large-scale transportation system that must link to another state, the Rocky Mountain Rail Authority is a good model for how these governments could organize themselves in the pursuit of a common megaregional goal.

2.2.3 Cascadia

The Cascadia megaregion, consisting of the metropolitan areas of Seattle, Portland, and Vancouver, British Columbia, is notable for its unique defining characteristics. This megaregion is not only smaller in population and size than most of the other popularly demarcated megaregions, but is also largely seen as bi-national, which only Southern California and the Midwest megaregions can also claim. It is also the smallest megaregion demarcated on all megaregional maps, as the Front Range and the Arizona Sun Corridor are not always defined as megaregions.

Due to the bi-national nature of the megaregion, more competition exists for investment within the megaregion than perhaps in some of the others. For example, given equal external factors, it doesn't make a difference to a foreign manufacturer whether or not they locate in Oregon or British Columbia, as long as their needs are met at the lowest possible price. However, the federal governments of the United States and Canada have a much more vested interest in where that new manufacturing facility goes within the Cascadia megaregion.

Nevertheless, this competition does not stop megaregional partners on both sides of the border from working together to find solutions to transportation, environmental, and trade issues. The Pacific Northwest Economic Region (PNWER) is a statutory PPP that counts in its membership five U.S. states, (Alaska, Idaho, Montana, Oregon, and Washington) and four Canadian Provinces (Alberta, British Columbia, Saskatchewan, and the Yukon Territory). Established in 1991, this group encompasses more of northwestern North America than the specific Cascadia megaregion is normally defined to encompass. However, the decisions made by the group tend to affect the megaregion disproportionately as the largest centers of population in the PNWER region.

The primary group focused solely on the interests of the megaregion itself is the Cascadia Discovery Institute (CDI). The CDI aims to advance planning efforts for the Cascadia megaregion by promoting investments in surface and maritime infrastructures, funding these investments by implementing policy that would bring the cost of driving more in line with its actual cost, and focusing on corridor and environmental protection. This group has also heavily focused on the technological aspects of future transportation modes, such as ensuring that the Pacific Northwest is prepared for the anticipated future growth of the electric vehicles and intelligent transportation systems.

Additionally, the Cascadia Center for Regional Development was founded in 1993 and aims to solve planning issues that face the Cascadia corridor and the U.S.–Canada border realm. They promote policy improvements to improve the quality of life for residents of Cascadia.

Potential Lessons for Texas: The Cascadia region is generally seen as one of the most progressive megaregions and has multiple initiatives planned that have significant potential to position this megaregion for the future. Most of these initiatives relate to transportation and the

environment. Parts of the Interstate 5 corridor (which serves as the spine of this megaregion) are undergoing congestion similar to that seen along portions of the Interstate 35 corridor in Texas. Corridor protection for IH 35 and others will be critical to Texas continuing to grow economically. Environmental protection and stewardship will increasingly become issues for any state with a growing population.

2.2.4 Midwest (Great Lakes)

The Midwest (Great Lakes) megaregion stretches across the Midwest states of Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio, Pennsylvania, and Wisconsin, and encompasses the principal cities of Chicago, Cincinnati, Cleveland, Detroit, Indianapolis, Minneapolis, St. Louis, and Pittsburgh.

The Midwest megaregion faces unique challenges compared to most of the other megaregions. Between 2000 and 2025, the area generally demarcated as the Midwest megaregion is estimated to grow from 53.8 million to 62.9 million, a 17% increase. This projected increase is smaller than that of the other megaregions, which are projected to grow anywhere from 18% in the Northeast to 63% in the Arizona Sun Corridor. The demographic issues related to an aging and slowly growing population dictate that the future of this megaregion lies in its ability to attract new economic activity, help engender innovation, and make the population centers of the megaregions more sustainable and livable. As a traditional and historic hub of transportation activity, the level of service offered by the transportation system plays a big role in the ability of the megaregion to meet these goals.

Interregional cooperation in the megaregion has been hampered by a variety of different factors, including the sheer size of the area, differences in priorities between states and local jurisdictions, disagreements on the best way to foster economic growth, and declining funds available for interregional planning and construction. Nonetheless, the megaregion persists in utilizing interregional planning through groups such as The Great Lakes Commission and the Great Lakes Compact. These groups have found that issues such as water management and resource protection must be addressed at an interregional level in order to adequately provide for the current and future population. High-speed rail, long seen as an inevitable form of transportation to link the megaregion, has fallen on the list of priorities as fiscal austerity measures have taken hold, and has, in some circles, been broadly lumped into the category of wasteful spending.

Potential Lessons for Texas: Demographically, Texas and the Great Lakes megaregion are quite different. One area is among the fastest growing areas in the nation, while one is undoubtedly the slowest growing. Texas cities are growing while nearly all major Midwest cities are declining, both in terms of population and influence. The challenges that the Great Lakes megaregion faces require unique solutions that will stimulate sustainable economic growth, as well as changes in the built environment that will make the area more of a magnet for growth. These changes likely cannot be achieved via megaregional planning but on a more localized basis.

2.2.5 Piedmont Atlantic

The Piedmont Atlantic megaregion, stretching from central Alabama to northeast North Carolina, is a megaregion that has seen explosive growth not only in the area as a whole, but particularly concentrated in the metropolitan areas of its two primary population centers, Atlanta and Charlotte. These have been two of the fastest growing regions of the country for the last two

decades and are projected to continue to grow at a brisk pace in the future. This explosive growth, while an economic boon to the southeast United States in general, has also caused water management and availability issues in Georgia and the surrounding states.

The metropolitan Atlanta area specifically has had dramatic water rights battles with the federal government as well as the states of Alabama, Tennessee, and Florida concerning water draws from Lake Lanier and the Chattahoochee River. Solving these water rights and procuring a long-term agreement for the use of these two bodies of water is obviously critical to ensuring the future growth and prosperity of the megaregion as a whole. The scope of the issues and the perceived need to work together led the former mayors of Atlanta and Charlotte, Shirley Franklin and Pat McCrory, to begin a partnership called the Piedmont Alliance for Quality Growth, in which cities, businesses, and universities are focused on the development of innovative, sustainable, and green infrastructure systems for the megaregion.

Additionally, the Atlanta Regional Commission has completed a regional plan known as "Atlanta Fifty-Forward," which stresses the importance of cooperation between the component cities of the Piedmont Atlantic. The Appalachian Regional Commission is a regional economic development agency that consists of the governors of 13 Appalachian states, including all of the states of the Piedmont Atlantic megaregion. Although this plan goes beyond the scope of simply the Piedmont Atlantic, strengthening the economic competitiveness of all of the states would benefit the entire southeast United States.

Potential Lessons for Texas: The Piedmont Atlantic offers some strong lessons that may benefit Texas. Megaregional planning has a more pronounced presence in this area as opposed to others because of water rights issues. These issues have made interregional cooperation mandatory in order to ensure the continued growth of the megaregion. The partnership of the mayors of the two largest metropolitan areas within this megaregion realized this and set into motion the type of interregional relationship that perhaps other city and metropolitan area leaders should foster. Would megaregional planning in Texas be stronger if the mayors of the five major Texas cities within the megaregion created a partnership, along with businesses and academics, dedicated to improving cooperation, information sharing, and natural resource management throughout the state? Political strength gets things done, and the Piedmont Atlantic megaregion has benefited considerably from the political muscle that this partnership has behind it.

2.2.6 Northeast

The Northeast megaregion, as the largest of the commonly delineated megaregions, has a mixture of advantages as well as challenges to be faced in the near future. Situated on the Mid-Atlantic seaboard from Northern Virginia to Southern Maine, the region is bounded by the Appalachian Mountains to the west. The major metropolitan cities of Boston, New York, Philadelphia, Baltimore, and Washington D.C. are all found within this megaregion. This was the megaregion initially defined in Gottmann's *Megalopolis* in 1961, and which still sets the standard in many measures of interregional cooperation. The deterioration of the environment due to the massive scale of urbanization in the region is a pervasive issue. The Northeast is also unique in that it has significant congestion across essentially all modes, including roadways, airports, and passenger and freight rail. Though growth between 2000 and 2025 is expected to be 18%, tepid by megaregional standards, the existing large population means that this megaregion is expected to add roughly as many people in that timeframe as the Cascadia, Arizona Sun Corridor, and Gulf Coast megaregions combined.

Regional initiatives from the northeast include the Regional Greenhouse Gas Initiative, a cooperative agreement between 10 northeast and Mid-Atlantic states to reduce greenhouse gas emissions in the Northeast corridor through a cap-and-trade system. Another key entity that has influence in the Northeast is the IH 95 Corridor Coalition. This group focuses on the movement of goods and people within the busy Interstate 95 corridor, and encompasses all of the states on the corridor from Maine to Florida. Intelligent transportation systems, communication technologies including automated toll collection for the entire length of the highway, and enhanced real-time information systems are examples of some of the recommendations of the IH 95 Corridor Coalition being implemented for the benefit of the entire route.

Potential Lessons for Texas: The Northeast Corridor, particularly via the IH 95 Corridor Coalition, can offer lessons that focus on corridor protection. The Northeast Corridor, as a function of its high population density, has multiple transportation corridors that are extremely congested and must be managed accordingly. Interstate 35, while not approaching the overall congestion seen on IH 95, still has significant congestion throughout Texas metropolitan areas. North America's Corridor Coalition (NASCO) is IH 35's version of the IH 95 Corridor Coalition, lobbying for and researching improvements for IH 35, as well as Interstates 29 and 94. NASCO has tasked itself with promoting continued growth along various parts of IH 35, seeing it as a natural nexus for freight and business growth with natural transportation efficiencies. Though this potential growth will undoubtedly be a positive development, it will also bring more pressure to a corridor that already sees significant traffic and congestion, especially in Texas. The challenge will be to improve the corridor, given financial and political constraints, and to keep pace with the coming growth. The IH 95 Corridor Coalition could offer specific guidance on organizational structure and other issues when planning the future growth of IH 35.

2.2.7 Arizona Sun Corridor

The Arizona Sun Corridor, though the smallest of the commonly delineated megaregions, is projected to grow the fastest, with a projected growth rate of 63% between 2000 and 2025. The corridor is situated around the metropolitan areas of Phoenix and Tucson. The existing challenges—which must be addressed prior to the expected growth—are difficult issues with no simple solutions. Addressing these social issues will have to be a priority of elected officials in order to ensure the state continues to grow economically. One major issue is water availability and management. Arizona receives most of its water from the Colorado River, other rivers and streams, and groundwater. However, none of these water resources is able to replenish itself at the rate at which it is being depleted. Effluent water, which consists of treated water from other sources, is Arizona's only growing source of water and will likely play a key role in the water availability for the Arizona of the future.

Potential Lessons for Texas: Arizona's councils of government (COGs) have taken the lead in providing megaregional planning initiatives for the Sun Corridor. These COGs, including the Maricopa Association of Governments, the Pima Association of Governments, and the Central Arizona Association of Governments, have come together via Arizona State University's Morrison Institute for Public Policy to lay out a megaregional vision in the state's long-range transportation plan. This type of coordination will have to continue in the future as the state grows and planning activities become more critical for the ability of the state to continue to remain economically competitive.

2.2.8 Florida

The Florida megaregion is centered on its east and west coasts, and central and south Florida. The region is extremely diverse, with 6 out of every 10 residents who moved to Florida between 2000 and 2010 being from foreign countries. The region is also well known for being a retirement hub, and has a strong population of those over the age of 60. Florida has also recently promoted and developed a high-speed rail connection between Tampa and Orlando to begin the process of planning for the efficient movement of future larger populations. However, Governor Rick Scott returned federal funding for this endeavor in early 2011, jeopardizing the future of high-speed rail in the state.

Florida has a long history of megaregion-style planning related to disaster preparedness, evacuation plans, and ecosystem management and preservation. These plans required the state to address a variety of issues, including balancing large centers of populations with natural resources such as the Florida Everglades. Florida's sensitive ecology combined with the state's reliance on tourism creates a system where leaders must balance clearly competing interests.

Potential Lessons for Texas: Florida is unique in its system of regional planning councils (RPCs). RPCs are quasi-governmental organizations designated by Florida law to plan solutions that extend beyond local boundaries and provide input into state policy development. They are empowered to

1. Provide technical assistance to local governments on growth management matters.
2. Coordinate land development and transportation policies in a manner that fosters region-wide transportation systems.
3. Review local government comprehensive plan amendments, evaluation reports, and Developments of Regional Impacts for consistency with state and regional plans.
4. Review the plans of independent transportation authorities and MPOs to identify inconsistencies between those plans and applicable local government plans.

These RPCs essentially address planning on what can be a megaregional scale in certain instances. The effectiveness of these RPCs should be assessed to determine whether a similar arrangement may be useful for Texas.

2.2.9 Texas Triangle and Gulf Coast

The Texas Triangle megaregion is, like Florida, another intrastate megaregion with explosive population and economic growth over the last three decades. This region is situated between the metropolitan areas of Dallas/Fort Worth, Austin, San Antonio, and Houston. Two effects of this brisk growth have been increases in natural resource consumption, as well as decreases in mobility. Both of these effects call into question the future economic and population growth in Texas, as finite resources and poor mobility will threaten the prosperity of the state in the long run. Within the Triangle, the Interstate 35 corridor between San Antonio and Dallas has seen particularly high levels of increasing congestion, culminating in the chokepoints seen in the Austin metropolitan area. The Texas Triangle megaregion is clearly a people- and consumer-oriented megaregion.

The Gulf Coast megaregion was characterized by the research workshop (described in Chapter 6) to be primarily a goods-driven megaregion, stretching from south Texas to eastern Louisiana, and centering on the strength of the energy and petroleum industries in this part of the

country. This megaregion, arguably more than any other, relies on these industries to exist, and increasing the ability of goods to move quickly is essential to the continued health of the megaregion. This ability must be prioritized when planning for this megaregion.

Many entities within the state of Texas plan on a regional scale, including Envision Central Texas, Vision North Texas, and Blueprint Houston. However, the ability of these entities to actually make progress on their goals is severely limited by their lack of statutory power or land use authority. They can create plans, but cannot effectively ensure their ultimate implementation. Weak land use laws in Texas make corridor protection and interregional planning difficult tasks.

MPOs in Texas generally do not have a specific framework in which to work with other MPOs on projects, but do talk to one another on an informal, ad hoc basis. Rebekah Karasko of North Central Texas Council of Governments (NCTCOG) gave an example when speaking about the coalition of MPOs that came together in order to support the expansion of Tower 55 in Fort Worth. She expressed that the presence of other MPOs in support of NCTCOG was likely a reason that funding was granted and that other projects could potentially be strengthened by MPOs working together.

However, the cooperative framework must be determined. Most people interviewed about megaregions, including Ms. Karasko, Lily Wells of the Port of Houston Authority, and Howard Lazarus of the City of Austin, do not want to see another bureaucratic layer dedicated to administering megaregions. Instead, they would like to see the Texas Department of Transportation (TxDOT) take a leadership role in facilitating communication between entities.

2.2.10 The 2011 Volpe Study

One of the latest pieces of research, unpublished at the time of this report, is being undertaken by a team from the Volpe Center for the Federal Highway Administration (FHWA)[4]. The Volpe research clearly supports a step-wise, hierarchical approach to megaregional planning that is of particular benefit for those Departments of Transportation—like TxDOT—that work closely with MPOs yet need to have a regional system-wide vision to ensure corridor needs are being addressed. As noted earlier, railroads have a system-wide view and megaregions allow the DOT to view highways and other modes in a similar fashion, thus framing transportation planning to meet the future freight needs of large multi-MPO agglomerations.

Table 2.3 summarizes this process, which describes preliminary recommendations for moving towards a comprehensive megaregional planning process that includes MPOs and other key stakeholders.

[4] The work is led by Dr. W. Lyons at the Volpe Center and managed by Mr. F. Bowers, FHWA Project Manager, Office of Planning.

Table 2.3: Hierarchy of Megaregion Transportation Planning

1. Define needs, measure passenger and freight flows, and establish boundaries.
2. Conduct stakeholder outreach and development of priorities and strategies.
3. Conduct data collection, cooperative, sub-area, or modal studies.
4. Integrate findings into the MPO planning process and MPO project selection with DOT participation.
5. Implement joint megaregion projects.
6. Manage the system, update, and improve elements over time; measure benefits.

Source: Adapted from Volpe Study presentation at 2011 TRB Summer Meeting; report forthcoming

The process has clear sequential steps that allow transportation planners to first measure current and future demand for transportation services—in this case freight—and establish geographical boundaries. Next, priorities and strategies are determined based on stakeholder feedback and data collected to allow estimation of cost-benefit and system-wide efficiencies. These three activities are quite familiar to most transportation planners; the difference lies in the scale and the system-wide perspective. The next step of integration goes beyond the single MPO and requires that every MPO impacted by the investment is aware of the project(s). The state DOT planning group can also play an important role in this integration. In Texas, all MPOs are represented by a single entity—the Association of Texas Metropolitan Planning Organizations (TEMPO)—so the megaregional group in Texas would comprise individually impacted MPOs, TEMPO, and TxDOT. The final steps cover the implementation, management, feedback, and improvement of the process. This important piece of work lends credence to the benefits of megaregional planning and provides a basic "road map" suggesting the steps needed to facilitate such a process at the state and federal levels. The next section outlines the international scan undertaken during this research project.

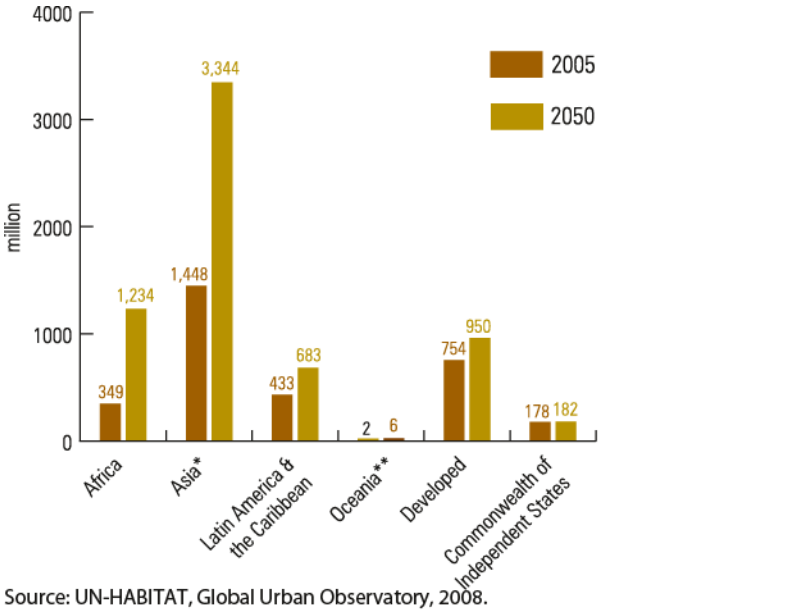
2.3 International Scan Review

Internationally a number of megaregions have been identified by various authors over the past 10 years. In October 2007, Richard Florida, Tim Gulden, and Charlotta Mellander released a paper entitled *The Rise of the Mega Region* (Florida et al., 2007). In this paper they identified 40 megaregions using a dataset of night-time light emissions to produce an objectively consistent set of megaregions for the globe, and estimate population of these regions. According to Florida et al. (2007), the megaregions also had output of more than $100 billion, produced 66% of the world outputs, and accounted for 85% of global innovation. The full analysis of international megaregions can be found in Appendix E.

The United Nations (UN) in its 2008–2009 biannual State of the World's Cities report discussed how the identified mega-cities were merging to form vast megaregions around the globe. As Figure 2.1 shows, over half of the world's population was living in urban areas as of 2008–2009, so that the 21st century has been termed the "urban century" (UN, 2009). The 2010–2011 UN *State of the World's Cities* report noted the continued urban trends, and found that urban-to-urban migration was occurring globally and impacting city growth. The 2010–2011

report also discussed how urban corridors were playing a role in the process of large cities integrating their hinterlands into their primary city-regions (UN, 2001).

Part 1 of the 2010–2011 report is a section titled *Urban Trends* that explicitly discusses megaregions, as well as the importance of corridor connections. Discussed as cross-currents in global urbanization, the prediction is that by the year 2030 more people in every region of the world will live in urban areas as opposed to rural areas. The report notes that the convergent urban growth patterns, while somewhat slower, are much more pervasive, and are strongly linked to the development process. The convergence is viewed in three ways: megaregions, urban corridors, and city regions. All of these urban configurations—cities in clusters, corridors, and regions—are becoming the new engines of global and regional economies. These megaregions are also accumulating even larger populations than any previously defined mega- or meta-city.

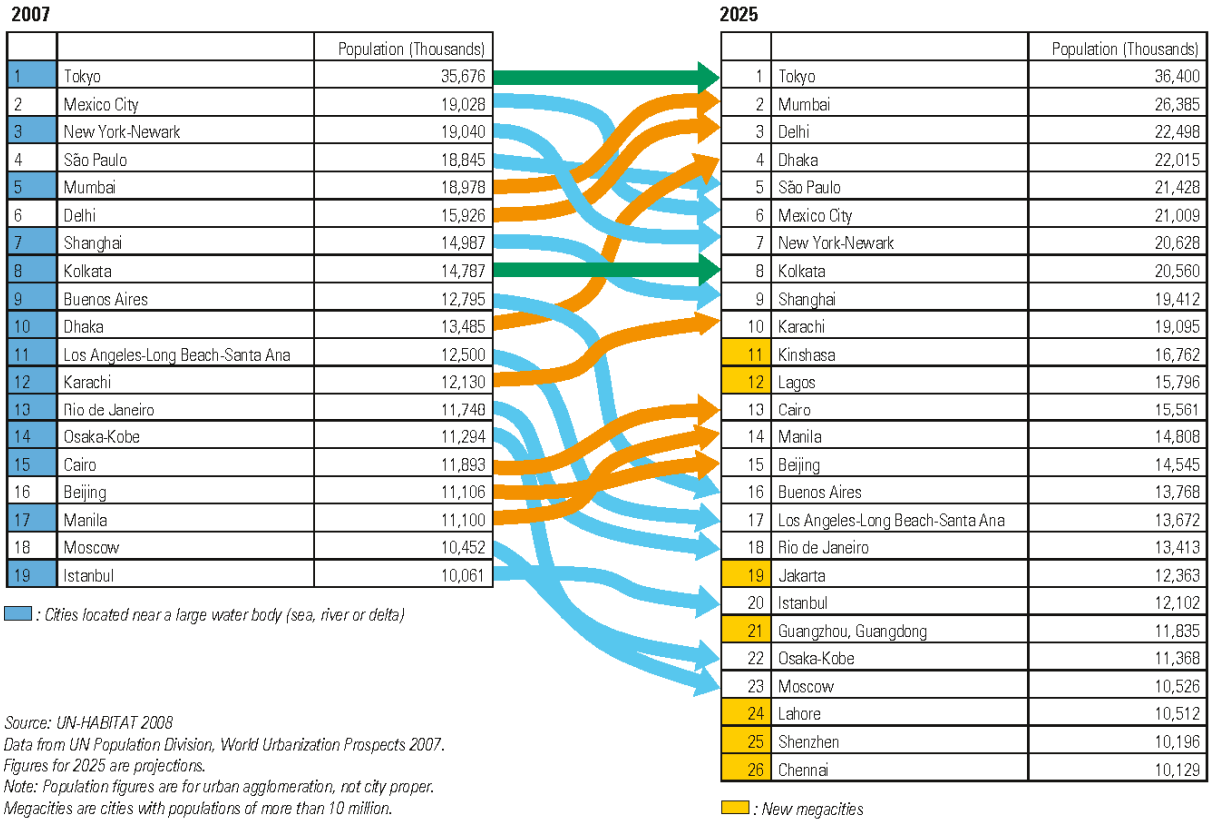


Source: UN-HABITAT, Global Urban Observatory, 2008.
Data from UN Population Division, World Urbanization Prospects, 2007 revision.
Note: *Asia doesn't include Japan. ** Oceania doesn't include Australia and New Zealand.

Source: UN State of the World's Cities 2008–2009

Figure 2.1: Urban Population by Millions

The 2008–2009 report's findings note that properly planned cities provide both the economies of scale and the population densities that have the potential to reduce per capita demand for resources such as energy and land. Central governments play a critical role in determining the prosperity and growth of cities. Geography also matters in explaining economic dynamism and growth of cities and regions. Location, agglomeration factors, comparative advantages, and proximity to resources will all play a key role in the future. The report notes that cities located near the sea, or along a river bank or delta, have historically dominated and will continue to dominate the urban landscape of countries and regions. Fourteen of the 19 largest global cities are located near water and can link their local and regional economies to regional and global supply chains and trade. Globally, 55% of the world's population residing close to inland water ecosystems was urban in nature in 2000. Figure 2.2 shows the global megacities that will arise by 2025.



Source: UN State of the World's Cities Report 2008–2009

Figure 2.2: Global Megacities by 2025

The report also notes that geography alone will not determine the growth and prosperity of cities. The role of central, regional, and local governments—along with national policies, corporate strategies, and the existing comparative advantages that cities offer the global landscape—will determine where, how, and why cities will continue to grow and thrive. The report notes that balanced urban and regional development can be achieved through consistent and targeted investment in transportation and communication infrastructure.

The report's analysis of the fastest growing cities in the developing world found that 40% benefited from diversification, expansion, or improvement of regional or national transportation systems, including roads, airports, urban and inter-urban railways and ports. Transportation infrastructure planning, development, and financing is therefore a critical determinant in both international and domestic megaregion planning for ensuring the health, wealth, and sustainable development of communities.

Although significant activity relating to megaregions is clearly occurring within academia and regional/local governments, the private sector and regional organizations significantly influence U.S. planning initiatives. While academics and local governments wield influence through scholarship and policy, respectively, private sector participants and regional organizations must seek their desired outcomes through other means, such as lobbying and advocating. In order to determine the role that these private sector and regional organizations play in the provision for megaregional planning, the objectives, goals, and *modus operandi* of these entities must be analyzed. This aspect of megaregional planning is addressed in Chapter 3.

Chapter 3. Regional Organization and Private Sector Reviews

A major objective of the project research plan was to provide an update on megaregion-related activities in the private sector and within regional organizations and other research centers. Researchers specifically reviewed the websites of Georgia Tech, George Mason University, and America 2050, who have been in the forefront of developing this research area and hosting forums to review new activities. A series of interviews with a cross-section of freight groups and other regional organization entities, including Texas entities, was also undertaken. Table 3.1 provides a list of interviews conducted to date with these private sector and regional organization groups. The main list of questions developed to guide these interviews is provided in Appendix B.

Table 3.1: Regional Organization and Private Sector Interview List

Name, Title, Agency	Date
Dr. Jonathan Gifford, Dean of Research, George Mason School of Public Policy	June 2011
Regina Minish, Director of Market Research, BNSF Railway	May 2011
Clint Schelbitzki, Director of Public Affairs, UP Railroad	May 2011
Petra Todorovich, Director, America 2050	May 2011

3.1 Overview of Regional Organizations and Universities

3.1.1 America 2050

America 2050 is a national initiative "to meet the infrastructure, economic development and environmental challenges as we prepare to add 130 million additional Americans by 2050." The main focus of America 2050 is the emergence of megaregions, and it serves as a clearinghouse for research and megaregional planning efforts nationwide. The organization is supported by multiple foundations, including the Rockefeller Foundation, Doris Duke Charitable Foundation, Lincoln Institute of Land Policy, Ford Foundation, and the engineering construction and consultancy firm AECOM. One of America 2050's primary objectives is to advocate for the eventual construction of a high-speed rail system as a viable transportation option for residents of U.S. megaregions.

While Petra Todorovich, director of America 2050, sees the provision of high-speed rail as one unifying nexus for megaregions, she believes that the success of megaregional planning is directly tied to the broader ability of planners and stakeholders to identify a unique unifying nexus in each case to enable megaregional planning. While this unifying nexus will differ from megaregion to megaregion, its purpose is simply to validate the necessity and potential benefits of planning at this scale. Furthermore, Ms. Todorovich feels that megaregional planning will benefit regions by facilitating the identification of common regional issues. She believes that identifying these "pressing needs" will promote development of megaregional planning both socially and politically, as this approach would ideally serve to placate those who are opposed to expansion of government in the planning area.

3.1.2 Regional Plan Association

The Regional Plan Association (RPA) of New York, New Jersey, and Connecticut is America's oldest independent urban research and advocacy group. It prepares long-range plans and policies to guide growth of the New York-New Jersey-Connecticut metropolitan region. Established in 1922, it released its first plan in 1929 and provided a blueprint for the transportation and open space networks that today are taken for granted. RPA has three state committees composed of business leaders, experts, and opinion-makers that provide strategic advice. In 2007 it released the report *Northeast Megaregion 2050: A Common Future*. This report found that the future of the Tri-state region was intertwined with the Northeast megaregion from Boston to Washington. The report reviewed economic indicators and recommended governing alliances to address mobility, emissions, sprawl, and environmental protection (RPA, 2007).

3.1.3 Brookings Institute

The Brookings Institute began in 1916 as the Institute for Government Research, which was a private organization dedicated to analyzing public policy issues at the national level. Brookings has since grown and has multiple research centers that focus on governance, metropolitan policy, economic studies, cities, and economic growth in general. Brookings' megaregional focus is mainly centered upon the Great Lakes megaregion. Their Metropolitan Policy Program released reports on the Great Lakes megaregion in 2006 as a strategy to revitalize this area (Brookings, 2006), and released a second update in 2008 that focused on bi-national U.S.–Canadian regional leadership (Austin et al., 2008). They also have a web page devoted to the Great Lakes Economic Initiative.

3.1.4 University of Pennsylvania

The University of Pennsylvania's School of Design has also been active in the megaregional area. The 2005 Studio Workshop Series focused on the megaregion that stretches from Boston to Washington D.C. and developed recommendations and a set of strategic actions for the region (UPenn, 2005). During the spring 2011 Studio Workshop Series, the focus turned to high-speed rail and a report entitled *High-Speed Rail in the Northeast Megaregion: From Vision to Reality* was released (UPenn, 2011).

3.1.5 George Mason University

The George Mason University School of Public Policy has been a notable center of megaregional research in recent years, particularly in the area of freight movement. Led by Dr. Jonathan L. Gifford, a graduate research team at George Mason initiated the first study of commodity movement between the America 2050-delineated megaregions. This study uncovered many interesting findings about the relationship between megaregions and freight, such as discovering that less freight, per capita, moves in and out of megaregions than the areas outside of them. This finding likely arose because many large food products businesses and raw materials businesses are located in rural areas outside of megaregions, but rely on trucks and trains to carry their products to population centers.

A less surprising finding was that freight exported from megaregions generally has a higher value than freight imported into megaregions. This scenario is logical because often raw

materials are imported into megaregions in order to create more valuable finished products for export. Texas sees this situation with, among others, the petroleum industry.

Mr. Gifford himself is, notably, skeptical of megaregional freight planning in its current form because he thinks that the major issues facing American freight planning are political as opposed to infrastructural (Gifford, 2011). He gives Europe as an example: several European countries have invested in maritime freight infrastructure in recent years but this new and improved infrastructure has not seen growth in utilization commensurate with the level of investment. The reason, according to Gifford, is that policy changes are far more important and influential in changing planning behaviors than simply increased investment alone. In his opinion, investment must be spurred by changes in policy.

3.1.6 Georgia Institute of Technology

The Center for Quality Growth and Regional Development (CQGRD) at Georgia Tech, directed by Dr. Catherine L. Ross, has a program area dedicated to the study of megaregions. In 2006, CQGRD hosted a symposium with public, private, academic, and nonprofit organizations across six southern states in Atlanta to discuss the emerging southeastern megaregion known as the Piedmont Atlantic. In 2007, CQGRD hosted a symposium that brought researchers and practitioners to discuss the challenges and opportunities posed by megaregions. Between 2007 and 2009, they conducted a project for the Federal Highway Administration on "Megaregions and Transportation Planning Framework." This project reviewed the formation of megaregions in the United States from the perspective of transportation demand, infrastructure supply, and economic relationships; they also surveyed the best practices of megaregional planning around the globe and historically within the U.S. This study led to the development of a conceptual framework that incorporates the megaregion concept into existing policy and governance processes. CQGRD also held a FHWA Megaregions and Transportation symposium in 2008. Additionally, Catherine Ross was the lead editor of the 2009 textbook *Megaregions: Planning for Global Competitiveness.*

3.1.7 Virginia Polytechnic Institute and State University (Virginia Tech)

Virginia Tech faculty Robert E. Lang and Dawn Dhavale have been heavily involved in the development of megaregions. The Metropolitan Institute at Virginia Tech has released a series of papers on the megaregions, and Lang and Dhavale identified "megapolitan areas" that exceed 10 million total residents, or will pass that mark by 2040. The Lang and Dhavale megaregions differ in shape, format, and underlying criteria from the America 2050 and Georgia Tech definitions that have become the norm in megaregional discourse.

3.1.8 NASCO

North America's Corridor Coalition (NASCO) was created in 1994 to unite the public and private sectors to address infrastructure and trade along the IH 35 corridor from Mexico to Canada. This corridor connects over 71 million people and supports over $1 trillion in commerce between the three nations. Membership comprises states, cities, counties, provinces, private sector groups, and educational institutions along the corridor. NASCO's three main initiatives focus on these areas:

- Transportation efficiency and security
- Energy and environmental quality

- Entry-level logistics workforce development

While not actively focused on any specific megaregion, NASCO hosts a yearly meeting rotating through the member countries, as well as numerous other events along the IH 35 corridor, which Lang and Dhavale identified within their 10-megapolitan area from Laredo to Kansas City. From the freight perspective, the group's North American Inland Port Network and associated committee work to promote inland ports and intermodal terminals along the corridor.

3.1.9 Greater Houston Partnership

The Greater Houston Partnership (GHP) is an advocacy group for Houston's business community. It was formed from the original chamber of commerce in Houston founded in 1840. GHP's website has a regional flavor and notes that its principal objective is to facilitate business developments within the Houston area and its 10-county region.[5]

The partnership is composed of multiple corporate members, and has a 130-strong member board of directors who are the top regional officials in their companies, and set the policies for the partnership. The partnership tracks multiple indicators, offering information on the region's infrastructure and key industries. Committees for economic development, international business, transportation, public policy, and legislative resources are all staffed via its members.

3.1.10 Envision Central Texas

Envision Central Texas (ECT) is a nonprofit organization that has as its goal addressing growth sensibly with the interests of the region's citizens in mind. Incorporated in September 2001, the group works within the five counties of Central Texas (Bastrop, Caldwell, Hays, Travis, and Williamson). The nonprofit has a governing board of directors and an executive committee. ECT gathered community input throughout 2002 through a series of focus groups, telephone surveys, and a series of workshops that reviewed a variety of planning elements associated with transportation and neighborhood development. From these, a series of strategies for growth options was developed that took a 20–40 year view. Four growth scenarios were developed; these were reviewed at a series of workshops and a leadership workshop with 150 regional leaders. ECT was also a partner at the "Megaregion and Megaprosperity: Sustainable Economics for the Texas Triangle" conference hosted in Houston in September 2009.

They have also developed, in partnership with UT Austin's School of Community and Regional Planning, a compendium of more than 1,000 planning tools to assist the public and private sector in understanding the use of these growth tools and strategies.

3.1.11 Vision North Texas

Vision North Texas (VNT) assembles leaders and experts from the greater Dallas/Fort Worth region to imagine a new future. Created in 2006, it has been developing a series of strategies and alternative futures for the North Texas Area. At a regional summit in 2010, it released the guiding document on alternative futures: *North Texas 2050* (Vision North Texas, 2010). VNT has held multiple stakeholder workshops throughout its 16-county region[6] to find

[5] Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, San Jacinto, and Waller

[6] Wise, Denton, Collin, Hunt, Palo Pinto, Parker, Tarrant, Dallas, Rockwall, Kaufman, Navarro, Ellis, Johnson, Hood, Somervell, and Erath.

out what people want for the region's future, including a series of sub-regional workshops throughout 2007 and 2008. The major focus issues for the group are transportation, education, health care, water, economy, and housing.

3.1.12 Vision San Antonio

Vision San Antonio is an organization of young professionals that engages with peers in long-term community planning. Created in 2005, it is a nonprofit 501 (c)(4) organization and membership is free and open to all. Issue areas are infrastructure, health and human services, planning development and environment, local governance, education, and arts and culture. However, from its website, the last major activity that can be found was from 2009.

3.2 Overview of Private Sector Entities

3.2.1 BNSF Railway

BNSF Railway is a major U.S. Class I railway and is the product of nearly 400 discrete railroads that merged over the course of 160 years. BNSF has over 32,000 miles of track and its operations are primarily concentrated west of the Mississippi River. BNSF has an active research group within its organization that has been conducting work on the megapolitans for over 5 years.

BNSF, along with UP, and in partnership with the local cities of Dallas and Fort Worth, TxDOT, and the federal government, also spearheaded and funded a large portion of the improvements implemented at the Tower 55 intersection in downtown Fort Worth. Some of the interviewees and workshop attendees noted that Tower 55 was the first Texas Triangle megaregion project that had multiple partners, and took what could be viewed as a megaregional approach to highlighting the importance of partnerships between the groups for this project.

According to Director of Market Research Regina Minish, BNSF is utilizing megaregional planning, and even includes the idea of "megapolitan areas" within internal planning documentation. BNSF sees the megaregion as a tool that can be used to leverage capital for specific parts of a network, as well as to identify future demand trends, current capacity, and solutions to reconcile the future capacity-demand gap. Megaregional planning, from the railroad's perspective, provides a justification for investment in certain areas. It has allowed BNSF to improve its level of planning foresight and provide departments within the railroad a competitive advantage in terms of procuring both internal capital and external capital such as PPPs. The railroad has developed megaregional planning to such an extent that external consultants have begun utilizing BNSF's version of the megapolitan areas in order to analyze large-scale planning methods.

3.2.2 Union Pacific

UP is a major Class I railway in the United States and the primary competitor of BNSF Railway, serving 23 states in the western U.S. UP has over 36,000 miles of track and specializes in hauling chemicals, coal, food products, lumber, grain products, metals, and automobiles and parts. According to UP, while they haven't adopted the use of the term "megaregion" in their planning process, their focus does have a megaregional aspect to it, as it focuses on corridors and delivery to the large metropolitan areas that make up many of the megaregions. UP aims to find the most efficient way to transport goods to their customers, and carrying out this task requires a fundamentally megaregional perspective.

UP sees a role for government to make megaregional planning easier and more palatable from a railroad perspective only by supporting customer initiatives to locate along a rail line as a competitive advantage. The railroad argues that the trucking industry has been subsidized by government-funded roads, so supporting customer relocations along rail is a method of leveling the playing field.

3.3 Interview Analysis: Key Points

As part of the review of these private sector entities and regional organizations, the researchers interviewed a series of their stakeholders. The resulting feedback was used to develop the following set of key points. Additionally, these interviews were the impetus for the workshop on June 24, 2011, and heavily influenced workshop development. The June 24 workshop is discussed in significantly more detail in Chapter 5.

1. *Most entities felt that another layer of bureaucracy would not be useful for megaregional planning.*

This question was asked of nearly all interviewees, and provided a substantial point of discussion in the context of the June 24 workshop. Most participants agreed that adding bureaucracy would not be a desirable outcome in the pursuit of megaregional planning. Surprisingly, some of the strongest advocates of an approach that works within the existing bureaucracy were themselves government employees, such as Margaret Shaw of the City of Austin and Michael Kramer of the City of Houston.

These stakeholders generally felt that potential issues with starting a megaregional approach to planning were not related to a lack of bureaucratic capacity, but would likely be related to gaining public acceptance of the approach, particularly in a socially, politically, and fiscally conservative state such as Texas. The larger potential issue in this scenario is the ability to effect change and help the idea gain momentum.

2. *Most agencies felt that TxDOT and the MPOs should play a role in "setting the stage" for megaregional planning, and for developing metrics, standards, committees, and groups to discuss these issues. Some suggested that the DOT could provide a centralized portal for information gathering and sharing via a clearinghouse*.

Along similar lines as the above point, workshop participants and interviewees felt that existing governments and other entities have significant untapped potential for greater information sharing. Strikingly, most felt that TxDOT represented a logical nexus upon which to build a system of information sharing accessible to the entire state (and thus, significant portions of any megaregion, no matter the definition). Information to be shared would include that which is useful across regions and on a greater-than-local scale. Examples include engineering data, models that could be utilized in different areas, and other technical data beneficial to MPOs and local governments. In this regard, smaller MPOs would benefit immensely by having access to data that ordinarily they would not have the resources to obtain. This clearinghouse could have tremendous fiscal benefits as well by minimizing the number of unique resources that must be generated by all of the Texas's governmental agencies.

3. *All entities felt that megaregional planning would benefit their communities by supporting growth in trade and economic development through a distinct focus on leveraging corridors and intermodal connections*.

Although undoubtedly a sizable number of interviewees and workshop participants were skeptical about details surrounding megaregional planning, such as the form it could take or the specific benefits it can deliver, the group unanimously felt that some sort of megaregional-based planning held potential for significant economic growth.

Much of this sentiment stems from the realization in the transportation community that systems are complex and interconnected, and must be planned in an integrated fashion with other types of transportation systems. Some of these non-local transportation assets are critical to the economic health of regions, the state, and in some cases the entire nation. Examples of these in Texas include the Port of Houston, the Dallas/Fort Worth International Airport, and various rail yards that connect different parts of the state to the wider U.S. and worldwide markets.

Therefore, it is reasonable to hypothesize that greater coordination and input in the protection and expansion of these assets could lead to a more coordinated, efficient system, and make the state more competitive in capturing future economic growth.

4. *Megaregional planning was widely expected to deliver economies of scale, especially if development of the local Transportation Improvement Programs could be coordinated to align resources*.

One of the primary benefits of megaregional planning, as continuously noted by participants, is the ability to improve economies of scale in the state and reconcile the local Transportation Improvement Plans with the larger Long-Range Statewide Programs. Currently, the cut-and-paste amalgamation style of local plans that are submitted to the state fails to showcase the unique features of each plan, and causes some overlap in plans that don't necessarily match. The ability to distribute resources based on those plans is, in effect, diluted. As a result, the most useful projects that can benefit the largest amount of people may not always be chosen. In order to more efficiently align resources, megaregional planning could offer the ability to discriminate between plans that primarily benefit a local area and those that can hold benefits for the entire state or even the entire megaregion.

The ability of transportation officials to deliver on the promise of megaregional planning is dependent on the level of interaction and regional planning allowed and encouraged by current policy. In Chapter 4, the legal factors related to the provision of megaregional planning are examined in detail.

Chapter 4. Planning and Legal Review

4.1 Legal Review

The research team undertook an analysis of the federal and state rules that govern transportation planning to ascertain how these could be utilized for megaregional planning and make recommendations where appropriate. The team also considered how regional planning and local planning fit into the overall picture for setting up any new structure to conduct megaregional planning. Consideration was also given to local land use planning in the United States, which, as it is currently structured, does not necessarily support a megaregional land use planning process. Evident from the review of rules (which can be found in Appendix D) is that the state DOTs already have latitude to conduct megaregional planning within the state transportation plans and to enter into agreements and memorandums of understanding to support activities related to interstate and regional planning with local jurisdictions and the MPOs/COGs.

4.2 Federal Structure for State Transportation Planning

The federal rules for State Transportation Planning can be found in Title 23 Code of Federal Regulations (CFR) at Part 450. The rules and requirements for creating the state transportation plan are to ensure that the plan (i) adheres to conformity determination for attainment and non-attainment areas and the maintenance areas vis-à-vis air quality, (ii) demonstrates fiscal constraint, and (iii) complies with the State Implementation Plan (SIP) required under the Clean Air Act (CAA).

Part 450 sets out the transportation planning assistance and standards for the Statewide Long Range Transportation Program (LRTP), and the development and integration of Transportation Improvement Programs (TIP) into the State Transportation Improvement Programs (STIP).

Within the definitions of Section 450.104, certain elements pertain to how the DOT and its partners plan for regional projects, as well as the prioritization of projects by MPOs or COGs. Specifically, the germane definitions that we are concerned with are the following:

*A **regionally significant project*** is a transportation project on a facility that serves regional transportation needs (access to and from the area outside the region; major activity centers in the region; major planned developments [new retail malls, sports complexes, or employment centers]; or transportation terminals) normally included in the modeling of the metropolitan area's transportation network. At minimum, this includes all principal arterial highways and fixed guideway transit facilities that offer a significant alternative to regional highway travel.
*A **transportation improvement program (TIP)*** is a prioritized listing/program of transportation projects covering a period of 4 years formally adopted by an MPO as part of the metropolitan transportation planning process, and required for projects to be eligible for federal funding.
*A **transportation management area (TMA)*** is an urbanized area with a population over 200,000, defined by the U.S. Census Bureau and designated by the Secretary of Transportation, or any additional area where TMA designation is requested by the governor and the MPO and designated by the Secretary of Transportation.
Urbanized area means a geographic area with a population of 50,000 or more, as designated by the Census Bureau.

Under 23 CFR Section 450.206, the scope for the Statewide Transportation Planning Process (STPP) specifies that all states are required to carry out a continuing, comprehensive, cooperative statewide transportation planning process that provides for projects, strategies, and services that address the following factors:

TxDOT could therefore integrate megaregional planning within the parameters of factors 1, 6, 7, and 8.

1. Economic vitality
2. Safety
3. Security
4. Accessibility
5. Protect and enhance environment
6. Integration and connectivity of the system for people and freight
7. Efficient system management and operation
8. Preservation

States are given wide discretion in how they consider these factors and accord them weighting as appropriate.

> The degree of consideration and analysis of the factors should be based on the scale and complexity of many issues, including transportation systems development, land use, employment, economic development, human and natural environment, and housing and community development (§450.206 (b)).

Under Section 450.208, in carrying out the STPP the states are required at a minimum to coordinate with the MPOs and rely on information, analyses, and studies that the MPOs provide for their planning areas. States are also required to coordinate with other statewide offices and agencies such as trade and economic groups who also conduct *multistate planning efforts*. This also includes taking into account the concerns of local elected/appointed officials who are responsible for transportation planning in *non-metropolitan areas*. As part of this, the DOT is required to consider related planning activities being conducted outside of metropolitan planning areas and between states; and coordinate data collection and analyses with MPOs and public transportation operators to support statewide transportation planning and programming priorities and decisions (§450.208 (a) (6) and (7)).

The federal rules already present plenty of opportunity to embed a megaregional cooperative focus in the STPP.

Under Subsection 450.208 (c), states can also enter into agreements or compacts for cooperative efforts and mutual assistance in support of activities related to interstate areas and localities in the states. This includes establishing authorities the states consider desirable for making the agreements and compacts effective.

Section 450.212 indicates that an MPO or public transportation operator may undertake a multimodal systems-level corridor or subarea planning study as part of the STPP. Development of these transportation planning studies shall involve consultation with, or joint efforts among, the state(s), MPO(s), and/or public transportation operator(s). The results or decisions of these transportation planning studies may be used as part of the overall project development.

4.2.1 Long Range Statewide Transportation Plan

The LRTP is another area that provides opportunities for the DOT to integrate a megaregional transportation (including freight) planning focus.

The content and development of the LRTP is contained within 23 CFR Section 450.214. The LRTP is required to be developed for a minimum 20-year forecast period, and provide for the development and implementation of the multimodal transportation system for the state. The LRTP shall consider and include, where applicable, the elements and connections between public transportation, non-motorized modes, rail, commercial motor vehicle, waterway, and aviation facilities, particularly with respect to intercity travel. The LRTP may consider projects/strategies that address areas or corridors where current or projected congestion threatens the efficient functioning of key elements of the state's transportation system (§450.214 (b)).

The LRTP would be an ideal place to establish the how and why of a megaregion focus. For example, TxDOT could reference the literature review and recommendations from this research.

The LRTP is required to reference, summarize, or contain applicable short-range planning studies; strategic planning, policy, and transportation needs studies; management systems reports; emergency relief and disaster preparedness plans; and any statements of policies, goals, and objectives (e.g., transportation, safety, economic development, social and environmental effects, or energy) that were relevant to its development (§450.214 (c)).

4.2.2 Statewide Transportation Improvement Program

The STIP is created by the DOT to cover all areas of the state for a period of no less than 4 years, updated every 4 years (§450.216). The STIP is developed in cooperation with the MPO for designated metropolitan areas and is the amalgamation of the TIPs developed by the MPOs. The TIPs shall be included without change in the STIP, directly or by reference, after approval of the TIPs by their MPOs and the governor (450.126 (b)). The STIP is a financially constrained document and must use inflation rates to reflect year of expenditure dollars, although the financial plan can include recommendations for additional projects if additional finance strategies become available. The STIP shall contain all regionally significant projects that require FHWA/FTA action, even if they are not funded with federal money (§450.216 (g)).

4.3 Federal Structure for MPO Plans

23 CFR Part 450 Sub-part C, Metropolitan Transportation Planning and Program, sets out the scope of the Metropolitan Transportation Planning Process (MTPP). This process under Section 450.306 shall be continuous, cooperative, and comprehensive, and provide for

consideration and implementation of projects, strategies, and services that will address eight factors:

1. Support economic vitality of metropolitan area, by enabling global competitiveness, productivity, and efficiency;
2. Increase accessibility/mobility of people and freight;
3. Protect and enhance the environment, promote energy conservation, improve quality of life, promote consistency between transportation improvements and State and local planned growth/economic development patterns;
4. Enhance integration and connectivity of the transportation system, across/between modes, for people and freight;
5. Promote efficient system management and operation;
6. Emphasize preservation of the existing system;
7. Increase safety of the transportation system; and
8. Increase security of the transportation system.

These eight required factors are all megaregional factors; therefore, the MPO could also indicate how these support megaregional planning efforts.

The consideration of these factors is to be reflected in the MTPP and any degree of consideration and analysis of these factors should be based on the scale and complexity of many issues, including transportation system development, land use, employment, economic development, human and natural environment, and housing and community development. The MTPP must be carried out in coordination with the STPP (§450.306 (d)).

Section 450.322 (a) requires that the MTPP shall include the development of a transportation plan addressing no less than a 20-year planning horizon as of the effective date. The transportation plan shall include both long-range and short-range strategies/actions that lead to the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand (§450.322 (b)).

Development of the next sets of MTPPs would be an ideal time to begin to review how a megaregional approach could assist in achieving economies of scale and in assisting with non-attainment and SIP conformity programs.

Sub-section 450.322 (f) requires that the MTPP shall, at a minimum, include 10 items, including what could be factored as megaregional purposes:

- Existing and proposed transportation facilities (including major roadways, transit, multimodal and intermodal facilities, pedestrian walkways and bicycle facilities, and intermodal connectors) that should function as an integrated metropolitan transportation system, giving emphasis to those facilities that serve important

national and regional transportation functions over the period of the transportation plan; and

- Assessment of capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure and provide for multimodal capacity increases based on regional priorities and needs.

4.3.1 Metropolitan Planning Area Boundaries

Section 450.312 sets out the boundaries of a metropolitan planning area (MPA), which are determined by agreement between the MPO and the governor. At a minimum, the MPA boundaries shall encompass the entire existing urbanized area (as defined by the census) plus the contiguous area expected to become urbanized within a 20-year forecast period for the metropolitan transportation plan. The MPA boundaries may be further expanded to encompass the entire metropolitan statistical area or combined statistical area, as defined by the Office of Management and Budget (§450.312 (a)).

An MPA boundary may encompass more than one urbanized area (§450.312 (c)) and MPA boundaries may be established to coincide with the geography of regional economic development and growth forecasting areas (§450.312 (d)). If the boundaries of the urbanized area or MPA extend across two or more states, the governors of the multistate area, MPO(s), and public transportation operator(s) are strongly encouraged to coordinate transportation planning for the entire multistate area (§450.312 (f)). MPA boundaries shall not overlap with each other (§450.312 (g)).

The authority for cross-regional/border megaregional planning opportunities exists within federal code. The justification for coordination of planning is set out within sub-sections f and h. Identification of a megaregion could occur during the review of boundaries after each census.

Where part of an urbanized area served by one MPO extends into an adjacent MPA, the MPOs shall, at a minimum, establish written agreements that clearly identify areas of coordination and the division of transportation planning responsibilities among and between the MPOs. The MPOs may adjust their existing boundaries so that the entire urbanized area lies within only one MPA. Sub-section (i) requires the MPA boundaries are reviewed after each census by the MPO to determine if existing MPA boundaries meet minimum statutory requirements for new and updated urbanized area(s), and adjusted as necessary. Additional adjustments should be made to reflect the most comprehensive boundary to foster an effective planning process that ensures connectivity between modes, and promotes efficient overall transportation investment strategies.

4.4 Texas Structure for Transportation Planning

In Texas, the Texas Transportation Code (TC) sets out how TxDOT will conduct transportation planning. Section 201.601 requires the department to develop a statewide transportation plan that contains all modes of transportation.

TxDOT is required, in developing the plan, to seek opinions and assistance from other state agencies and political sub-divisions that have responsibility for the modes of transportation

(§201.601 (b)). TxDOT can enter into a memorandum of understanding with an agency or political subdivision relating to the planning of transportation services. As with the federal rules, the plan must include a component that is not financially constrained.

Section 201.6011 requires TXDOT to coordinate with entities to develop an integrated international trade corridor plan, which has to be updated biannually and reported to the legislature. It must include the following:

1. strategies and projects to aid the exchange of international trade using the system of multiple transportation modes in this state;
2. priorities based on the amount of international trade, measured by weight and value, using the transportation systems of this state, including:
   A. border ports of entry;
   B. commercial ports;
   C. inland ports;
   D. highways;
   E. pipelines;
   F. railroads; and
   G. deep-water Gulf ports; and
3. an implementation plan for the recommendations of the Border Trade Advisory Committee

4.5 Texas Structure for Regional Government Planning

The Local Government Code (LGC) within Title 12 Planning and Development allows for the formation of Regional Planning Commissions (RPC) under Chapter 391. Section 391.001 sets out the purpose of the chapter, which is to encourage and permit local governmental units to

1. join and cooperate to improve the health, safety, and general welfare of their residents; and
2. plan for the future development of communities, areas, and regions so that:
   A. the planning of transportation systems is improved;
   B. adequate street, utility, health, educational, recreational, and other essential facilities are provided as the communities, areas, and regions grow;
   C. the needs of agriculture, business, and industry are recognized;
   D. healthful surroundings for family life in residential areas are provided;
   E. historical and cultural values are preserved; and
   F. the efficient and economical use of public funds is commensurate with the growth of the communities, areas, and regions.

The general purpose of a commission is to make studies and plans to guide the unified, far-reaching development of a region, eliminate duplication, and promote economy and efficiency in the coordinated development of a region (391.001 (b)).

LGC Section 391.002 defines in sub-section (3) a region as a geographic area consisting of a county or two or more adjoining counties that have, in any combination:

a) common problems of transportation, water supply, drainage, or land use;

b) similar, common, or interrelated forms of urban development or concentration; or

c) special problems of agriculture, forestry, conservation, or other matters.

Recommendation: The definition of region in 391.002 could be enhanced to include a megaregion definition as well. Also recommended is changing the criteria to more than just "adjoining counties" and allowing non-contiguous counties to join. The definition could also specify relevant transportation problems, and include megaregional transportation connections.

Any combination of municipalities or counties can agree, by ordinance, resolution, rule, order, or other means to establish an RPC (§391.003 (a)). The agreement that designates an RPC for the commission (which is a political subdivision of the state) indicates that the RPC

1. consists of territory under the jurisdiction of the counties or municipalities, including extraterritorial jurisdiction; and
2. is consistent with the geographic boundaries for state planning regions or sub-regions that are delineated by the governor and subject to review and change at the end of each state biennium.

Under 391.008 (c) for federally or state-aided projects, the RPC shall advise the governmental unit on whether the proposed project for which funds are requested has region-wide significance. If yes, the RPC must determine if it conflicts with a regional plan or policy, and may consider whether the proposed project is properly coordinated with other existing or proposed projects within the region. Again, the RPC is required to record its views and comments on any application. If the project does not have region-wide significance, the RPC shall certify that it is not in conflict with a regional plan or policy (e).

Section 391.008 could be modified to include language for ensuring funding is utilized for projects with a megaregional significance.

4.6 Local Government Planning

One of the larger obstacles encountered when attempting to use megaregional structures as a planning platform for improving freight and infrastructural connectivity is governance and jurisdictional overlay. In the context of the United States, under the tenth amendment to the U.S.

Constitution, governance for powers not delegated to the United States by the Constitution, nor prohibited by it to the states, is reserved to the states. Planning is reserved for the individual states and in most instances states have delegated this authority to local jurisdictions (cities, townships, counties, and parishes).

Thus, in the United States the county and city are the two most important local-level jurisdictions that i) control land use planning and development and ii) collect local fees such as property taxes and vehicle registration fees. Local citizens interact with these entities most frequently and they are the logical places that citizens will look to for megaregional governance. The local jurisdictions govern how cities and their outlying regions grow and zone for different types of land use activity; through their economic development departments, local jurisdictions are primary supporters and generators of new industrial and commercial growth. Cities and counties also work with their respective MPOs and/or COGs to create the federally mandated transportation plans and programs discussed earlier in this chapter.

To date, the city, MPO, and the state have worked as reasonably efficient mechanisms given the patterns of growth seen in the United States, and the underlying transportation networks that support retail, commercial, residential, and other personal trip functionality. They have facilitated the growth of many parts of the country and have proven useful for determining appropriate levels of services and funding.

However, the United States is continuing to grow, with much of the new growth moving to large urban areas and the megaregions. These megaregion areas all need goods and services, and the demand for these goods and services is projected to continue to grow over the next 25 years. Because of this growth, demand for freight movement will also continue to increase. Capacity to transport freight via rail, air, and road requires preservation as well as continued investment in a freight network—megaregional in scope—that will be able to keep pace with increasing demand.

Planning for freight movement is a major factor in maintaining economic advantages, ensuring sufficient future capacity, and protecting key corridors that are critical to the smooth flow of freight within and between the megaregions. Currently, freight planning is an often overlooked aspect of land-use planning at the city and county level. Without a balanced and nuanced approach to freight planning, corridors can easily become not only congested, but also surrounded by incompatible land uses that impact freight's ability to effectively transport goods. While air freight makes up a relatively small percentage of total freight throughput, the ability of the road and rail networks to provide a reasonable level of service for freight carriage is contingent on state and local governments effectively working with the freight community (trucking, logistics, and railroads) to continue to help meet their needs and protect future transportation corridors that serve the megaregions.

As a consequence, the ability to govern, plan, and fund at the megaregional scale may require the multitude of individual jurisdictions to compromise and, in essence, give away an element of their sovereignty for the better good of the megaregion. In Texas, this issue is compounded because counties are not empowered by the state with the authority to conduct land use zoning and planning. Consequently, counties cannot delegate or plan for a right which they do not hold, nor protect or plan for transportation infrastructure corridors. From the Texas perspective, this creates a key weakness in the current system of governance and a structural deficiency in considering the totality of elements that would be required for megaregional planning.

4.7 Conclusions

The emergence of megaregions as a planning concept offers a new and vital tool for planners to communicate the interrelationship between urban areas that have developed independently yet have a shared future. While the movement of goods cannot be the only relevant factor in defining the boundaries of a megaregion, for a number of reasons freight connections should be included within the matrix along with more traditional factors such as population density and commuting patterns. While academics will continue to debate the ideal way to define a megaregion, recognizing the megaregion is only the first step. In order for this recognition to spur tangible change in intraregional compatibility, a number of structural deficiencies in the current planning system must be addressed.

Given the structural deficiencies inherent in the current systems for planning in the U.S., finding alternate ways of planning for our megaregions outside of the current planning structures will be required. Ideally, the solution to this problem would be to amend the enabling acts to reorganize the level of U.S. local governments in order to serve the purpose of facilitating the future growth of freight movement in megaregions. However, this would also necessitate the changing of current political boundaries, which is unlikely to take place in the foreseeable future. Therefore, any discussion of improvements to the regional governance should emphasize improving cooperation among the megaregion's existing government entities.

One method would be to increase the scope of current COGs and MPOs to include (i) conducting megaregional analysis in their plans and (ii) developing a mechanism to bring multiple COGs/MPOs together to form a "megaregional COG." This would allow corridor planning to be more synchronized and appropriate to the needs of specific megaregions. If the COG/MPO boundaries could also be expanded to include larger areas (thus encompassing more of the local jurisdictions that currently do not fall into the existing regions), a megaregional governance structure would likely emerge that could tie regions together via economic linkages—the flows of which would be mirrored through freight corridors. Megaregions, while clearly not the best choice of scale for some planning applications, present themselves as a more appropriate scale when examining infrastructure needs that often span the entire megaregion and are interconnected across modes and communities.

COGs and MPOs are useful elements of this solution because they are inter-jurisdictional coalitions, composed of elected officials, and already occupy a unique role in the hierarchy of governing bodies vis-à-vis transportation planning. They offer a transitional bridge between the individualized needs of local governments and the wide-ranging requirements of the state government. Utilizing the MPOs/COGs would allow each region to communicate its needs to the state as a bloc, and therefore offers a "middle ground" perspective of the requirements of the member communities. This could also work to give formerly disparate jurisdictions within the same region a common voice and a means to convey their message to state leaders.

COGs and MPOs represent a relatively new approach to tackling issues that affect an entire region, and a step in the direction of regional governance. In Texas, they have primarily had the effect of facilitating infrastructural growth on a regional level. More specifically, toll roads and bypass routes have been planned and built after gathering input and ideas and sharing funding from benefiting counties and jurisdictions throughout the region.

The success of COGs and MPOs in bringing together the disparate interests of multiple jurisdictions in order to benefit the whole region supports the idea that this governance structure can be upsized to accommodate megaregions. The most useful approach could be creating a coalition of COGs and MPOs that represent a delineated megaregion. For example, the COGs

representing the metropolitan areas around Corpus Christi, Houston, Beaumont-Port Arthur, Lake Charles, Baton Rouge, New Orleans, and Mobile could be regarded as the Gulf Coast Megaregional Planning Organization and could be composed of the leadership of the regional COGs. This approach has a variety of advantages that could improve the ability of megaregions to plan future corridors and, in effect, more directly control the level of infringement on the corridors. Protecting corridors is essential as they form a key unit of the future economic growth of the region, megaregion, and nation as a whole.

The variety of published work, related data, current research, and materials from the various study interviews provided the catalyst for two study workshops: one early in the study aimed at gaining direction from the TxDOT study advisors and a second, larger, one near the end of the study where the findings would be reported to public audience for comment, criticism, and support. The next chapter focuses on the large workshop that was conducted in Houston in June 2011.

Chapter 5. Megaregions Workshop, Houston, TX

Two workshops were scheduled to be held during the yearlong scoping project. The first workshop was held in December 2010 at the TxDOT offices in Austin. The goal of this workshop was to work with the TxDOT Project Advisory Committee (PAC) to review the analysis from the literature review and specific priorities for the research team to address.

The second workshop took place on June 24, 2011, at the TxDOT Houston District offices. The workshop goals and questions were developed in response to a series of interviews (telephone and in-person) the research team conducted with local jurisdictions, agencies, and freight groups around the U.S. in the preceding 3 months. The goals of the workshop were to determine the possible benefits of adding elements of megaregional freight planning to both regional and statewide planning processes, and the feasibility of implementing such a plan. In particular, megaregional planning presents a framework for mitigating metropolitan problems of large-scale transportation systems and has attracted attention from a number of transportation advocates since 2000. Central questions addressed in this study include how this approach might change planning in Texas, the benefits and costs associated with its adoption, and the characteristics of particular interest to TxDOT. The ability of megaregional planning to improve the movement of freight throughout Texas is a major focus of this project, as freight demand is strongly anticipated to grow at a rate strongly correlated with the projected population growth. Megaregional planning could allow Texas to compete with other states by using it as a tool to promote private sector input and investment, as well as help procure increasingly limited federal support.

The literature review and interviews conducted during this research project made clear that freight should play a larger role within the megaregional definition and its general concepts for mitigating metropolitan problems of large-scale transportation systems.

This project's workshops also complemented a workshop held during November 2010 by Dr. Carol Lewis as part of a UTC Research Project on megaregions.

The research team sought to achieve this goal via discussions with a wide spectrum of potential stakeholders in a megaregional freight planning process. Invitees included PAC members, as well as representatives from cities, MPOs, Class I railroads, trucking business groups, Texas ports, private consultants, the Gulf Coast Rail District, and the Federal Railroad Administration. The research team considered it important to utilize the unique talents of a wide-ranging group of public and private stakeholders. The private sector already plans in a way that could be described as megaregional, as they utilize networks to move goods and grow their businesses. The workshop had 24 attendees, with 6 from TxDOT, 4 from local jurisdictions and MPOs, 3 from trucking and rail interests, 2 from ports, 2 from consulting firms, and 7 members of the research team. The structure of the workshop had four segments:

1. Introduction and overview of the megaregion concept and major issues.
2. Introduction and comments from attendees.

3. Open discussion, within five table groups.
4. Reporting and discussion on table findings.

The table groups were designed for diversity of geography, entity, and gender. Each group was assigned a specific primary set of questions to consider and asked to generate ideas to address certain issues. They were also instructed to write down their main findings on easel pads. If they completed their primary set of questions, they were encouraged to discuss the other groups' questions as well so that all groups could convene at the end for a large, unified discussion. The questions to consider for each group were as follows:

a. How would you define megaregions in Texas if your definition was based on freight considerations? Would the megaregion take on a similar form as current definitions, or would megaregions based on freight look completely different?

b. Many private sector users of infrastructure (such as trucking companies and railroads) already plan megaregionally, as they look at wide-ranging networks to determine the fastest and most efficient ways to move goods. What should be the role of the private sector in the megaregional planning process? How can these stakeholders ensure that their interests are protected in the planning of the future freight system of Texas?

c. How could megaregional planning assist in the protection and/or expansion of critical rail, maritime, and road corridors in the state of Texas?

d. What should be the role of individual communities be in the context of megaregional planning? What types of planning processes should be left to individual cities and counties, and, conversely, what should be planned at the megaregional level?

e. Megaregional planning would require some type of governance structure. What could that structure look like? Should it involve another layer of actual government, or should any potential megaregional planning processes be done utilizing the current bureaucratic framework?

This format worked well, as all groups reported back with various ideas on how a possible megaregional planning structure could work, utilizing both their questions and those of other groups. The next section lays out the table discussion overviews, and the overall suggestions and recommendations from the meeting attendees for the day. The workshop instruction handout is in Appendix C.

5.1 Table 1 Summary

Defining a megaregion in Texas is, by its very nature, a difficult and lengthy process. Texas is a diverse state and crafting megaregion boundaries will need to reflect the state's strength and complexity. Two criteria that could assist in the delineation of megaregions are the aforementioned purpose and a megaregional driver or crux. The purpose of megaregional delineation could be to assist with planning of any number of elements that are currently planned on the local level, the state level, or both. These elements include water management, electricity, utilities, and, most importantly, large-scale transportation planning. The primary goal of this workshop was to facilitate the development of freight transportation plans, so the discussions did not include non-freight issues.

Megaregional planning at the macro level comprises two distinct options: personal mobility for those living and working within the region and the efficient movement of goods. In the literature, almost all work has concentrated on personal mobility, from walking to high-speed rail. The commonly delineated America 2050 Gulf Coast megaregion is primarily a goods-based megaregion bound together not by a massive concentration of population, but by the energy industry and the transportation needs common to this industry. Conversely, the Texas Triangle is bound together by its large population centers and their proximity, but not necessarily a single unifying industry or economic link. Upon debate about the appropriate driver for megaregions, the consensus was that population was the better choice to utilize in the definitions, as population drives both passenger and freight movement.

Table 1 did not decide upon the actual definition of a Texas-based megaregion within the time allotted. However, a key recommendation made by the table is that the megaregional definition should expand to incorporate peripheral areas that are not normally thought of as within the megaregion, but are strong import or export markets for the primary urban agglomerations within the megaregion. An example would be the Midland/Odessa area, which has strong connections to the Dallas/Fort Worth area and, thus, the megaregion.

Table Group 1 Highlights: Defining Freight Megaregions

- The shape and size of any Texas-based megaregion necessarily reflect the purpose of the megaregion—freight, for example, will be highly influenced by modal corridors.
- The Texas Triangle does not adequately reflect the variety of population centers and economic generators in the state.

Table Group 2 Highlights: The Role of the Private Sector

- Facilitating greater outreach to the private sector, which uses the Texas transportation system, is the responsibility of state government.
- Outreach includes identifying, planning, and managing strategic state freight routes and corridors.
- The creation of efficient intermodal connections to and from air, rail, and marine terminals is a high priority as these are primary drivers of economic growth.
- Workforce development partnerships between the public and private sectors can help ease employment shortages.

5.2 Table 2 Summary

Early in the discussion, Table 2 determined that the effective participation of the private sector in any potential megaregion planning process was both desirable and critical. When defining the entities within the private sector that should have a role in the megaregion planning process, participants commonly cited the trucking industry, railroads, ports, and major distributors and retailers.

Each of these entities has a specific strength that can be useful to understanding and implementing megaregional planning. Trucking companies and Class I railroads already plan their routes on a megaregional level, utilizing models and strategies to determine the most efficient and cost-effective way to distribute goods. Their success is critically linked to this approach to planning and thus they can provide local governments and MPOs lessons on how to best utilize and implement this approach to planning. Major distributors and retailers such as Wal-Mart and HEB utilize a similar approach in their business models to get goods from distribution centers to stores in a timely and reliable manner. The expertise offered by these entities would be helpful to the public sector's understanding of the private sector's freight needs.

Airports and seaports play a much different but equally important role in the megaregional planning process. Although not classified as private sector entities, they do not necessarily participate in the traditional public sector planning process due to their relatively specific role in the larger supply chain. While air freight contributes a small amount to the freight chain by weight, its corresponding footprint by value is significant, and its contribution to economic output should not be overlooked. Seaports are also essential links in the export/import supply chain, as well as drivers of wealth creation in the megaregion. The intermodal connections at these international trade hubs have local and megaregional impacts and, therefore, should ideally have a role in any future megaregion planning process in Texas.

Another area where the private and public sectors can partner is in labor management. For example, in certain areas of Texas, particularly South Coastal Texas, the recent economic boom fueled by the oil and gas industry has resulted in a demand for a variety of skilled labor. Local governments can work with private entities to balance employment opportunities in Texas through support for educational training, partnerships, and improved communication.

5.3 Table 3 Summary

The discussion at Table 3, which centered on protection and expansion of corridors, touched on a basic reason for advocating a megaregional approach. The table first discussed some of the impacts due to lack of corridor planning, including incompatible land use and development impacts adjacent to major trade and passenger corridors around the state. Tower 55 in Fort Worth, IH 35 as the NAFTA corridor, the connectors to the Port of Houston, and the Gulf Intracoastal Waterway (GIWW) were all noted as freight investments that had national, system-wide benefits. These facilities were also discussed in terms of their impacts on local air quality and the looming non-attainment status of these areas under the new National Ambient Air Quality Standards (NAAQS). The Tower 55 Tiger II application was considered one of our first megaregion corridor funding applications and, as such, the table felt that this experience could assist TxDOT in promoting future critical corridors by funding applications through a multi-stakeholder megaregional team approach.

The table discussed how corridors are megaregional in scope, considering their average length in the state of 200–500 miles and their impact on multiple local or metropolitan authorities. Key to their protection and expansion is education on freight flows and freight percentages, including their economic impacts and their importance as nodes in the Texas Triangle and Gulf Coast megaregions. Demographic growth and continued funding reductions will also necessitate more efficient planning for corridors due to a lack of strategic redundancy.

The table then discussed why it was important for local officials and areas to understand their crucial role on a corridor segment. Fulfilling this role is one way in which local jurisdictions could assist in megaregional planning, thus creating a sense of corridor ownership in local jurisdictions and stakeholders. One way to position corridors' importance in a megaregional context is to highlight the fact that many corridors contribute to the economy in the forms of jobs and taxes. The corridors both support and are the underlying driver in the Texas megaregions for these economic impacts.

Existing committees, such as those that have been created for the IH-35 and future IH-69 corridors, were viewed as potential models of how megaregional committees could be structured. These committees are perceived as successful in soliciting input from multiple stakeholders and the model could be expanded to include corridors from the entire state.

Table Group 3 Highlights: Corridor Protection and Expansion in the Megaregion

- Communication of the key benefits of our corridors fits easily into a megaregional framework. The focus should be on positive effects with respect to *jobs and taxes.*
- Megaregional views should take into account how site-specific project decisions on a corridor impact the megaregional system.
- Megaregional planning would generate a sense of corridor ownership and an understanding of the benefits in the corridor cities.
- Segment committees, such as the I-35 and I-69 committees, could serve as examples for megaregional corridor planning and protection.

Table Group 4 Highlights: The Role of Individual Communities

- Communication of the benefits of megaregional planning to all Texas cities is critical to build support in rural communities and counter the common urban rural divide.
- A standing committee composed of community representatives should focus on developing long-term, fundamental issues rather than single, project-based issues.
- Standing committees should not strive for consensus as a goal but should position themselves as problem-solving, information-distributing entities.

5.4 Table 4 Summary

Individual cities and the MPOs that serve the areas surrounding those cities play a key role in Texas's current planning process. Cities are given a wide variety of jurisdiction and leeway to carry out local planning processes, while MPOs serve a similar function for regional planning processes. By its very nature, megaregional planning offers an opportunity to expand the planning horizon beyond that which cities and MPOs are accustomed to looking. However, critical issues must first be addressed.

Table 4 chose as its starting point the question of how to get cities to endorse the concept of megaregional planning. With the assumption that megaregional planning in Texas will not require a new governmental structure, the conversation turned to ways of achieving the goals of megaregional planning within the current governance framework, particularly enlisting the support of smaller cities outside of the major metro areas. The significant hurdles to obtaining this support were discussed. The main obstacle was how the conversation about megaregional governance could be framed so as to overcome distrust between different jurisdictions, and the perception that one jurisdiction's gain may be another jurisdiction's loss. The table agreed that this zero-sum mentality was the largest social obstacle to megaregional planning.

The group decided that the ideal role of individual communities as stakeholders in a megaregional planning process should be participation on a standing committee, supported by dedicated TxDOT staff. Although the staff would be the primary points of contact for the committee, their role would be as committee facilitators rather than leaders. The committee would be composed of MPOs from every metropolitan area in the proposed megaregion, and possibly some from outside of the megaregion that have significant outside interests. However, the end goal of a megaregional committee should not be consensus. With such a diverse set of interests, consensus will rarely be achieved. The principal goal should be to involve all cities within the megaregion as stakeholders to discuss options, share information, and set clear objectives that would support greater passenger and freight mobility throughout the state. If megaregional committees can achieve that goal, then the chances of the process receiving widespread support and moving forward would be significantly improved.

5.5 Table 5 Summary

The first question when considering how to form and structure a governance framework is whether another layer of government is necessary to achieve the goals set forth by megaregional planning. The table generally thought that another layer of government would be detrimental to the pursuit of megaregional planning for two reasons: (1) funding would be required to support any new bureaucracy created to manage megaregional planning (while some additional funding may be necessary if other avenues of governance were pursued, the existing layer of government already utilizes dedicated funding sources); and (2) public perception, particularly in these austere budgetary times, could be negative, and may make the pursuit of megaregional planning more difficult to implement.

After arriving at a relatively prompt consensus about the inappropriateness of another layer of government, the conversation shifted to how effective governance could be achieved within the current framework of bureaucracy. The table considered TEMPO (which is composed of all of the state's MPOs) a key component in creating a coalition of stakeholders for megaregional planning purposes. TEMPO already holds much of the power and influence needed to get megaregional planning off the ground. Specifically, TEMPO provides a skeleton governance structure that can be enhanced through the addition of private sector stakeholders; major and minor cities; water, energy, and environmental regulatory committees; and key political figures that share the goals implicit in megaregional planning. The table favored a standing megaregional committee centered on TEMPO to meet the demands of the megaregions.

Another major point of discussion was the role of individual property owners in a megaregional planning structure. In Texas, property owners comprise a significantly powerful coalition with the ability to alter land use planning, especially outside of city boundaries. The ability of property owners to derail a planning process was evident in the context of the failed Trans-Texas Corridor (TTC) project. This was not an outcome or a process that any in the group would like to see repeated. Therefore, the group determined that one of the most beneficial actions would be to reach out to this extremely important coalition in hopes of beginning the conversation on a much more positive note. Ideally, the skillful communication of potential megaregional benefits to rural communities would offset the initial reaction of distrust.

Table Group 5 Highlights: Governance of Megaregional Planning

- A new layer of government is seen as detrimental to megaregional planning efforts.
- TEMPO provides an ideal framework to bring together all major potential stakeholders in megaregional planning.
- Within the TEMPO framework, a committee consisting of major public and private sector stakeholders should be supported by TxDOT.
- Property owners are critical stakeholders and need to be incorporated into any potential megaregional planning process.
- Specific outreach efforts to the stakeholders early in the process can pay dividends in increased cooperation down the line.

5.6 Conclusion

The TxDOT project director expressed interest in inserting megaregional planning, in some form, into the statewide planning process. TxDOT currently has a number of advisory committees related to specific issues, such as the Port Authority Advisory Committee, Foreign Trade Advisory Committee, and the Aviation Advisory Committee. The possibility of a Freight Advisory Committee has been discussed within TxDOT and could provide a framework to begin implementing megaregional planning. TxDOT was extremely interested, in particular, in ways to encourage greater cooperation between MPOs and saw this as the primary point upon which to focus in any future megaregional planning process.

The concept of corridor planning was fully addressed by the wide variety of stakeholders attending this workshop. In terms of allowing expansion in international trade megaregional planning, when seen through the prism of freight corridors, could allow a sharper view of economic growth and possible innovative solutions to increase corridor capacity and efficiencies. Chapter 6 examines this idea, and others related to international megaregional corridor planning.

Chapter 6. The Role of International Trade Corridors in Megaregional Planning

Megaregional planning enables city planners to look outside their immediate jurisdictions and consider how actions taken within their city may impact the flow of people and goods within the region. Acknowledging the role of international trade corridors requires a wider perspective to recognize the interconnections between planning decisions made at the local level and patterns of international merchandise trade. While urban areas have extensive road networks, usually only a handful of corridors are used extensively to handle international trade flows. The options for moving international trade by rail or by water are even fewer. Delays incurred anywhere within a supply chain can add cost to the shippers' bottom line. Furthermore, the economics of international trade often require very small profit margins; thus, seemingly minor delays tied to worsening congestion can sometimes have significant impact on trade corridor selection.

A trade corridor is essentially an interconnected series of infrastructure assets used by shippers for delivering a product from origin to destination. The term has gained additional importance now that shippers and carriers have embraced the concept of door-to-door delivery in which a single party takes responsibility for cargo throughout the course of its international journey. Thus, a single carrier has a direct interest in monitoring the performance of infrastructure of all modes and across all jurisdictions. Maersk Line, for example, offers shippers a choice of delivery to a container yard or "store door" delivery. In this way, trade corridors compete against each other.

While delays can occur almost anywhere in a supply chain, the most common occurrences of delay are in or near urban areas, either at points of modal transfer—i.e., ship to rail or rail to truck—or in areas where congestion leads to lower operating speeds. In general, if a shipper's cargo can successfully transverse modal transfer points and highly congested corridors in the vicinity of urban area, it will not be significantly delayed. Improving freight reliability on international trade corridors is thus a legitimate issue for megaregional planning, as most delays occur within the megaregions and the impacts of delays radiate throughout the megaregion and beyond. As a leading trading state and the country's largest exporter, Texas relies on several international trade corridors connecting to trade partners in Mexico, South America, Europe, and Asia. Texas has strong and balanced trading relationships with all of these regions, yet its strategy for trading with each is unique.

6.1 Profile of Trade Lanes

6.1.1 Maritime Corridors

Texas–Europe trade is driven by maritime trade lanes connecting to the Port of Houston with a diverse profile of European hubs, including Antwerp, Bremerhaven, Felixstowe, Helsinki, Kaliningrad, Le Havre, Malmo, Rotterdam, and Thamesport (JOC Sailings database, 2011). The concentration of European population along the coasts and inland waterways often means that deliveries from Europe to Houston require little overland cargo movement.

South American services are also dominated by the water mode. Many of the South American strings stop first at Mexican Gulf Ports before coming to Houston. Major ports that trade with Houston include Barranquilla (Colombia), Cartagena (Columbia), La Guaira

(Venezuela), Rio Grande (Brazil), Rio de Janeiro (Brazil), Salvador (Brazil), and Santos (Brazil) (JOC Sailings Database, 2011).

6.1.2 NAFTA Corridors

Mexican trade corridors include road, rail, and marine. Truck corridors have been the dominant mode for Mexican trade corridors; however, the development of Mexican port and rail infrastructure has led to a diversification in the modal share. Almost all of the maritime liner service traffic from Mexico's ports emanates from the Ports of Altamira and Veracruz, split rather evenly. Rail shipments from Mexico utilize the Kansas City Southern and Ferromex lines that connect to U.S. Class I railroads at several border crossings, including Laredo, Eagle Pass, and El Paso. The competitiveness of all international shipments is impacted not only by normal highway congestion but also by border-related congestion and delay. Border delays are more critical for Texas–Mexico shipments given that short transit time is one of the principal advantages of Texas trade with Mexico over competitors in Asia. If improvements made to interstate travel speeds are negated by increases in border wait times, the trade corridor will not realize the advantages from these improvements. The state DOT is limited in its ability to improve border crossing times, yet must be cognizant of the impact that this has on shipment reliability when deciding whether to invest in a corridor improvement initiative. While megaregions spanning more than one country have seldom been proposed, the Texas–Mexico freight trade provides great incentive for including border-related delays (as well as delays that occur within Mexico) within the framework of megaregional planning. For a freight-oriented megaregion to be useful, planners should consider the perspective of a freight shipper. From the shippers' perspective, their world does not end at the border. Thus, while possibly too ambitious a goal in the short term, eventually an international freight megaregion that includes parts of Mexico could be envisioned.

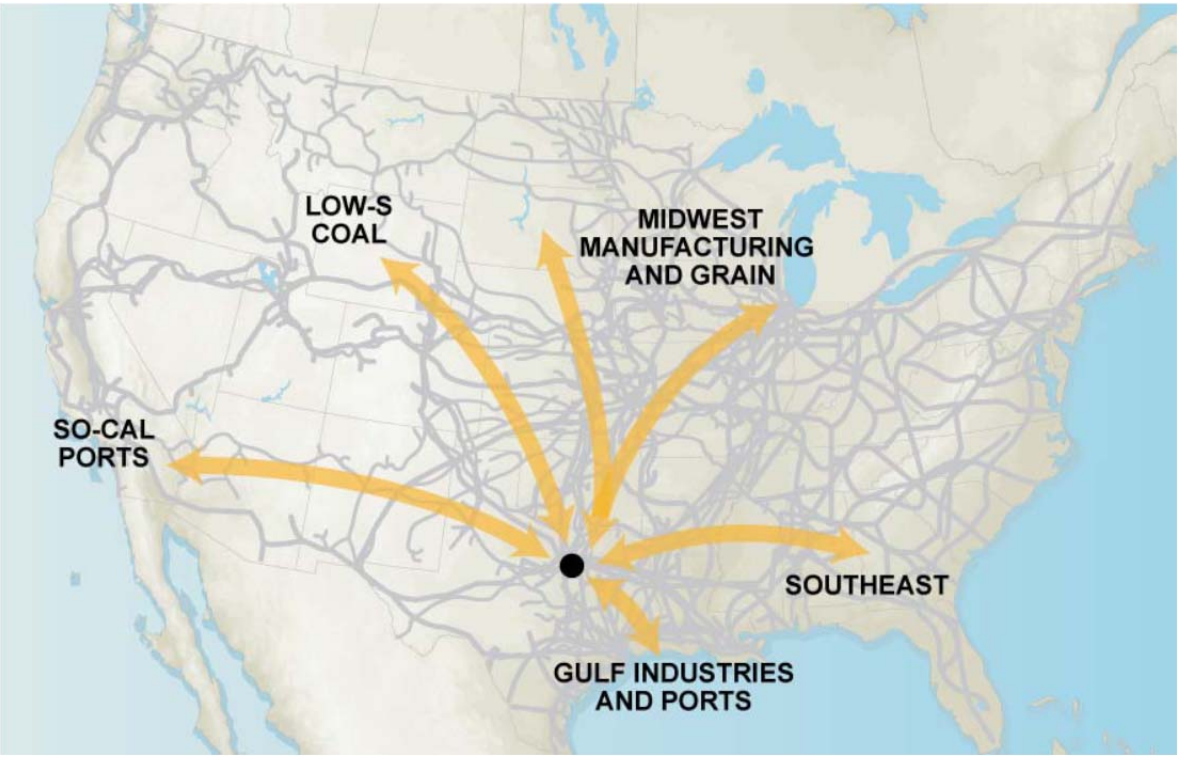
6.1.3 Class I Rail Corridors

The BNSF Railway has attempted to quantify the impacts by state of some of its most important corridors used for handling international trade. Two major BSNF trade corridors impact Texas. The Mid-Con corridor is the principal corridor for north-south trade, constituting 3,216 miles. The Texas portion of this corridor is made up of 909 miles of track, handles 954 thousand annual carloads, and is estimated to serve 13.1 million of the state's 25 million people (BNSF Railway Corridors of Commerce, 2010). The Transcon corridor, by contrast, serves east-west trade principally, including Asian trade. The Texas portion of the corridor is 553 of the total 4,647 miles. The BNSF estimates that this corridor serves 6.4 million Texans and handles 1.2 million carloads (BNSF Railway Corridors of Commerce, 2010).

6.2 Megaregional Planning Example: Tower 55

The Tower 55 project, which was developed to ease a severe rail bottleneck in the Dallas/Fort Worth region, is illustrative of the type of project that benefitted from a megaregional approach. Tower 55 is inherently a trade corridor enhancement project. The impacts of delays experienced at Tower 55 impacted not only the Dallas region but the trade network serving Texas. It handles over 100 trains a day and sits at the intersection of several domestic and international trade corridors (Figure 6.1). For this reason, letters of support for the Tower 55 project were gathered from multiple areas and organizations both inside and outside

the state. The Port of Houston cited the need to improve Tower 55 to serve the distribution needs of the Port following the expansion of the Panama Canal. Support was also expressed by the Secretary of Transportation of the State of Oklahoma, emphasizing not only the freight congestion generated by the bottleneck but also the substantial delays to Amtrak trains (such as the Heartland Flyer) that directly impact Oklahoma. The award of $34 million dollars in federal funding, combined with funding from TxDOT, the City of Fort Worth, and the railroad, make Tower 55 an important trial case for future megaregional planning issues.



Source: http://www.tradecorridors.com/tower55/pdf/Application%20-%20Tower%2055%20Multimodal%20Improvement%20Project.pdf

Figure 6.1: North American Flow of Commodities through Tower 55

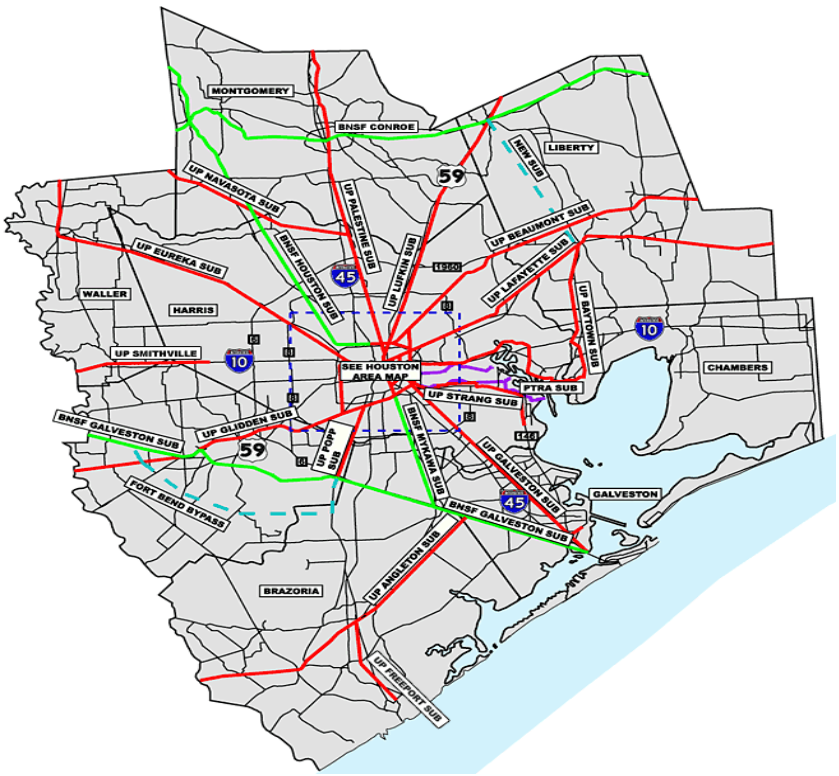
The need to act regionally and inclusively on Tower 55 was made evident by a number of factors. First, the project had been applied for as part of the original stimulus in 2009 and had not been approved for funding. The previous application had requested $22.9 million in additional funding (Tower 55 TIGER II Grant Application, 2010).

While the previous application had also had broad support within the Dallas/Fort Worth area, the second application had a greater array of support from representatives outside the Metroplex. While the exact reason the project failed to receive funding under the first application is unknown, the broader geographic range of supporters for the second application may have strengthened the attractiveness of a federal investment in the eyes of the grant reviewers. The need for regional participation was also enhanced by the fact that Tower 55 had become a notorious problem for the region, as it had for years been cited by transportation publications as one of the country's worst rail bottlenecks. As shippers became more aware of the extent of the problem, it raised the stakes among all cities in Texas to ensure that shippers and carriers did not lose confidence in the trade corridors that utilized Tower 55.

Thus, after years of being a symbol for rail gridlock within Texas, thanks to the TIGER grant Tower 55 has now become an example of interregional cooperation used to solve a pressing problem. Many years passed, however, from the point at which Tower 55 was identified as a problem to the point at which a workable resolution emerged. Had the TIGER grant process not been established, the problem could conceivably still exist.

6.3 Megaregional Planning Example: Houston Rail Network

Not all infrastructure bottlenecks in international trade routes will be as obvious or pressing as Tower 55. Thus, a process is needed to identify and address corridor improvement issues before they reach that level of severity. Some issues might be just as important as Tower 55 yet less easily defined. A good example might be the series of improvements planned for the Houston rail network. As identified by the engineering firm HNTB, the Houston rail network will require massive investment in the coming years in order to improve the speed and reliability of shipments within the Houston area and alleviate traffic congestion associated with rail movements. Improving the system will take a long series of investments, principally involving grade separations. While all of these projects are important, selecting a starting point for the process is difficult, particularly if the goal is to choose those projects that most positively impact the megaregion. Figure 6.2 shows the major corridors HNTB evaluated for improvement in 2006.



Source:
http://www.txdot.gov/project_information/projects/houston/railway/improvements_map.htm

Figure 6.2: Major Corridors Evaluated For Improvement

In some cases, public benefits of the projects were calculated, based on factors such as traffic mitigation. If this analysis were to be redone within a megaregional framework, the methodology might be expanded to include an assessment of where the benefits of improvements occur, including the principal benefits outside of the Houston region itself.

Houston is the principal maritime gateway for the whole of Texas for many cargo types, including containerized goods. Delay encountered within the Houston rail network has the potential to impact other parts of the state. The 2007 report emphasized that most rail movements in Houston have either an origin or termination point within the urban area. Thus, unlike Tower 55, there is not a lot of through rail traffic moving through Houston. Nevertheless, the statistic used in the report that only 5% of shipments constitute through traffic may actually understate the role that Houston rail traffic plays in the economy of the Texas megaregion. For example, shipments that come to the Port of Houston are transferred to a rail yard, and then railed from Houston to another destination could also be considered through traffic. If the Houston rail network improvement plan were to be reevaluated from a megaregional perspective, it would require an analysis of how delays that occur in Houston impact other parties outside of Houston. For example, a study of the rail links used to ship cargo to Dallas, San Antonio, or Austin under different conditions might clarify which improvements merit inclusion in a list of priority projects. Public benefits would be calculated not only in terms of total public benefit but would also be estimated for different areas of the megaregion.

6.4 Conclusions

Using 2007 freight data from the Freight Analysis Framework database, four different Texas megaregion delineations were compared with each other (Chapter 7 illustrates these in Figures 7.6, 7.7, 7.8, and 7.9). By tonnage, the Texas Trapezoid accounted for 69% of U.S. domestic flows, compared to 60% for the Texas Triangle. The Texahoma Triangle delineation accounted for 61% of flows and the Gulf Coast delineation accounted for 44% of domestic flows. Freight movement between the statistical areas alone in the Texas Trapezoid accounted for 42% of domestic flows compared to 34% in the Triangle. Domestic flows between MSAs within the Texahoma megaregion was 34% compared to 24% between MSAs in the Gulf Coast megaregion.

An examination of current trade corridors and two case studies demonstrated that Texas has been dealing with megaregional planning issues for some time, even though the megaregion terminology has not been used. Trade corridor enhancement projects are usually megaregional in scope. While this point has sometimes been properly documented, the ramifications of infrastructure improvements on the regional economy should be more regularly and systematically documented. With a general tightening of budgets all around, projects that can convey regional importance will be more likely to gain broad backing and the potential for federal support.

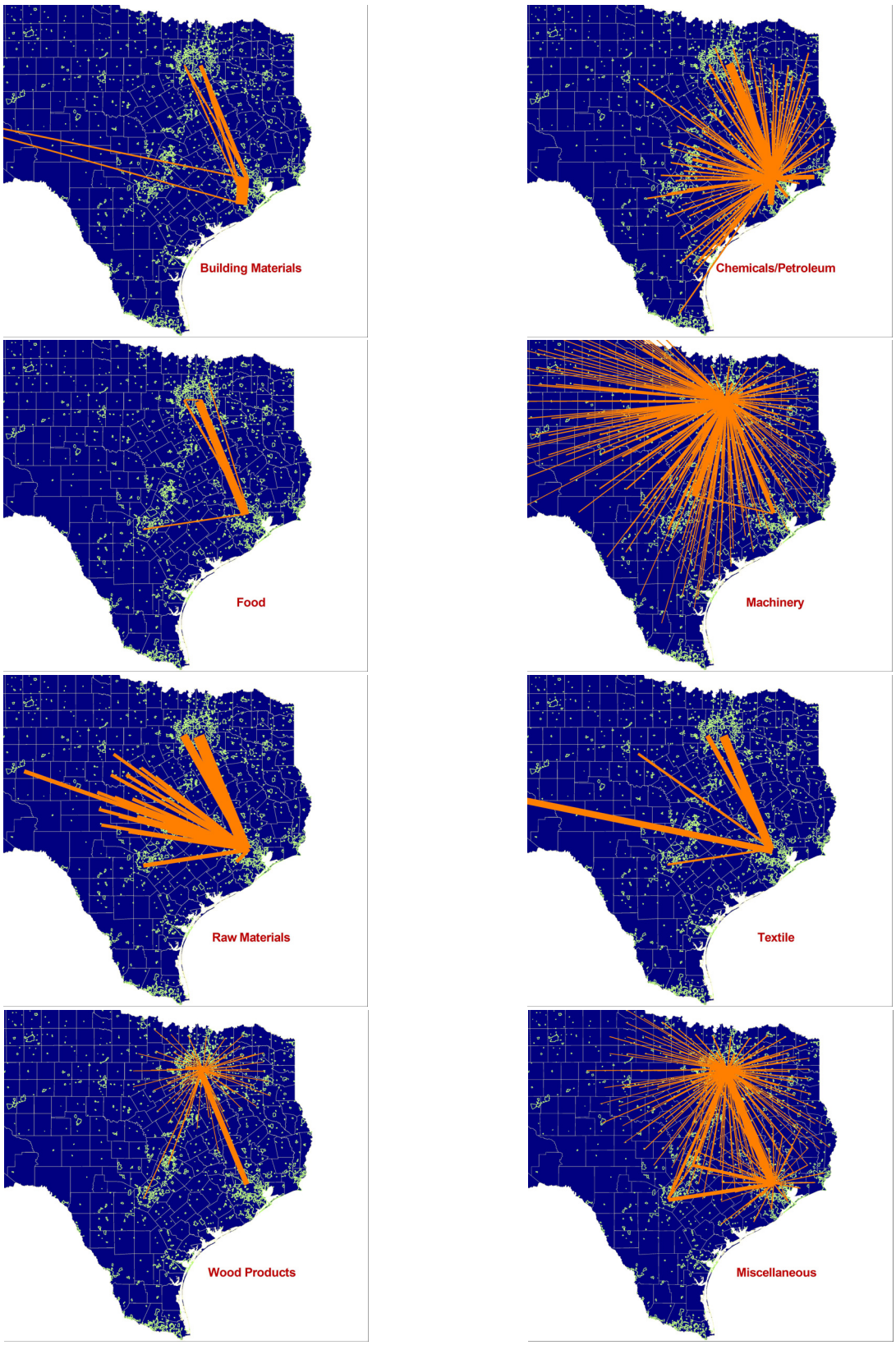
Based upon this analysis, the research team decided to conduct further analysis to determine how freight flows compare between megaregions and non-megaregions, and how that affects the possible definitions of megaregions. This analysis is presented in Chapter 7.

Chapter 7. The Role of Freight in Defining Megaregions in Texas

In Texas, freight plays a critical role in the economic health of the state. The Dallas/Fort Worth Metroplex is a large air and rail freight hub, the Port of Houston is the second-busiest maritime port in the U.S. by overall tonnage handled (Port of Houston, 2009), and massive amounts of goods moving to and from Mexico and Central America cross the border between Texas and Mexico at Laredo via road and rail. In Texas, planning for freight is seen as a strategic activity to enhance the economic competitiveness of the state and expand access to goods.

Lang and Dhavale (2005) defined megaregions as a combination of flow and place information, and drew the boundaries based on a mixture of census data, cultural geography, transportation linkages, ecology, future growth projections, and economic linkages. While the state has as many as three existing megaregions delineated via national maps[7], none were delineated with a specific focus on freight's role in the megaregion. However, the study by Zhang et al. (2007) of the Texas Triangle megaregion provides an exception. Using data on county-to-county goods movements in Texas, the authors mapped out freight flows of nine commodities transported by trucks, as seen in Figure 7.1. The maps illustrate the strong economic ties formed by freight movement among the four metropolitan areas of the Texas Triangle. Nevertheless, the study is limited in the lack of freight flows from modes other than trucks.

[7] As defined by Lang and Dhavale and America 2050.



Source: Ming Zhang

Figure 7.1: County-to-County Goods Flows in Texas

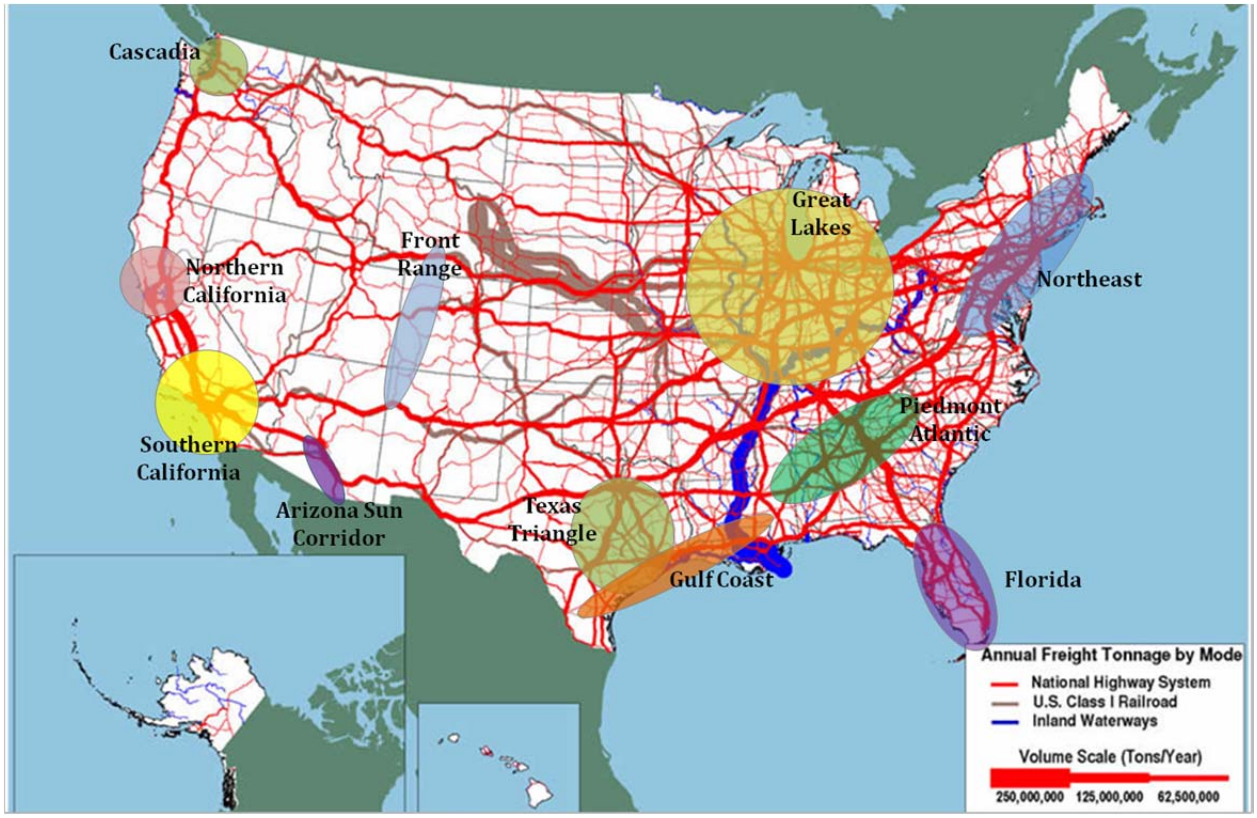
In order to best meet Texas's freight needs, it would be prudent to examine the possibility of generating a megaregional geographical definition that would link the areas tied together by freight. The omission of freight movement as a criterion for megaregional delineation is not solely due to oversight by academics, but also due to the limitations, accuracy, and availability of freight flow data. Data for freight flows is generally not readily and easily available for rail and air freight as it is for truck freight, making direct comparisons difficult. Commodity flow survey (CFS) data, though utilized in megaregional freight studies, is a flawed set of data for comparing the flows of commodities in, out, and through megaregions. Lang and Dhavale advised that as "flow data is further developed (including such measures as goods movement and airline travel), it will help further refine future iterations of the megapolitan boundary analysis" (Lang and Dhavale, 2005).

As freight flow gives a good indication of where goods are traveling to and from—a key component of the analysis of a region's economic performance—the lack of comprehensive data should not deter scholars from taking advantage of what readily available freight data reveals about freight movement within the megaregion. Gifford et al. studied the flow of freight inside and outside megaregions in the U.S. for 2002 and 2007 using CFS data. They determined that areas outside of megaregions generate larger volumes of freight tonnage than those within. However, freight within megaregions has a higher value per ton value after taking into consideration population, income, and fuel prices (Gifford et al., 2010). Megaregions and non-megaregions were compared by setting megaregional boundaries using CFS zones and other areas as the land outside of these zones. This approach had the effect of comparing megaregions and non-megaregions on an even scale with no set political boundaries. Although the CFS data is problematic (as the megaregional boundaries cannot be compared with exact geographic precision), the approach does do a reasonable job of allowing comparison of disparities between roughly delineated megaregions. As CFS data is the only publicly available information that can facilitate estimation of flows of freight movement on a nationwide basis, it was also utilized in the following analysis of the Texas megaregions.

7.1 Methodology

Using data from Freight Analysis Framework 3.1 (FAF^3), the megaregions were delineated[8] using the 2007 CFS analysis regions—the same geography used by FAF^3. The FAF^3 zones are made of up 123 domestic regions: 74 metropolitan area determined regions identified as either MSAs or combined statistical areas (CSA); 33 regions made up of state remainders, representing a state's territory outside these metropolitan regions; and 16 regions identified as entire states within which no FAF^3 metropolitan regions exist (FHWA, 2010). According to the FHWA, the metropolitan regions defined in FAF^3 do not cross state boundaries. Thus, the Chicago, Kansas City, Philadelphia, and St. Louis metro areas are each split into two state-specific FAF^3 regions, while the New York and Washington metropolitan areas are split into three distinct zones. Other metropolitan areas, such as Atlanta (GA), Boston (MA), Charlotte (NC), Louisville (KY), Memphis (TN), Minneapolis/St. Paul (MN), Portland (OR), Providence (RI), Sacramento (CA), and Virginia Beach (VA), are each defined by the state in which most of the metro area's population resides and economic activity takes place. Shown in Figure 7.2 are the eight world regions that act as the origination and destination points for U.S. exports and imports.

[8] Gifford et al. (2010) used a similar delineation in their megaregion study.



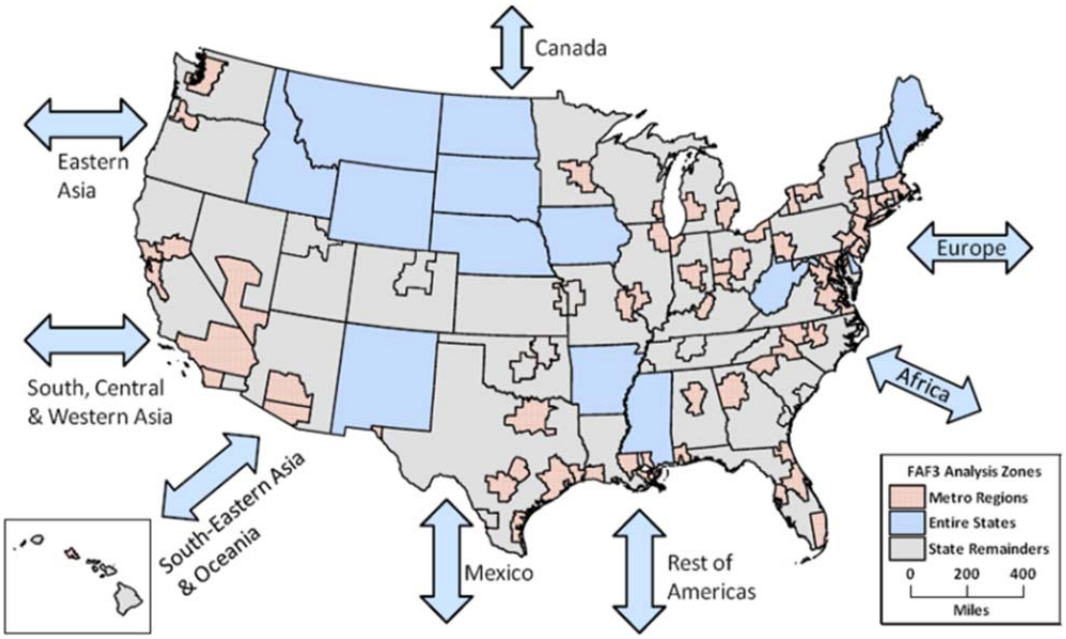
Source: Adapted from Federal Highway Administration, 2010

Figure 7.2: 2007 Tonnage on Highways, Railroads, and Inland Waterways with Megaregion Delineations

Using the America 2050 definition of megaregions (as was illustrated in Figure 1.2 in Chapter 1), the FAF[3] metropolitan area zones were assigned to the 11 commonly delineated megaregions. Areas outside of the megaregion are delineated by taking data for the areas of the requisite state outside of the metropolitan area definition. For example, the Arizona Sun Corridor megaregion is identified as a combination of the Phoenix MSA and the Tucson MSA, and its non-megaregion is identified as the remainder of Arizona. States are used to delineate the boundaries for megaregion and non-megaregion areas so that, during our analysis, states with no megaregions do not influence the data for states having at least one megaregion.

This approach is necessary as the authors believe that the greatest influence on a megaregion is within the state(s) where the megaregion exists. In comparing megaregions to each other, when an entire state is within a megaregion (such as New Jersey), the entire state is included in the analysis. Finally, when a major city is in megaregion but is located at the state's border (such as Albuquerque), and data is available, the city is treated as megaregion and remainder of state as non-megaregion. If data for the major city is not available, the city and state were excluded from the analysis. In the case of the Front Range megaregion, data was available only for Denver. Data was not available for Albuquerque, Santa Fe, Colorado Springs, and Cheyenne, the other metropolitan areas in the megaregion. Therefore, the Front Range megaregion was completely excluded from this analysis. Other notable zones or metro areas excluded from the analysis include Memphis and Nashville (part of the Piedmont Atlantic megaregion) and Oklahoma City and Tulsa (part of the Texas Triangle megaregion). Based on

the above-stated methodology, the 10 identified megaregions and their corresponding FAF[3] zones are shown in Figure 7.3.



Source: Adapted from the Federal Highway Administration, 2010

Figure 7.3: FAF[3] Geography

Freight flows were then divided into three categories: domestic, imports, and exports. Domestic flows include trade between U.S. origins and destinations only, with no foreign trade flow, as shown in Figure 7.3. Import flows include freight moved from foreign origins (FAF foreign regions) to U.S. destination regions, and export flows include freight moved from U.S. origin regions to foreign destinations (FAF foreign regions) as illustrated in Figure 7.4. Figure 7.5 depicts U.S. import/export freight flows.

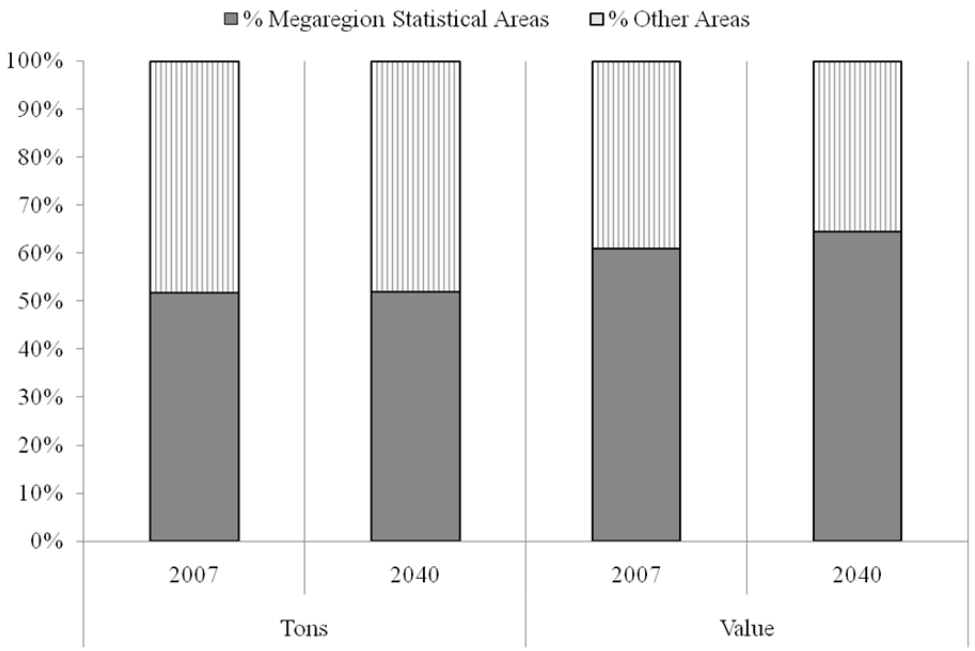


Figure 7.4: U.S. Domestic Freight Flows

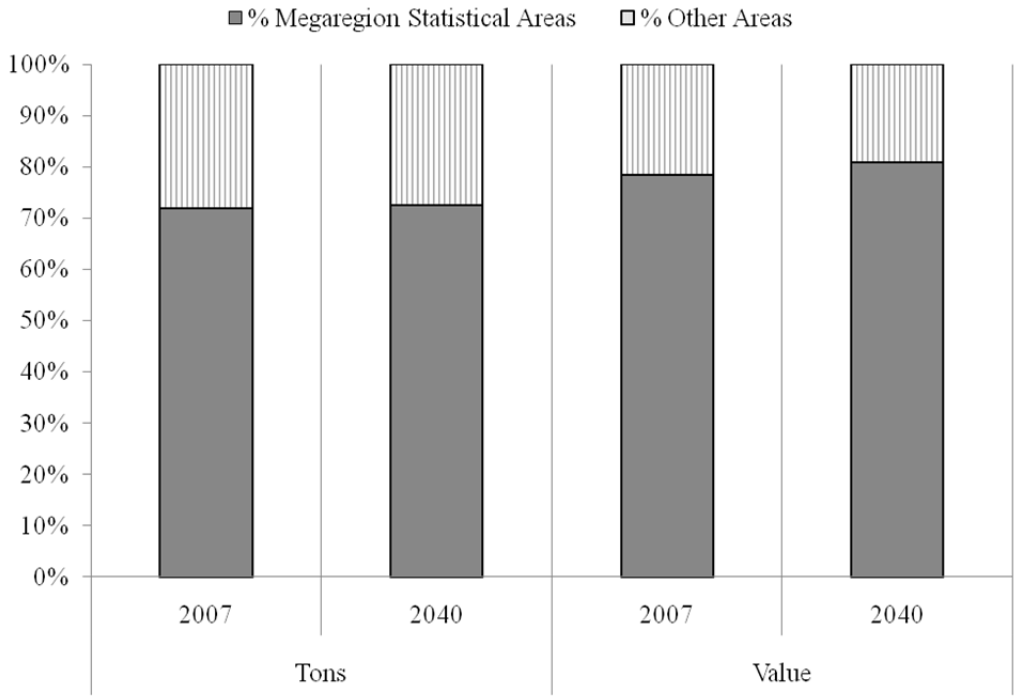


Figure 7.5: U.S. Import/Export Freight Flows

A major limitation of the data for megaregional analysis is the lack of data for smaller metropolitan areas that are located between the above-listed statistical areas but are included in the America 2050 definition of megaregions. An example of this would be found in the Texas

Triangle megaregion. The cities and metropolitan areas at the points (Houston, Dallas/Fort Worth, San Antonio, and Austin) all have data. However, no data is available for the smaller areas that are within the Triangle, such as Bastrop, Bryan/College Station, Conroe, Huntsville, Killeen, New Braunfels, San Marcos, Sealy, Temple, and Waco. This data omission will affect the findings, as areas such as these, which are within the megaregion, will be counted as lying outside of it. Thus, in most cases, freight amounts related to the megaregion will likely be higher than the figures shown.

7.2 Alternative Definitions for the Texas Megaregions

The debate regarding the criteria that should be used in defining megaregions is ongoing. For this reason, researchers should consider possible alternative ways of delineating megaregions separately from those that are currently studied.

As discussed previously, current megaregional definitions do not necessarily take into account the role of freight in defining a region. While transportation linkages and relationships are often very high in the hierarchy of criteria used in defining megaregions, freight needs are virtually ignored. Because the movement of freight is dependent on the ability of goods to be moved reliably, expeditiously, and predictably, the ability of places to support future growth of freight movement should likely be a key component of megaregional definitions.

The use of freight movement as the lone criterion in the delineation of megaregions can be an effective tool for policymakers wanting to incorporate a megaregional perspective into future transportation plans. This case study seeks to analyze megaregional delineations based on freight movement and population within the component metropolitan areas. The case study will present four different scenarios of megaregional delineations for Texas, Oklahoma, Louisiana, and Alabama. The freight flows and populations of these megaregions will be compared with the remainder of the states. Following are the four scenarios:

1. Gulf Coast: Affected states include Texas, Louisiana, and Alabama. The statistical areas within this megaregion are Beaumont, Corpus Christi, Houston, Baton Rouge, Lake Charles, New Orleans, and Mobile. Areas not in this megaregion are the remainder of Alabama, the remainder of Louisiana, and the remainder of Texas including Austin, Dallas/Fort Worth, San Antonio, Laredo, and El Paso. See Figure 7.6.
2. Texas Triangle: All MSAs within this megaregion (Austin, Dallas/Fort Worth, Houston, and San Antonio) are located in the state of Texas. The areas not in the megaregion include Corpus Christi, El Paso, Laredo, and the remainder of Texas. See Figure 7.7.
3. Texas Trapezoid: This is a combination of the Texas Triangle plus Laredo, Corpus Christi, and Beaumont. Areas not in this megaregion are El Paso and the remainder of Texas. See Figure 7.8.
4. Texahoma: This definition falls within both Texas and Oklahoma. MSAs within this megaregion include Austin, Dallas/Fort Worth, Houston, San Antonio, Laredo, Oklahoma City, and Tulsa. Areas not in this megaregion include the remainder of Texas including El Paso and Beaumont, and the remainder of Oklahoma. See Figure 7.9.

7.2.1 Gulf Coast

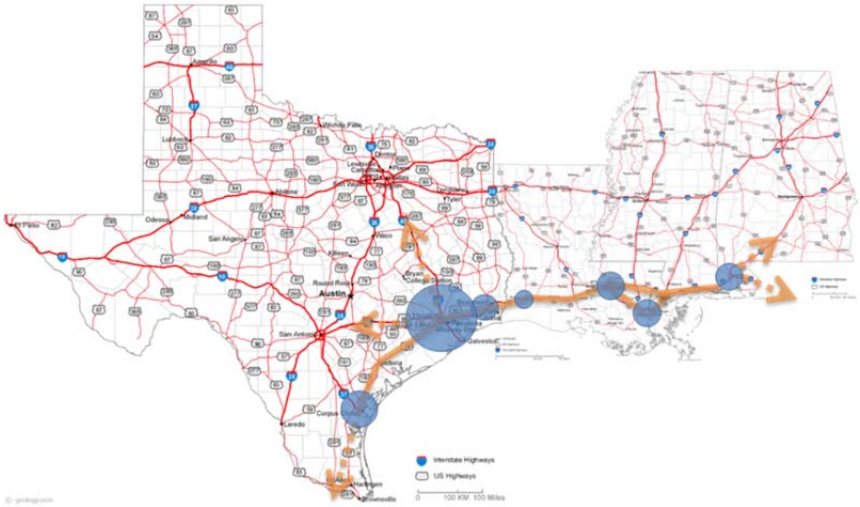


Figure 7.6: Gulf Coast

The Gulf Coast megaregion encompasses a wide swath of coastal land that runs from Corpus Christi east to the Florida Panhandle. This megaregion is notable due to the similar economic interests of the component metropolitan areas in the region and is often also known as the Energy Corridor due to the abundance of petrochemical activity along the corridor. This megaregion is also linked by its susceptibility to hurricanes and the planning that must be undertaken in order to minimize the risk in the event of a storm. In the last decade, all of the major metropolitan areas contained within this megaregion have been impacted by a hurricane or tropical storm. This megaregion includes two of the busiest maritime ports in the United States: the Port of Houston and the Port of New Orleans. These ports are major employers within their respective metropolitan areas and provide the infrastructure necessary to the continued growth of the petrochemical industry in this part of the country, as well as freight capacity to meet the needs of regional residents. This megaregion offers the opportunity to not only improve freight capacity along the area roughly defined by the I-10 corridor, but an opportunity to create better plans to protect residents from future hurricanes and devise more efficient disaster response and evacuation systems. Ensuring the safety of local residents will be the key to expanding the economies of the areas contained within the Gulf Coast megaregion.

7.2.2 Texas Triangle

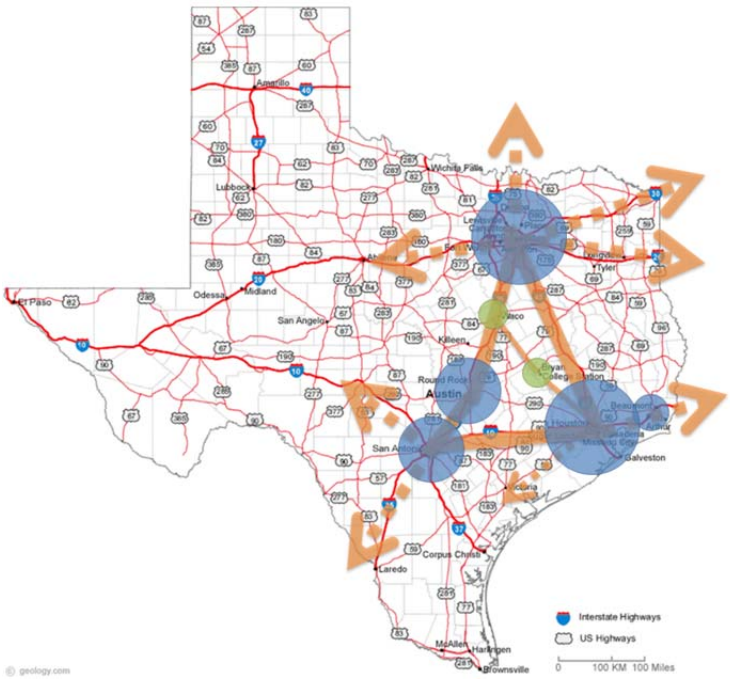


Figure 7.7: Texas Triangle

The Texas Triangle, as delineated by America 2050, is a megaregion that encompasses much of the eastern half of the state of Texas, and four of the state's top five most populated metropolitan areas. The vertices of the Triangle are defined as the metropolitan areas of Dallas/Fort Worth, Houston, and San Antonio, and the edges as the Interstate highways that connect these regions. Austin, the fourth largest metropolitan area in the state, is included along the western edge of the Triangle, leaving El Paso as the only major Texas metropolitan area located outside of the Triangle. The Triangle represents the epicenter of economic activity in the state; as of the year 2000, areas within the Triangle accounted for nearly 84% of the state's GDP while comprising only 61% of the population (Zhang, Butler, and Steiner 2007). Most freight passing through or within the state of Texas must traverse some part of the Triangle at some point along its journey and the demand for freight in these areas is anticipated to continue to grow as the population grows. Using the Triangle as the geography for a megaregion in Texas also highlights the economic inequality that exists across the state. Areas outside of the megaregion are on the whole significantly poorer with less access to opportunities than those within.

7.2.3 Texas Trapezoid

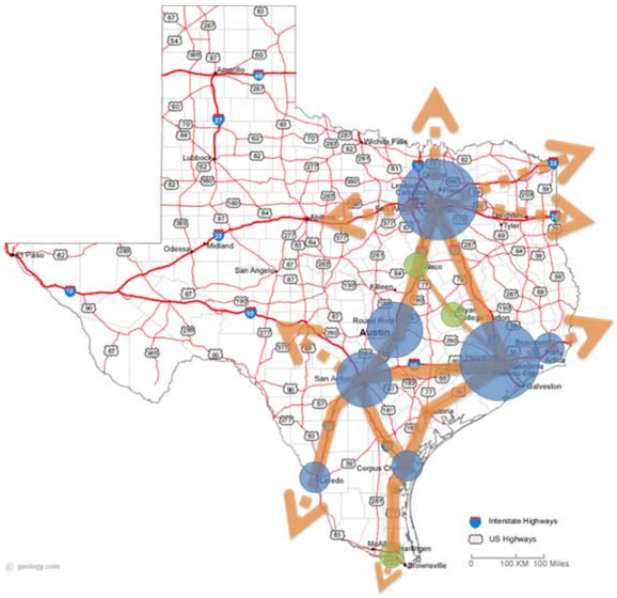


Figure 7.8: Texas Trapezoid

This megaregion definition expands the boundaries of the Texas Triangle megaregion into the fast-growing areas of South Texas, including the Rio Grande Valley and Laredo. South Texas is the fastest growing area of the state (McAllen Chamber of Commerce, 2011), and will continue to generate increased freight demands as its population grows. Laredo, as the initial U.S. component of the IH 35 NAFTA corridor, has long been the busiest point of entry for cargo on the over 2,000 mile U.S.–Mexico border (Black, 2010). However, both of these areas are generally seen as outside of the megaregion. While America 2050 acknowledges the Rio Grande Valley as a part of the Gulf Coast megaregion, Laredo is completely ignored in all scenarios. From the perspective of moving freight, Laredo is the most important trade link between Texas and Mexico, and its importance to international trade between the U.S. and Mexico on the IH 35 NAFTA corridor deems it worthy of inclusion in megaregional delineation.

7.2.4 Texahoma Triangle

This megaregion definition expands the definition of the Texas Triangle to include Oklahoma City and the corresponding IH 35 corridor connecting the area between Oklahoma City and the Dallas/Fort Worth Metroplex. In essence, it is a hybrid megaregion that combines the Texas Triangle as defined by America 2050 with a large part of Lang and Dhavale's delineated IH 35 corridor megaregion, omitting the Kansas City metropolitan area from the definition. The justification for this definition stems from the strong economic ties that the IH 35 corridor in the state of Oklahoma shares with the corridor in North Texas. The rail and road linkages that exist today largely follow patterns of trade and settlement established in the 19th century with the rise of the cattle industry in the region. Historic routes such as the Chisholm and Shawnee trails closely follow current transportation routes between Texas and Oklahoma. Transportation linkages between Texas and Oklahoma are essential for continued efficient inter- and intrastate freight movement for both states.

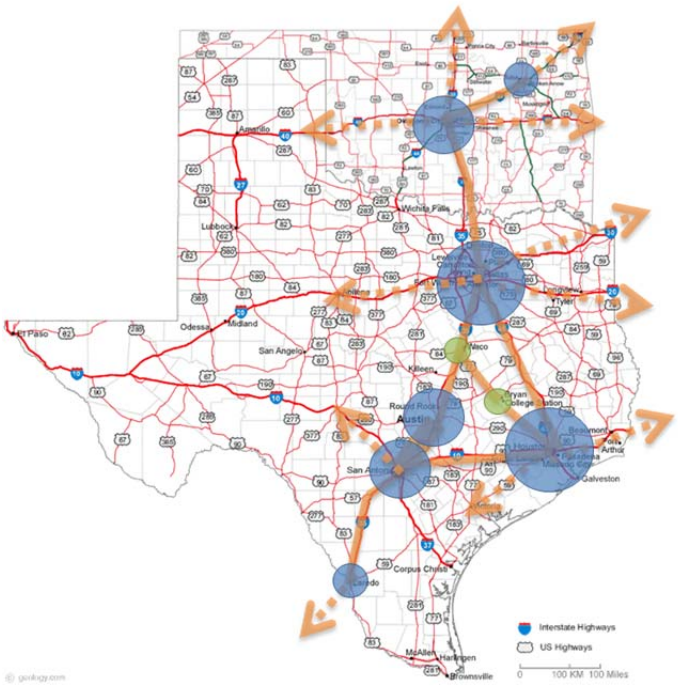


Figure 7.9: Texahoma Triangle

7.3 Case Study Findings

Using 2007 freight data from the FAF[3] database, the above-stated megaregion delineations were compared with each other as illustrated in Figures 7.10, 7.11, and 7.12. By tonnage, the Texas Trapezoid accounted for 69% of U.S. domestic flows, compared to 60% by the Texas Triangle. The Texahoma Triangle delineation (Texas and Oklahoma combined) accounted for 61% of flows and the Gulf Coast delineation (Texas, Louisiana, and Alabama) accounted for 44% of domestic flows. Freight movement between the statistical areas alone in the Texas Trapezoid accounted for 42% of domestic flows compared to 34% in the Triangle. Domestic flows between MSAs within the Texahoma megaregion was 34% compared to 24% between MSAs in the Gulf Coast megaregion. Quantifying freight flows between statistical areas within the megaregion is important for planners as these flows directly impact the transportation infrastructure within the megaregion.

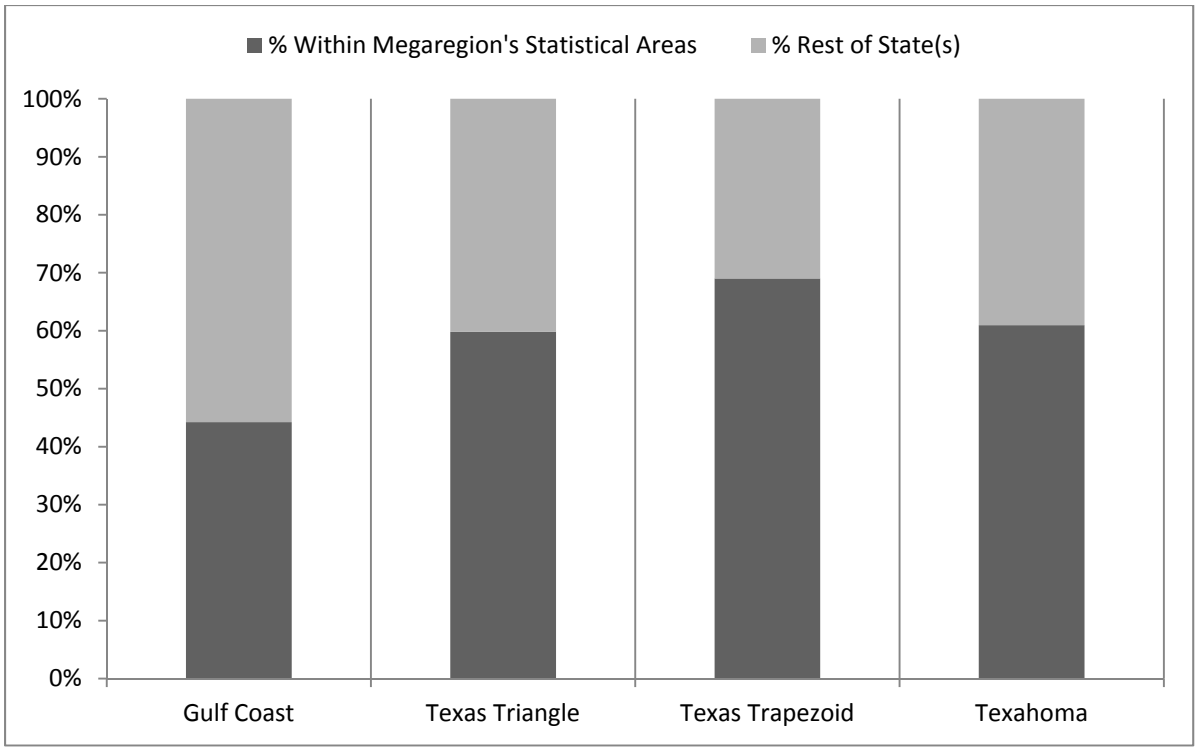


Figure 7.10: 2007 U.S. Domestic Flows Originating or Terminating by Tons

Examining freight movement by value, the Texas Trapezoid made up 76% of U.S. domestic trade in Texas, compared to 68% by the Texas Triangle, 70% by Texahoma (Texas and Oklahoma combined), and 41% by the Gulf Coast (Texas, Louisiana, and Alabama combined). Trade between the megaregions' statistical areas was 35% of domestic flows for the Texas Trapezoid, 30% for the Texas Triangle, 29% for Texahoma, and 20% for the Gulf Coast.

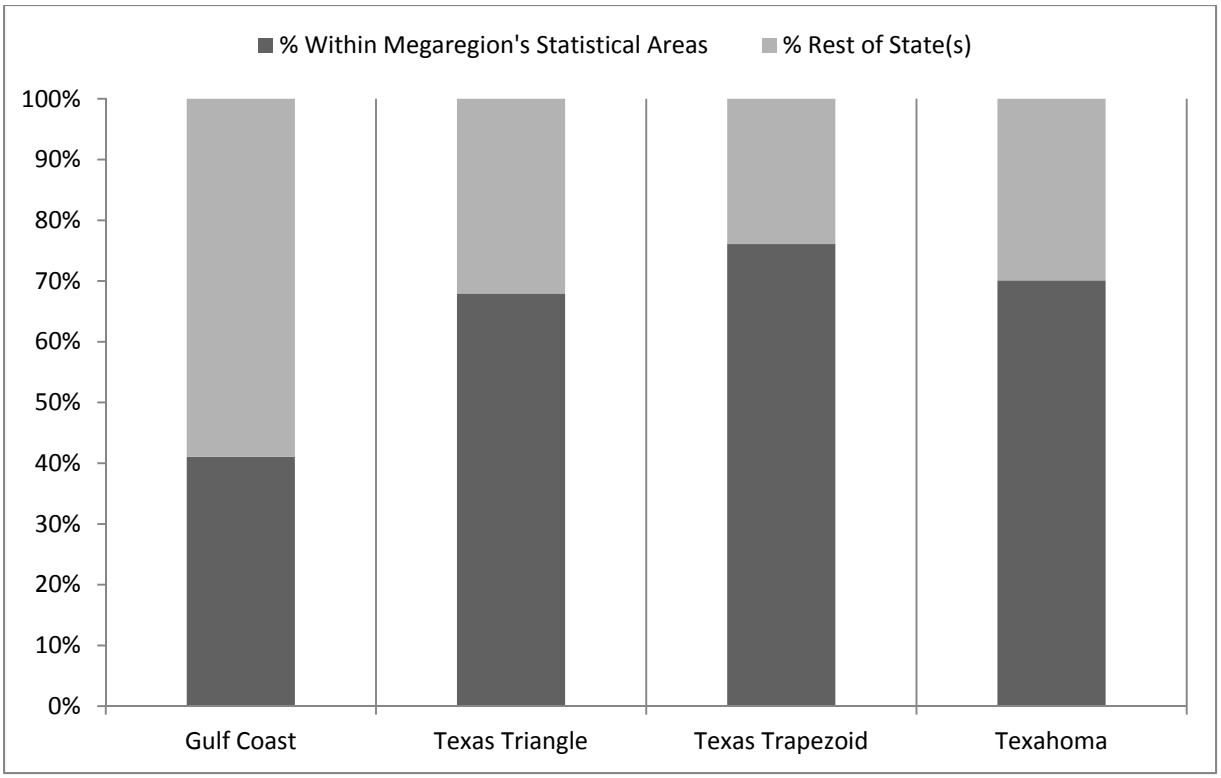


Figure 7.11: 2007 U.S. Domestic Flows Originating or Terminating by Value

The four megaregions also account for the majority of the import and export trade in their respective state(s). The Texas Trapezoid makes up 90% of Texas's trade and the Texahoma Triangle comprises 82% of Texas and Oklahoma trade combined. The Texas Triangle accounts for 78% of Texas trade while the Gulf Coast makes up 61% of Texas, Louisiana, and Alabama trade combined.

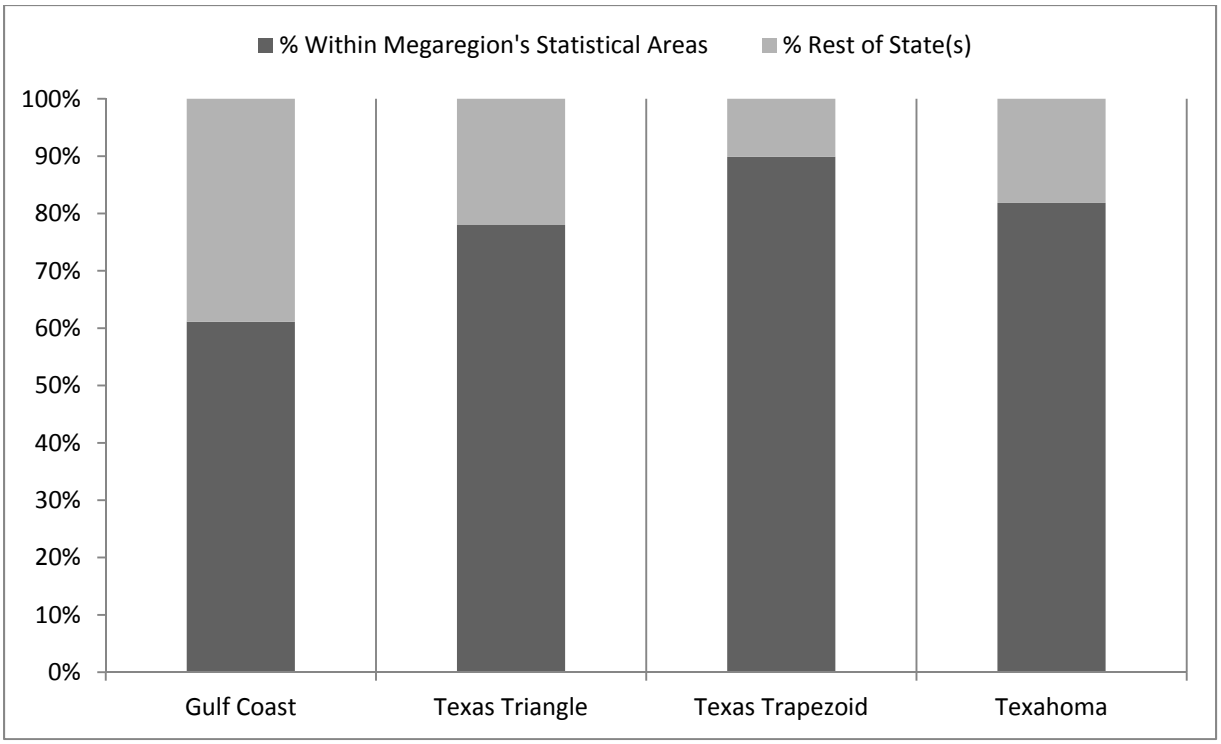


Figure 7.12: 2007 Imports and Exports by Value

Chapter 8. Recommendations and Areas of Further Study

Key recommendations, including suggestions for future research, are detailed in this chapter.

1. *Define the megaregion, with the quality, quantity, or capacity of freight systems as a primary criterion.*

As megaregional planning is a foreign and undeveloped concept to many planners, and several definitions have been formulated, there is no consensus on which definition will come to dominate. Therefore, Texas should take the lead and create a freight megaregion definition that will serve its needs as well as facilitate transportation (and perhaps other) functions for surrounding states.

Freight needs should serve as the primary criterion for any such megaregional definition. Trends in population and freight are highly correlated—a growing population will have a growing need for the provision of freight movement. More precise data on freight flows will be a prerequisite for utilizing freight as the primary criterion, as the existing FAF^3 data is too broad in certain areas of the country and does not discriminate by precise location.

2. *Position megaregional planning to promote corridor protection, preservation, and expansion while bridging inconsistencies between statewide plans and local and MPO plans.*

Corridor protection is a theme that continues to emerge in academic research as well as in discussions throughout this project. Attempts to protect corridors in Texas are often made difficult by landowners' general reluctance to sell land to the government or have it taken by eminent domain. Furthermore, current county land use laws limit the scope of government land condemnation. Megaregional planning, in concert with slightly revised land use laws, could offer a way for local and state agencies to reliably protect corridors that have been shown to be critical to the state's economy.

3. *Explore the concept of load-centering freight within metropolitan areas via intermodal ports, utilizing megaregional criteria to determine optimum port locations.*

Freight distribution underwent a substantial change in the last 20 years as supply chains were scrutinized, bottlenecks removed or bypassed, and the logistics industry grew to meet the global reach of the 21st century. A substantial amount of freight entering or leaving current megaregions moves on a multimodal system, taking advantage of rail and maritime economies of scale over longer distances and the flexibility of trucks for speed and just-in-time reliability. Cargoes moving between modes are switched at terminals; as megaregions grow, either in population density or area, a greater number of terminals and distribution centers will be needed. Scarcity and attendant costs associated with urban land suggest that planning for "load centers" where companies would site their facilities should be on the planning schedules of all MPOs. Rail-based containerization is likely to be centered at one or two sites (such as Alliance at Fort Worth) within a single megaregion utilizing a hierarchy of distribution centers (such as Austin)

from which zero-emission smaller trucks would undertake the final urban deliveries. Incentives to load centers would be based on using the limited highway funding to improve access to these sites, thus lowering vehicle operating costs to users.

4. *Create, via TxDOT and/or TEMPO, a standing megaregional committee to identify projects or initiatives that are essential to support passenger and/or freight mobility and to benefit multiple regions.*

A committee that could successfully emulate the productivity seen in the IH 35 and IH 69 committees would be an ideal outcome of this initiative. This committee would ideally contain the key public, private, and nonprofit stakeholders in the megaregion and would work to further the goals of those stakeholders. Examples of tasks that the committee would be responsible for could include creating the working definition for a Texas-style, freight-based megaregion, identifying feasible projects of megaregional value, advocacy, and data sharing between MPOs.

This committee would likely not have any specific statutory powers but could be effective under the existing bureaucratic structure. The committee would be structured with representatives from TxDOT, member MPOs from TEMPO, railroads, truckers, ports, airports, and maritime operators, as well as various other relevant private sector actors. Recommendations made by the committee should be incorporated into future Transportation Improvement Plans and Long Range Transportation Plans.

5. *Utilize findings from the legal review to determine megaregional initiatives that can be pursued within the current frameworks of both state and federal codes, as well as identify changes that can be made to these codes in order to explicitly give local jurisdictions the power to plan and procure funding for megaregional projects.*

As discussed in Chapter 4, DOTs and MPOs currently have latitude to begin to consider and incorporate a megaregional planning focus within their current state transportation and transportation planning documents. They also have latitude to enter into compacts, agreements, and memorandums of understanding so that multiple MPOs, counties, or cities can also partner to achieve effective megaregional planning. This outcome will, however, require a set of criteria, data analysis requirements, and other procedural elements to ensure conformity across the various documents produced by the MPOs and DOT. As this chapter's first recommendation noted, a specific definition of the freight megaregion needs to be developed in order to effectively plan for megaregional freight needs. The legal and planning review highlighted structural deficiencies regarding land use planning at the local level; these deficiencies would also need to be addressed in the long term if cities and counties are to effectively administer land use and other planning elements to strategically plan for their jurisdiction within the megaregion.

6. *Determine megaregional benefits from positioning megaregional planning to address interdisciplinary planning issues.*

Megaregional planning, because it plans for extremely large areas, has the potential to be used for much broader planning applications than simply freight. For example, the Environmental Protection Agency, through the National Ambient Air Quality Standards (NAAQS), has steadily reduced the allowable limit for ground-based ozone in the air over the

last two decades. In Texas, 27 counties are already not in compliance with the limit of 75 parts of ozone per billion parts of air, a number that would undoubtedly grow if the level is reduced further to 60 or 70 parts per billion (Carmack 2009). At these levels, in fact, essentially the entire state roughly east of IH 35 could be out of compliance with federal air standards. Transportation systems, along with weather conditions and stationary pollution sources such as power plants, are key drivers in the emission of pollutants. An approach that would essentially force local and state agencies to look at opportunities to decrease pollution across large areas would, necessarily, also enhance the potential for more efficient transportation systems to bring the state into NAAQS compliance.

Approaching the concept of megaregional planning in a manner intended to focus primarily on air quality vividly illustrates the allure of increased megaregional focus—its inherently interdisciplinary nature. Another topic that is megaregional in nature and affects increasingly large amounts of Texans is water quality and availability. Although good transportation is often seen as a need, particularly in the United States, clean air and clean water are needs of a much higher order. Tying the provision of clean air and clean water to more efficient corridors and transportation systems can potentially introduce megaregional freight and passenger planning to more receptive audiences.

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Appendix A: Literature Review

1. Amekudzi, Adjo A, Linda Thomas-Mobley, and Catherine Ross. "Transportation Planning and Infrastructure Delivery in Cities and Megacities." *Transportation Research Record: Journal of the Transportation Research Board*, 2007: 17–23.

The Amekudzi et al. article argues that planning on a supraregional scale is necessary to keep up with future growth trends in the U.S. and around the world. Regional planning will still be sufficient in some regions, but the paradigm shift in development currently taking place will elevate the importance of regional governments and authorities, expanding their level of functional cooperation with their peers (p.19). Scenario-based planning is examined as a means of expanding intra-authority cooperation and accurately forecasting future needs for large areas. Two practices—doubling the planning horizon to 40 years and significantly broadening the geographic scope of the planning area—are presented as necessary components to sustainable planning practices. These are primarily seen from a transportation perspective, but can be defined in differing contexts, such as a megaregion that is linked by conflicts arising from shared water resources. Financing mechanisms that can make many of the megaregional initiatives feasible are also explored (p. 22).

Topics: *scenario-based planning, Texas, national perspective, international perspective, economics, financing, passenger transportation needs*

2. Dewar, Margaret, and David Epstein. "Planning for 'Megaregions' in the United States." *Journal of Planning Literature*, 2007: 108–124.

Dewar and Epstein, after completing a comprehensive review of disparate definition criteria for U.S. megaregions, make the case that freight movement is a central nexus to the most appropriate megaregional definitions in the U.S. (p. 118). Looking at commute flows or the patterns of freight trucks are noted as suitable means of public-sector information gathering and offer opportunities to improve services and expand the breadth of the planning process across wide regions (and megaregions). The availability of the FHWA's FAF^3 facilitates the collection of freight-related data and is a major tool in the process of organizing and analyzing that data. Its widespread use could help better identify current and future megaregions by quantifying flows of both passenger and traffic (p. 119). Figure A.1 depicts commute flows in the Great Lakes Megaregion.

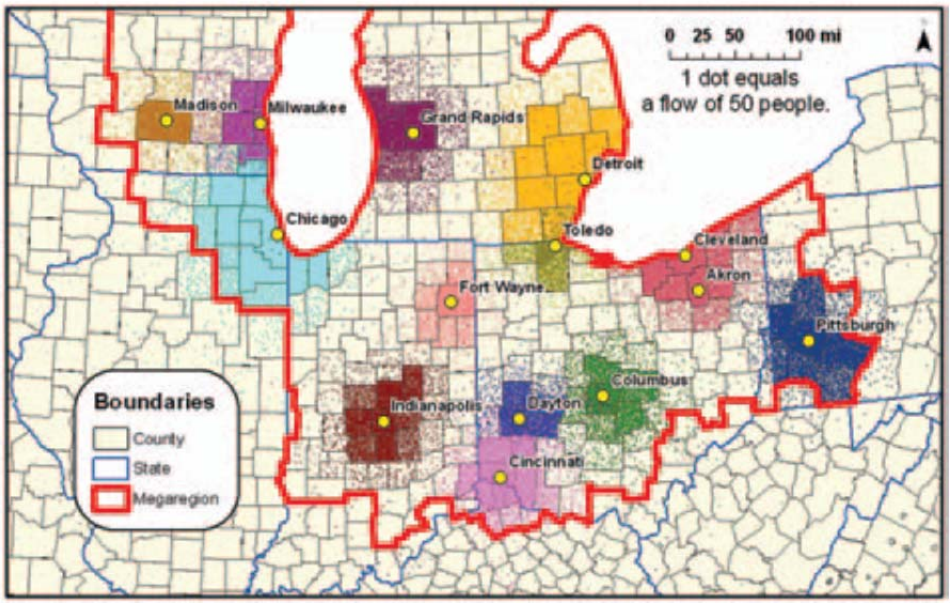


Figure A.1: Commute Flows, Great Lakes Megaregion (University of Michigan Department of Urban and Regional Planning)

From a policy perspective, freight movement by truck, as one of the main factors in U.S. highway congestion, is mentioned as an issue that could be better addressed through megaregional planning. As freight impacts as a whole are largely felt and prioritized according to the corresponding amount and magnitude of local impacts, megaregional planning has the potential to address the issues in broader, more regionally centered terms while still enabling the local political process to mobilize support for impact mitigation (p.120).

Topics: *freight transportation needs, passenger transportation needs, unique definitions of megaregions, land use*

3. Florida, Richard, Tim Gulden, and Charlotta Mellander. *The Rise of the Mega Region.* Toronto: University of Toronto, 2007.

Florida et al. attempt to identify an alternate definition of worldwide megaregions using light patterns, population data, GDP, and a qualitative index of technological and scientific innovation. The megaregion is perceived as more than simply a larger city or region, but a conglomeration of centers of innovation, production, and consumer markets (p. 5). Using this definition, megaregions differ significantly from megacities, which are viewed as simply large clusters of population, but lacking other elements of a megaregion, such as substantial innovative activity and highly skilled talent (p.7). The economic engines that comprise megaregions are a main focus. The strength of this model, which is implicitly objective, is that it allows a direct form of comparison between megaregions not only from different nations, but from all over the world.

Topics: *unique definitions of megaregions, economics*

4. Gottmann, Jean. *Megalopolis: The Urbanized Northeastern Seaboard of the United States.* Cambridge, MA: MIT Press, 1964.

Jean Gottmann's *Megalopolis* is the first text that fully examines the concept of a megacity and its importance to the U.S. and world economy. Gottmann uses the burgeoning Boston–Washington corridor of urbanization as a model to explain that large city-clusters and areas of urbanization are unique in many ways, but particularly focuses on the heightened level of economic innovation that was present in the corridor. Gottmann argues that due to the physical and spatial advantages inherent in megalopolises, as well as advantages in attracting industry and commerce, this would be the form of growth that would be predominant in the future (p. 500). In coming to this conclusion, Gottmann examines statistics and qualitative data. This conclusion is supported by studies that examine a variety of indicators and sectors, such as agriculture, the role of business, environmental stewardship, urban form and sprawl, and social issues. In writing this publication, Gottmann laid the foundation for the modern megaregional studies seen today.

Topics: *history of megaregions, economics, land use*

5. Lang, Robert, and Dawn Dhavale. *America's Megapolitan Areas.* Cambridge, MA: Lincoln Institute of Land Policy, 2005.

Lang and Dhavale examine American "megapolitan areas" from a variety of contexts, examining the various links that tie them together. These links include flows of goods, transportation connections, political preferences, and geographical similarities (p.1). Another interesting concept that the authors explore is the idea that a megaregion can be connected by industrial and economic specialization and that most already are. Megaregional planning in Texas can be impacted by this typology when defining megaregions due to the prevalence of certain similar key industries that make up significant parts of the economic bases of our metropolitan areas. This megaregional industry matching can be used, for example, to study transportation links between industrial zones and their suppliers and buyers. Figure A.2 depicts the IH 35 Corridor Megaregion.

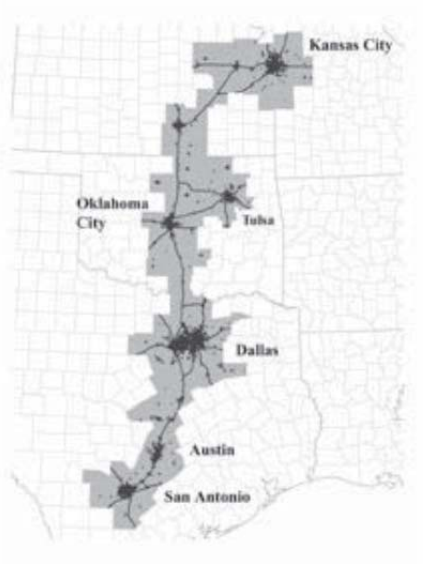


Figure A.2: IH 35 Corridor Megaregion (Metropolitan Institute at Virginia Tech)

Topics: *freight transportation, passenger transportation, economics*

6. Ross, Catherine L. *Megaregions: Planning for Global Competitiveness.* Washington, D.C.: Island Press, 2009.

This Catherine Ross-edited compilation is essentially the first full-scale work on megaregions since Gottmann broached the idea in 1961's *Megalopolis.* In this book she brings a series of scholars together to examine various aspects of modern megaregional planning including its definition(s), overall viability, possible uses as a planning unit, current spatial planning trends, relationship to sprawl, social equity issues, and governance strategies. For such a large, new topic, it is interesting to note that even the authors of the studies still have reservations about the basic question of the viability of the megaregion. In his chapter, Scott Campbell even questions the very validity of a megaregion as a unit of governance or consequence, effectively admitting that its role as a useful concept is dubious and uncertain (p. 127). Co-authored by a variety of scholars, *Megaregions* is divergent in its attitudes about the subject, but overall embraces the idea that megaregional planning makes sense for some uses, specifically in transportation, on which Ross herself focuses (p. 141).

Topics: *freight transportation, passenger transportation, economics, land use, national perspective, international perspective, Texas, sprawl, governance, finance*

7. Wheeler, Stephen. *Regions, Megaregions, and Sustainability.* Davis, CA: Routledge, 2009.

Stephen Wheeler examines issues of sustainability in megaregional planning from a variety of contexts, including mobility, land use, equity, social welfare, and economic development. Regionalism is perceived as a force with limited pull in the U.S., primarily due to a variety of institutional and cultural factors (p. 867). Both U.S. and international instances show

regionalism working as a planning framework. However, Wheeler warns that this type of planning is not a panacea and has never been. Instead, regional and megaregional planning are best as a limited complement to more traditional local planning, a concept the author refers to as "glocal" planning. In many areas, such as Texas, local interests largely predominate over national or global ones. Thus, within the context of expanding regional and megaregional planning, local power must be maintained at a certain level to ensure that local identities are not lost in a globalized world. Texas is a perfect example of strong local identities and thus a perfect application to test the ideas that Wheeler espouses.

Topics: *sustainability, governance, national perspective, international perspective*

8. Zhang, Ming, Kent Butler, and Frederick Steiner. *Connecting the Texas Triangle: Economic Integration and Transportation Coordination.* Healdsburg Research Seminar on Megaregions. Healdsburg, CA: University of Texas, 2007.

Zhang et al. put the discussion of megaregional planning squarely on Texas, focusing specifically on the Texas Triangle Megaregion and the correlation between improving intercity transportation between megaregional metropolitan areas and the economic future of the state. After a thorough history and background of the core cities that make up the Texas Triangle, an examination of the ties between these regions is carried out using a variety of tools. Techniques such as using an LQ analysis to examine industrial specializations, comparison of goods flows, and air traffic analysis were all used to show the depth and number of links these areas share.

Also shown is that the Texas Triangle Cities are competitors, yet complement one another economically in such a way that improvements that speed the flow of goods or people within the Triangle can have exponential impact in more than one city. High-speed rail, conventional rail, and airline frequency expansions should all be part of the discussion in order to meet the future need of transportation facilities in an environment where the automobile is not the only mode supported (p.32).

Topics: *Texas, economics, freight transportation, passenger transportation*

9. McCarthy, Linda. "Mega-city regional cooperation in the United States and Western Europe." In *Governance and Planning of Mega-City Regions: An International Comparative Perspective*, by Jiang Xu and Anthony Yeh, 148–167. Hoboken, NJ: Taylor and Francis Group, 2010.

Linda McCarthy makes the case that "mega-city" regional cooperation can be beneficial to both the U.S. and Europe as a whole, although she feels that Europe is further along in implementing policy changes, novel approaches to planning, and a regional approach to planning than is the U.S. Following are specific benefits she mentions:

- Better economies of scale from pooling resources for more cost-effective spending.
- The potential to better market a metropolitan region for investment and reduce zero-sum competition.
- Helping a metropolitan area region mobilize its strengths to address socioeconomic divisions that can weaken its chances of success.

- Finding a profitable niche in the global economy.

McCarthy delves into the structural differences of European and U.S. governmental structures and how they play into the dynamics of governance of mega-city regions in the U.S. and EU Olympic bids for 2012 in four American and European cities (New York, Los Angeles, London, and Paris) were used as a prominent example. In the European cities, the governments of the U.K. and France were the primary drivers of the Olympic bid, whereas in the U.S. the private sector played a much more prominent role. Though London ended up winning the Games, McCarthy focused on the fact that both of these approaches had significant strengths and weaknesses, especially when considering public support for the Olympic bids. Los Angeles and Paris had very high public support while London and New York had comparatively low public support, due to a variety of economic and logistical factors unique to each city.

McCarthy then delves into the specific strengths and weaknesses of the governance structures of the United States versus Europe, followed by the specific strengths and weaknesses of the mega-city regions associated with the preceding four cities. The U.S. federal government has a much smaller role in the governing of mega-city regions than the European governments do, and she points to the role of state governments in the U.S. as more comparable to the role of European national governments.

In terms of the results of the disparate policies of U.S. and EU governments, McCarthy argues that there is not a huge difference in actual results on the ground, despite dramatically different approaches. The EU tends to focus on regional cooperation from the top-down, while the U.S. tends to do it from the bottom-up. However, the EU also has a tendency to devote resources to improving economically impoverished areas by improving infrastructure. The areas do not include the mega-city regions of Paris and London. The EU has programs, including Eurocities, the European Urban Knowledge Network (EUKN), and the Network of European Metropolitan Regions and Areas (METREX), that all promote and facilitate information sharing between European urban areas on a wide variety of topics. However, the success of these programs is debatable.

In the U.S., McCarthy discusses initiatives to increase regional or megaregional planning through initiatives such as SAFETEA. McCarthy argues that the federal government attempts to support supraregional planning as a goal, but falls short because each of the federal agencies only promotes coordination for its own programs, rather than across all agencies. This weakens the concept in general, and contributes to high inefficiency within the subcomponents of the federal government.

10. Todorovich, Petra. “America's emerging megaregions and implications for a national growth strategy.” International Journal of Public Sector Management, 2009: 221–234.

Petra Todorovich makes the case that emerging megaregions could, if implemented correctly, form the basis for a badly needed U.S. national growth plan. Given that the country is expected to grow to a population of 420 million by the year 2050, management and planning of this growth is necessary in order to prevent the negative externalities of growth, such as sprawl and its implicit encroachment on valuable agricultural land, resource management issues, and air quality issues.

She cites the case of the northeast corridor to make the case for megaregional planning. An interesting example is the case of the Philadelphia and New York City regions. New York

City is, generally speaking, a more dynamic region with more job growth than is Philadelphia. However, it is also much more expensive, with many people who work in the city being priced out due to high housing costs and high costs of goods. Philadelphia, separated from New York City by only about 60 miles, has begun to absorb some of those who are priced out of New York and are able to find a comparable job in the Philadelphia region. Large-scale, high-speed commuting between the two is precluded by high fares for the Amtrak Acela Express high-speed line. Todorovich hypothesizes that if there were a form of megaregional planning between the states that compose the commuting corridor between the Philadelphia region and the New York City region, then both cities would benefit immensely. Philadelphia would attract some who work in New York, but still desire a city lifestyle, while New York would be able to continue to grow its job base via the increased connectivity to a major commuting area.

Megaregions have an advantage over areas that are within non-megaregional areas because they are generally large enough and diverse enough to accommodate a broad range of economic functions, as well as a broad range of wages and talents associated with those functions. They also generally have larger-scale problems that are difficult to address on simply a regional or local scale. Therefore, megaregions could increase the efficiency of large zones by removing local responsibility for large-scale improvements and replacing it with megaregional responsibility, particularly in the areas of corridor protection, air quality, and water resource management and conservation.

Appendix B: Interview Questions

Cities/Local Jurisdictions

1. What is the level of interaction between you and your local MPO? Where do the bulk of transportation planning activities originate, with you, the MPO, or the state?
2. Do you think that there are any applications that could benefit from a more centralized planning structure (e.g. water transit, power infrastructure, roads, freight rail, passenger rail, etc.)? What do you think would be the main benefits? What do you think would be a reasonable geography to be under the jurisdiction of this new (or existing) planning structure?
3. With respect to freight, do you feel that megaregional planning would help or hurt the effort to strengthen freight corridors and networks in Texas? Do you think this is better addressed at another level of government or entity, such as local governments or the DOT?
4. What, if any, of your current powers or influence do you think should be delegated to another entity in order to help implement megaregional planning for freight? Do you think other cities and/or local jurisdictions would be willing to abdicate any powers in order to further comprehensive freight planning? Why or why not?
5. Do you have any specific ideas that could improve freight planning and corridor protection in Texas, either within or outside of the purview of megaregional planning?
6. Do you feel that there are any particular stakeholders or champions that could be instrumental in focusing attention on the importance of freight movement in Texas?
7. How do you think the performance of megaregional planning should be measured, should it be implemented?
8. How do you think the current funding structure would have to be changed in order to allow for megaregional freight planning?
9. Do you have any current initiatives related to megaregional planning?
10. Do you have any other thoughts or suggestions concerning megaregions and/or freight planning in Texas?

MPOs

1. Previously, you have undertaken planning efforts to facilitate infrastructural development in your region. Do you think that your MPO could have any future role in planning on a megaregional scale? What role could that be?
2. Do you feel that an MPO is an appropriate entity to undertake possible megaregional planning? What do you feel would be the cumulative effects of the changes that need to be made to federal code in order to allow MPOs to plan outside their region? Do you feel that these changes would be beneficial to your MPO and by extension your region?
3. What specific areas of regional planning do you feel could be improved via megaregional planning (e.g. water resources, emergency preparedness, corridor planning, etc.)?
4. With respect to freight, do you feel that megaregional planning would help or hurt the effort to strengthen freight corridors and networks in Texas (California, Arizona)? Do you think this is better addressed at another level of government or entity, such as local governments or the DOT?

5. Do you have any specific ideas that could improve freight planning and corridor protection in Texas (California, Arizona), either within or outside of the purview of megaregional planning?
6. Do you feel that there are any particular stakeholders or champions that could be instrumental in focusing attention on the importance of freight movement in Texas (California, Arizona)?
7. How do you think the performance of megaregional planning should be measured, should it be implemented?
8. How do you think the current funding structure would have to be changed in order to allow for megaregional freight planning?
9. Do you have any current initiatives related to megaregional planning?
10. Do you have any other thoughts or suggestions concerning megaregions and/or freight planning in Texas?

Ports and Airports

1. How do you feel that your port/airport fits into the freight system of Texas (Washington), both now and in the future? Do you feel that stronger connections to other parts of the state would benefit or be detrimental to your port/airport's business?
2. Do you perceive any advantages to planning freight movement beyond your region? Do you think that improvements in freight flow could be effected by planning on a megaregional scale?
3. Does your port/airport have any current initiatives that could be improved or more easily implemented if other entities were involved in the planning?
4. Do you think that you have sufficient resources and institutional (MPO, DOT, local & state governments) support to continue to provide your current level of service for future freight needs?
5. Do you have any other thoughts or suggestions concerning megaregions and/or freight planning in Texas (Washington)?

Coalitions/Nonprofits

1. What are your current initiatives that promote or are associated with freight planning from a megaregional perspective?
2. What do you feel could be your greatest contribution to ensuring the future reliability and high level of service of the U.S. freight system? Do you feel that this could be most easily achieved by planning from a megaregional perspective?
3. How should current and possible future corridors be enhanced and protected from encroachment? What role would megaregional planning play in this?
4. What entity do you feel should be the primary locus for megaregional planning and corridor protection (local government, MPO, DOT, etc.)? How would your organization fit into a wider megaregional planning and implementation structure?
5. Do you feel that there are any particular stakeholders or champions that could be instrumental in focusing attention on the importance of freight movement in your state/area/region?
6. How do you think the performance of megaregional planning should be measured, should it be implemented?

7. How would you approach areas outside of the megaregions and link their needs to improvements within megaregional boundaries?
8. How do you think the current funding structure would have to be changed in order to allow for megaregional freight planning?
9. Do you have any current initiatives related to megaregional planning?
10. Do you have any specific ideas that could improve freight planning and corridor protection in your state/area/region, either within or outside of the purview of megaregional planning?
11. Do you have any other thoughts or suggestions concerning megaregions and/or freight planning in the U.S.?

Private Sector

1. What is your perception of the Texas (or U.S.) freight system now and what do you anticipate the status of the system will be in 2040?
2. Are you currently altering your freight operations in any way to adjust to changing conditions on the system? With respect to freight, what is currently your largest operational challenge in Texas (or U.S.)?
3. What effect do you think the concept of megaregional planning would have on your company's ability to move goods quickly and efficiently?
4. What type of institutional and/or government support would be beneficial to help your company remain competitive in your ability to move goods quickly and efficiently? Does the current structure effectively serve your needs?
5. Do you think that a certain entity or combination of entities (DOT, MPO, local gov't, etc.) would serve as a logical locus to undertake the comprehensive freight planning and implementation necessary to ensure the continuing adequacy of the Texas (or U.S.) freight system?
6. Are there any potential transportation linkages or connections that you would like to have, but do not currently exist? Are there specific corridors that you are concerned will not be adequate to serve your future needs?
7. What types of performance measures do you use to measure the efficiency of your cargo movements? What do you think would be a logical way to measure the performance of an entity responsible for megaregional freight planning? What would be some positive outcomes for your company?
8. Do you have any other ideas or suggestions on how to enhance megaregional freight planning or improve the freight system?

Academics

1. Do you think the megaregion is an appropriate planning domain to improve comprehensive freight planning in the U.S.?
2. Do you think that focusing megaregions on freight issues will hurt or help the push to use megaregions as a locus for other transportation issues more commonly associated with them (e.g. HSR, pure highway projects, etc.)
3. Do you feel as if megaregional planning will hurt or help the ability to protect current and future freight corridors of all types (road and rail)?
4. What issues do you feel will be the most challenging to overcome if megaregional freight planning is to become a reality?

5. Do you think that a certain entity or combination of entities (DOT, MPO, local gov't, etc.) would serve as a logical locus to undertake the comprehensive freight planning and implementation necessary to ensure the continuing adequacy of the U.S. freight system?
6. How would you approach areas outside of the megaregions and link their needs to improvements within megaregional boundaries?
7. How do you think the performance of megaregional planning should be measured, should it be implemented?
8. Do you feel that there are any particular stakeholders or champions that could be instrumental in focusing attention on the importance of freight movement in the country?
9. Do you have any other ideas or suggestions that could help strengthen megaregional freight planning in the country?

Appendix C: Workshop Materials

CTR/CTTR Megaregions Workshop: June 24, 2011

Abstract

Megaregions originate from the work of French geographer Jean Gottmann, who described a new urban form, *megalopolis*, to characterize the network of interconnected cities from Boston to Washington, D.C. along the Northeastern seaboard in 1961. Interest in megaregions has grown strongly in the last decade and is now seen by a growing number of planners as offering provocative and visionary answers to problems such as modal congestion, disparities in development, movement of freight, resource allocation, and pollution that individual metropolitan areas or cities cannot solve individually. Megaregional planning presents a framework for mitigating metropolitan problems of large-scale transportation systems and has attracted attention from a number of transportation advocates since 2000. Central questions addressed in this study include how this approach might change planning in Texas, what benefits and costs are associated with its adoption and what characteristics are of specific interest to TxDOT. The ability of megaregional planning to improve the movement of freight throughout Texas is a major focus of this project, as the growth in freight volume transported throughout the state is projected to continue to outpace population growth. This will allow to Texas to compete with other states by using megaregional planning as a tool to promote private sector investment and input, as well as help procure increasingly limited federal support.

Project Summary

Task Number	Task Name	Percentage Complete
1	Literature Review	100%
2	Workshop I	100%
3	Workshop Recommendations	100%
4(a)	National Scan	100%
4(b)	International Scan	100%
5	Private Sector/Regional Organization Review	85%
6	Legal/Planning Issue Review	70%
7	Transportation Scenario Planning	65%
7(a)	Economic Linkages	65%
7(b)	International Trade Corridors	55%
7(c)	Funding Resources	55%
8	Workshop II	100%
9	Final Report	45%

Agenda

- 10:30–11:15
    - Welcome: Robert Harrison – TxDOT Study 0-6627
    - Mega-region Background and Fall Workshop: Carol Abel Lewis
    - Definitions, Governance, and Policy Challenges: Donovan Johnson
    - Corridor Protection and Freight Challenges: Nathan Hutson
- 11:15–11:45: Participants, Roles and Expectations
    - Jack Foster, TxDOT
    - Regina Minish, BNSF Railway
    - All Workshop Attendees
- 11:45–12:30
    - Break for Lunch
- 12:30–1:45
    - Small Group Discussion
- 1:45–2:00
    - Afternoon Break
- 2:00–3:00
    - Large Group Discussion
- 3:00 Wrap-up

Questions for Small Work Groups

Table 1: How would you define megaregions in Texas if your definition was based on freight considerations? Would the megaregion take on a similar form as current definitions, or would megaregions based on freight look completely different?

Table 2: Many private sector users of infrastructure (such as trucking companies and railroads) already plan megaregionally, as they look at wide-ranging networks to determine the fastest and most efficient way to move goods. What should be the role of the private sector in the megaregional planning process? How can these stakeholders ensure that their interests are protected in the planning of the future freight system of Texas?

Table 3: How could megaregional planning assist in the protection and/or expansion of critical rail, maritime and road corridors in the state of Texas?

Table 4: What should the role of individual communities be in the context of megaregional planning? What types of planning processes should be left to individual cities and counties, and, conversely, what should be planned at a megaregional level?

Table 5: Megaregional planning would require some type of governance structure. What could that structure look like? Should it involve another layer of actual government, or should any potential megaregional planning processes be done using the bureaucracy that is already present?

Appendix D: Legal and Planning Analysis

Federal Transportation Planning Regulations

The federal rules for State Transportation Planning can be found in Title 23 Code of Federal Regulations (CFR) at Part 450. These lay out the rules and requirements for creating the state transportation plan to ensure that the plan (i) adheres to conformity determination for attainment and non-attainment areas and the maintenance areas, (ii) demonstrates fiscal constraint, and (iii) complies with the State Implementation Plan (SIP) under the Clean Air Act (CAA). Part 450 sets out the transportation planning assistance and standards for the Statewide Long Range Transportation Plan (LRTP), and the development and integration of Transportation Improvement Plans (TIP) into the State Transportation Improvement Plans (STIP).

Within the definitions of Section 450.104, certain elements pertain to how the DOT and its partners plan for **regional projects**, as well as the prioritization of projects by the Metropolitan Planning Agencies (MPO) or Councils of Governments (COG). Specifically, the germane definitions that we are concerned with are outlined here.

Regionally Significant Projects means a transportation project (other than projects that may be grouped in the TIP/STIP or exempt projects as defined in EPA's transportation conformity regulation (40 CFR part 93)) on a facility that serves regional transportation needs (access to and from the area outside the region; major activity centers in the region; major planned developments [new retail malls, sports complexes, or employment centers]; or transportation terminals) normally included in the modeling of the metropolitan area's transportation network. At minimum, this includes all principal arterial highways and fixed guideway transit facilities that offer a significant alternative to regional highway travel.
Transportation improvement program (TIP) means a prioritized listing/program of transportation projects covering a period of 4 years formally adopted by an MPO as part of the metropolitan transportation planning process, and required for projects to be eligible for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53.
Transportation management area (TMA) means an urbanized area with a population over 200,000, defined by Census and designated by the Secretary of Transportation, or any additional area where TMA designation is requested by the governor and the MPO and designated by the Secretary of Transportation.
Unified planning work program (UPWP) means a statement of work identifying the planning priorities and activities to be carried out within a metropolitan planning area. At a minimum, a UPWP includes a description of the planning work and resulting products, who will perform the work, time frames for completing the work, the cost of the work, and the source(s) of funds.
Update means making current a long-range statewide transportation plan, metropolitan transportation plan, TIP, or STIP through a comprehensive review. Updates require public review and comment, a 20-year horizon for metropolitan transportation plans and long-range statewide transportation plans, a 4-year program period for TIPs and STIPs, demonstration of fiscal constraint (except for long-range statewide transportation plans), and a conformity

determination (for metropolitan transportation plans and TIPs in nonattainment and maintenance areas).
Urbanized area means a geographic area with a population of 50,000 or more, as designated by the Bureau of the Census.

Under 23 CFR Section 450.206, the scope for the statewide transportation planning process (STPP) is laid out All states are required to carry out a continuing, comprehensive, cooperative statewide transportation planning process that provides for projects, strategies, and services that address these eight main factors:

1. Economic vitality
2. Safety
3. Security
4. Accessibility
5. Protect and enhance environment
6. Integration and connectivity of the system for people and freight.
7. Efficient system management and operation
8. Preservation

TxDOT could therefore integrate megaregional planning within the parameters of factor 1, 6, 7, and 8.

States are given wide discretion in how they consider these factors and accord them weighting as appropriate. "The degree of consideration and analysis of the factors should be based on the scale and complexity of many issues, including transportation systems development, land use, employment, economic development, human and natural environment, and housing and community development."[9]

Coordination of Planning Process Activities

Under Section 450.208, in carrying out the STPP the states are required at a minimum to coordinate with the MPOs and rely on information, analysis, and studies that the MPOs provide for their planning areas. States are also required to coordinate with other statewide offices and agencies such as trade and economic groups who also conduct ***multistate planning efforts***. This includes coordination with federal land management agencies and also taking into account the concerns of local elected/appointed officials who are responsible for transportation planning in ***non-metropolitan areas***. As part of this, the **DOTs are required to consider related planning activities being conducted outside of metropolitan planning areas and between States**; and Coordinate data collection and analyses with MPOs and public transportation operators to support statewide transportation planning and programming priorities and decisions (§450.208 (a) (6) and (7)). Within this parameter the state must also coordinate with the DOT to develop the transportation portion of the SIP (§450.208 (b)) under the Clean Air Act (42 U.S.C. 7401 *et seq.*).

[9] According to 23 CFR 450.206 (c), failure to consider any of these factors shall not be reviewable by any court under title 23 U.S.C., 49 U.S.C. Chapter 53, subchapter II of title 5 U.S.C. Chapter 5, or title 5 U.S.C Chapter 7 in any matter affecting a long-range statewide transportation plan, STIP, project or strategy, or the statewide transportation planning process findings.

Under Sub-section 450.208 (c), states can also enter into agreements or compacts for **cooperative efforts and mutual assistance in support of activities related to interstate areas and localities in the States.** This includes establishing authorities the States consider desirable for making the agreements and compacts effective.

The STPP shall be consistent with the development of applicable regional ITS architectures (§450.208 (f)). Section 450.208 (g) requires that preparation of the coordinated public transit-human services transportation plan, should be coordinated and consistent with the STPP. Section 450.208 (h) also requires that the STPP should be consistent with the Strategic Highway Safety Plan, as specified in 23 U.S.C. 148, and other transit safety and security planning and review processes, plans, and programs, as appropriate.

Section 450.210 sets out the parameters for public involvement and consultation in the STPP. The DOTs are required to develop and document a public involvement process that includes opportunities for public review and comment at key decision points. The process is required under Section 450.210 (a) (1) to ensure that early and continuous public involvement opportunities are provided—of which the freight sector is specifically listed as an affected stakeholder—this includes reasonable public access to information used in its development, and provide adequate notice of any public involvement activities. The DOT is also required to give adequate time for public comment on the LRTP and STIP, and for revisions based on such comment. As part of this the DOT is required to demonstrate explicit consideration and response to public input during the development of the LRTP and STIP, this also includes a process to seek historically under-served communities and environmental justice communities.

The federal rules already present plenty of opportunity to cement a megaregional cooperative focus in the STPP.

The DOTs are also required to provide for non-metropolitan local official participation in the development of the LRTP and the STIP (§450.210 (b)) and develop a process to ensure this. Copies of the process document(s) shall be provided to the FHWA and the FTA for informational purposes.

Section 450.212 indicates that an MPO or public transportation operator **may undertake a multimodal, systems-level corridor or subarea planning study** as part of the STPP. Development of these transportation planning studies shall involve consultation with, or joint efforts among, the state(s), MPO(s), and/or public transportation operator(s) to the extent practicable. The results or decisions of these transportation planning studies may be used as part of the overall project development process consistent with the National Environmental Policy Act (NEPA) of 1969 and associated implementing regulations.

Long Range Statewide Transportation Plan

The content and development of the LRTP is contained within Section 450.214. The LRTP is required to be developed for a minimum 20-year forecast period, and provide for the development and implementation of the multimodal transportation system for the State. The LRTP shall consider and include, where applicable, the elements and connections between public transportation, non-motorized modes, rail, commercial motor vehicle, waterway, and aviation facilities, particularly with respect to intercity travel. Capital and operations management strategies and other measures should also be included. The LRTP may consider

projects/strategies that address **areas or corridors where current or projected congestion threatens the efficient functioning of key elements of the state's transportation system** (§450.214 (b)).

Within Section 450.214 (c), the LRTP shall reference, summarize, or contain any applicable short-range planning studies; strategic planning, policy, and transportation needs studies; management systems reports; emergency relief and disaster preparedness plans; and any statements of policies, goals, and objectives (e.g., transportation, safety, economic development, social and environmental effects, or energy) that were relevant to its development.

The LRTP would be an ideal place to establish the how and why of a megaregion focus. For example, TxDOT could reference the literature review and recommendations from this research.

Among other factors that must also be considered in the LRTP are safety elements under the Strategic Highway Safety Plan, and a security element, for transit safety (§450.214 (d and e). Section 450.214 (f) requires that within each metropolitan area of the state, the STPP shall be developed by the DOT in cooperation with the affected MPOs.

Section 450.214 (g) requires that, for non-metropolitan areas, the LRTP shall be developed in consultation with affected non-metropolitan officials using established state consultation processes. Consultation will involve comparison of plans to state and tribal conservation plans or maps or inventories of natural or historic resources (§450.214 (i)). This will also include discussion of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the long-range statewide transportation plan.

Under Section 450.214 (k), in developing and updating the LRTP, the state shall provide citizens, affected public agencies, representatives of public transportation employees, freight shippers, private providers of transportation, representatives of users of public transportation, representatives of users of pedestrian walkways and bicycle transportation facilities, representatives of the disabled, providers of freight transportation services, and other interested parties with a reasonable opportunity to comment on the proposed LRTP.

The LRTP is required to be a financially constrained plan, indicating where resources can reasonably be expected to be obtained for projects (both public and private (§450.214 (l)) and can recommend additional financing strategies for needed projects and programs. The LRTP can for illustrative purposes include in the financial plan additional projects that would be included in the adopted LRTP if additional resources beyond those identified became available. Under Section 450.214 (o) the state shall continually evaluate, revise, and periodically update the LRTP.

Statewide Transportation Improvement Program

Section 450.216 governs the development and content within the STIP. States are required to develop the STIP for all areas of the state covering a period of no less than 4 years and updated every 4 years. The governors of the states can adopt a more frequent cycle, but FHWA and FTA will consider projects in additional years as informational. If there are complications in developing parts of the STIP (e.g., metropolitan planning area, or nonattainment or maintenance areas), a partial STIP that covers the rest of the state can be developed.

Section 450.216 (b) requires that for each metropolitan area in the state, the STIP shall be developed in cooperation with the MPO designated for the metropolitan area. Each metropolitan TIP **shall be included without change in the STIP, directly or by reference, after approval of the TIP by the MPO and the governor**.

A metropolitan TIP in a nonattainment or maintenance area is also subject to a FHWA/FTA conformity finding before inclusion in the STIP. In areas outside a metropolitan planning area but within an air quality nonattainment or maintenance area containing any part of a metropolitan area, projects must be included in the regional emissions analysis that supported the conformity determination of the associated metropolitan TIP before they are added to the STIP.

Sub-section (c) requires for non-metropolitan areas of the state the STIP is developed with consultation of the affected non-metropolitan local officials with responsibility for transportation. Any Federal Lands Highway program TIPs shall be included without change in the STIP, directly or by reference (e) and the governor is required to provide interested parties with a reasonable opportunity to comment on the proposed STIP (f).

This rule could create problems if TxDOT wanted to rank projects based on megaregional impact. For example, if the state wanted to develop a ranking system for MPO use, it would have to be created so that it was utilized in the development of the individual TIPs. Perhaps fashioning a program along the lines of review of non-attainment projects would work.

Sub-section (g) sets out what types of transportation projects shall be included in the STIP. Both capital and non-capital surface transportation projects (or phases of projects) within the boundaries of the state proposed for funding under title 23 U.S.C. and title 49 U.S.C. Chapter 53 can be included. The section lays out some exceptions that may—but are not required—be included.[10] The STIP should contain all regionally significant projects that require FHWA/FTA action, even if they are not funded with federal money (450.216 h). As an example, the addition of an interchange on an interstate using state or local funds would need to be listed. For informational and conformity purposes, the STIP shall include—if appropriate—all regionally significant projects proposed to be funded with Federal funds other than those administered by the FHWA or the FTA, as well as all regionally significant projects to be funded with non-Federal funds. Sub-section 450.216 (h) (i) requires that the STIP shall include for each project or phase (e.g., preliminary engineering, environment/NEPA, right-of-way, design, or construction) the following:

- Sufficient descriptive material (*i.e.*, type of work, termini, and length) to identify project or phase;
- Estimated total project cost, or a project cost range, which may extend beyond the 4 years of the STIP;

[10] (1) Safety projects funded under 23 U.S.C. 402 and 49 U.S.C. 31102; (2) Metropolitan planning projects funded under 23 U.S.C. 104(f), 49 U.S.C. 5305(d), and 49 U.S.C. 5339; (3) State planning and research projects funded under 23 U.S.C. 505 and 49 U.S.C. 5305(e); (4) At the State's discretion, State planning and research projects funded with National Highway System, Surface Transportation Program, and/or Equity Bonus funds; (5) Emergency relief projects (except those involving substantial functional, locational, or capacity changes); (6) National planning and research projects funded under 49 U.S.C. 5314; and (7) Project management oversight projects funded under 49 U.S.C. 5327.

- Amount of Federal funds proposed to be obligated during each program year (for the first year, this includes the proposed category of Federal funds and source(s) of non-Federal funds. For the second, third, and fourth years, this includes the likely category or possible categories of Federal funds and sources of non-Federal funds); and
- Identification of the agencies responsible for carrying out the project or phase.

Projects not considered to be of appropriate scale for individual identification in a given program year can be grouped by function, work type, and/or geographic area. In nonattainment and maintenance areas, project classifications must be consistent with the "exempt project" classifications contained in the EPA's transportation conformity regulation (40 CFR part 93). Projects proposed for funding under title 23 U.S.C. Chapter 2 that are not regionally significant may be grouped in one line item or identified individually in the STIP (§420.216 (j)). Each project in the STIP must also be consistent with the LRTP, and also consistent in Metropolitan Planning areas with their approved Metropolitan Transportation Plan (§450.216 (k)).

The STIP's financial plan (if included) should demonstrate how the approved STIP can be implemented and indicate resources (public and private) and their reasonably expected availability to carry out the STIP. This can also include recommendations for additional finance strategies. The financial plan can show—for illustrative purposes—additional projects that would be adopted if additional resources beyond those identified become available. This does not create any requirement for the state to select projects from these illustrative lists for implementation. These additional projects cannot also be advanced without FHWA/FTA action on the STIP (§450.216 (l)). The STIP must also use inflation rates to reflect year of expenditure dollars based on reasonable financial principals that must be developed cooperatively by the state, MPOs, and public transportation operators.

The STIP shall include projects, or identified phases, only if full funding can be reasonably anticipated as available during the time period for project completion. In non-attainment and maintenance areas projects in the first 2 years of the STIP are strictly limited to only those that have funds available or committed. Financial constraint of the STIP must be demonstrated and maintained yearly, and include sufficient financial information to demonstrate which projects are to be implemented using current and/or reasonably available revenues, while federally-supported facilities are being adequately operated and maintained. Strategies must be set out in the financial plan that shows proposed funding availability. Transportation operations and maintenance, must also be set out in the STIP and include financial information on system-level estimates of costs and revenue sources reasonably expected to be available to support and maintain the Federal-aid highways (§450.216 (m)).

Projects within the first 4 years of the STIP can be exchanged with one-another subject to project selection requirements laid out in Section 450.220. The STIP can be revised at any time, consistent with the STIP development procedures and consultation processes. Changes that affect fiscal constraint must take place by amendment of the STIP (§450.216 (n)).

Section 450.220 sets out how projects are selected from the STIP by the DOT. For non-metropolitan areas the projects are selected by the state in consultation with affected local officials (450.220 (c)). In metropolitan areas projects are selected according to procedures in Section 450.330. Projects in the first year of the approved STIP according to 450.220 (e) constitute an "agreed to" list of projects for subsequent scheduling and implementation. No further action is required for the implementing agency to proceed with these projects. If Federal

funds available are significantly less than the authorized amounts, or if there is significant shifting of projects among years, §450.330(a) provides for a revised list of "agreed to" projects to be developed upon the request of the state, MPO, or public transportation operator(s).

MPO Planning

Title 23 Part 450 Sub-part C, Metropolitan Transportation Planning and Program, sets out the scope of the Metropolitan Transportation Planning Process (MTPP). This process under Section 450.306 shall be continuous, cooperative, and comprehensive, and provide for consideration and implementation of **projects, strategies, and services** that will address eight factors:

1. Support economic vitality of metropolitan area, by enabling global competitiveness, productivity, and efficiency;
2. Increase accessibility/mobility of people and freight;
3. Protect and enhance the environment, promote energy conservation, improve quality of life, promote consistency between transportation improvements and state and local planned growth/economic development patterns;
4. Enhance integration and connectivity of the transportation system, across/between modes, for people and freight;
5. Promote efficient system management and operation;
6. Emphasize preservation of the existing system;
7. Increase safety of the transportation system; and
8. Increase security of the transportation system.

These eight required factors are all megaregional factors, so the MPO could also indicate how these support megaregional planning efforts as well.

The consideration of these factors is to be reflected in the MTPP and any degree of consideration and analysis of these factors should be based on the scale and complexity of many issues, including transportation system development, land use, employment, economic development, human and natural environment, and housing and community development. The MTPP must be carried out in coordination with the STPP (§450.306 (d)).

Sub-section 450.306 (e) notes that in carrying out the metropolitan transportation planning process, MPOs, states, and public transportation operators *may apply asset management principles and techniques in establishing planning goals, defining TIP priorities, and assessing transportation investment decisions*, including transportation system safety, operations, preservation, and maintenance, as well as strategies and policies to support homeland security and to safeguard the personal security of all motorized and non-motorized users. The MTPP process is also required to be consistent with the regional ITS architectures, coordinated with the transit-human services transportation plan, and the Strategic Highway Safety Plan (Sub-sections f though h).

Could this section include a megaregional/trade focus in determining investment decisions?

Transportation Management Areas (TMA) are

designated by the FHWA/FTA for each urbanized area with a population of over 200,000 individuals, as defined by the Bureau of the Census. FHWA/FTA shall also designate any additional urbanized area as a TMA on the request of the governor and the MPO designated for that area. For urban areas not designated as TMAs, but which is an air quality attainment area, the MPOs can propose to develop an abbreviated MTPP and TIP. These will be assessed in light of the complexity of the transportation problems in the area (§450.306 (J)).

Funding for Transportation Planning and the Unified Planning Work Programs

Section 450.308 sets out how funds are made available to MPOs to accomplish activities in this subpart. At the state's option, funds provided under 23 U.S.C. 104(b)(1) and (b)(3) and 23 U.S.C. 105 may also be provided to MPOs for metropolitan transportation planning. In addition, an MPO serving an urbanized area with a population over 200,000, as designated by the Bureau of the Census, may at its discretion use funds sub-allocated under 23 U.S.C. 133(d)(3)(E) for metropolitan transportation planning activities. These planning activities are to be documented in the unified planning work program (UPWP) (§450.308 (b)).

The MPOs are required to develop, in cooperation with the states, a UPWP that includes a discussion of the **planning priorities** facing the MPA. The UPWP shall also identify work proposed for the next 1- or 2-year period by major activity and task in sufficient detail to indicate who (e.g., MPO, state, public transportation operator, local government, or consultant) will perform the work, a schedule for completing the work, the resulting products, the proposed funding by activity/task, and a summary of the total amounts and sources of Federal and matching funds (§450.308 (c)). For MPOs not in a designated TMA this can be a more simplified statement of work (§450.308 (d)).

Metropolitan Planning Area Boundaries

Section 450.312 sets out the boundaries of a metropolitan planning area (MPA), which are determined by agreement between the MPO and the governor. At a minimum, the MPA boundaries shall encompass the entire existing urbanized area (as defined by the Bureau of the Census) plus the contiguous area expected to become urbanized within a 20-year forecast period for the metropolitan transportation plan. The MPA boundaries may be further expanded to encompass the entire metropolitan statistical area or combined statistical area, as defined by the Office of Management and Budget (§450.312 (a)).

Under Section 450.312 (b), an MPO that serves an urbanized area designated as a nonattainment area for ozone or carbon monoxide under the Clean Air Act as of August 10, 2005, shall retain the MPA boundary that existed on August 10, 2005. The MPA boundaries for such MPOs may only be adjusted by agreement of the governor and the affected MPO in accordance with the re-designation procedures described in §450.310(h). The MPA boundary for an MPO that serves an urbanized area designated as a nonattainment area for ozone or carbon monoxide under the Clean Air Act after August 10, 2005 may be established to coincide with the designated boundaries of the ozone and/or carbon monoxide nonattainment area, in accordance with the requirements in §450.310(b).

An MPA boundary may encompass more than one urbanized area (§450.312 (c)) and MPA boundaries may be established to coincide with the geography of regional economic development and growth forecasting areas (§450.312 (d)). If the boundaries of the urbanized area or MPA extend across **two or more states**, the governors of the multistate area, MPO(s), and the public transportation operator(s) are **strongly encouraged** to coordinate transportation planning for the entire multistate area (§450.312 (f)). MPA boundaries shall not overlap with each other (§450.312 (g)).

Where part of an urbanized area served by one MPO extends into an adjacent MPA, the MPOs shall, at a minimum, establish written agreements that clearly **identify areas of coordination** and the division of transportation planning responsibilities among and between the MPOs. The MPOs may adjust their existing boundaries so that the entire urbanized area lies within only one MPA. Boundary adjustments that change the composition of the MPO may require re-designation of one or more such MPOs (§450.312 (h)). Sub-section (i) requires the MPA boundaries are reviewed after each Census by the MPO to determine if existing MPA boundaries meet minimum statutory requirements for new and updated urbanized area(s), and adjusted as necessary. Additional adjustments should be made to reflect the **most comprehensive boundary to foster an effective planning process** that ensures connectivity between modes, and promotes efficient overall transportation investment strategies.

Again, authority for cross-regional/border megaregional planning opportunities exists within federal code. The justification for coordination of planning is set out within sub-sections f and h. Identification of a megaregion could occur during the review of boundaries after each census.

Transportation Planning Studies and Project Development

Section 450.318 (a) allows the MPO(s), state(s), or public transportation operator(s) to undertake a **multimodal, systems-level corridor or subarea planning study** as part of the MTPP. To the extent practicable, development of these transportation planning studies shall involve consultation with, or **joint efforts among, the MPO(s), state(s),** and/or public transportation operator(s). The results/decisions of these studies may be used as part of the overall project development process consistent with the NEPA. Material that is produced in this studies can be incorporated directly, or by reference into NEPA documents (§450.318 (b)).

Development and Content of the Metropolitan Transportation Plan

Section 450.322 (a) requires that the MPPP shall include the development of a transportation plan **addressing no less than a 20-year planning horizon** as of the effective date. In nonattainment and maintenance areas, the effective date of the transportation plan shall be the date of a conformity determination issued by the FHWA/FTA. In attainment areas, the effective date of the transportation plan shall be its date of adoption by the MPO.

The transportation plan shall include both long-range and short-range strategies/actions that lead to the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods in **addressing current and future transportation demand** (§450.322 (b)). The plan is required to be reviewed and updated every 4

years in air quality nonattainment and maintenance areas (§450.322 (c)), and at least every 5 years in attainment areas to ensure its validity and consistency with current and forecasted transportation and land use conditions and trends and to extend the forecast period to at least a 20-year planning horizon. In non-attainment areas for ozone or carbon monoxide the MPO is required to coordinate the development of the MTPP in the process for development transportation control measures (TCMs) in an SIP (§450.322 (d)).

The MPO, state, and public transportation operators are required to validate data utilized in preparing other existing modal plans for providing input to the transportation plan. The MPO shall base the update on the latest available estimates and assumptions for population, land use, travel, employment, congestion, and economic activity. The MPO shall approve transportation plan contents and supporting analyses produced by a transportation plan update (§450.322 (e)).

One could imagine that development of the next sets of MTPs would be an idea time to begin to review how a megaregional approach could assist in achieving economies of scale and in assisting with non-attainment and SIP conformity programs.

Sub-section (f) requires that the MTPP shall, at a minimum, include 10 items:

1) Projected transportation demand of persons and goods in the metropolitan planning area over the period of the transportation plan;
2) Existing and proposed transportation facilities (including major roadways, transit, multimodal and intermodal facilities, pedestrian walkways and bicycle facilities, and intermodal connectors) that should function as an integrated metropolitan transportation system, **giving emphasis to those facilities that serve important national and regional transportation functions over the period of the transportation plan;**
3) Operational and management strategies to improve the performance of existing transportation facilities to relieve vehicular congestion and maximize the safety and mobility of people and goods;
4) Consideration of the results of the congestion management process in TMAs that meet the requirements of this subpart, including the identification of SOV projects that result from a congestion management process in TMAs that are nonattainment for ozone or carbon monoxide;
5) Assessment of capital investment and other strategies to preserve the existing and projected future metropolitan transportation infrastructure and provide for multimodal capacity increases **based on regional priorities and needs**. The MTPP may consider projects and strategies that address areas or corridors where current or projected congestion threatens the efficient functioning of key elements of the metropolitan area's transportation system;
6) Design concept and design scope descriptions of all existing and proposed transportation facilities in sufficient detail, regardless of funding source, in nonattainment and maintenance areas for conformity determinations under the EPA's transportation conformity rule. In all areas (regardless of air quality designation), all proposed improvements shall be described in sufficient detail to develop cost estimates;

7) A discussion of types of potential environmental mitigation activities and potential areas to carry out these activities, including activities that may have the greatest potential to restore and maintain the environmental functions affected by the metropolitan transportation plan;
8) Pedestrian walkway and bicycle transportation facilities;
9) Transportation and transit enhancement activities, as appropriate; and
10) Financial plan that demonstrates how the adopted MTPP can be implemented.
    i. For system operations and maintenance include system-level estimates of costs and revenues reasonable expected to be available.
    ii. Cooperatively develop estimates of funds that will be available to support MTPP implementation, and identify all necessary financial resources from public and private sources that are reasonably expected to be made available
    iii. Include recommendations on any additional financing strategies to fund projects and programs included in the metropolitan transportation plan. In the case of new funding sources, strategies for ensuring their availability shall be identified.
    iv. Take into account all projects/strategies proposed for. Revenue and cost estimates for the MTPP must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, state(s), and public transportation operator(s).
    v. For the outer years of the metropolitan transportation plan (i.e., beyond the first 10 years), the financial plan may reflect aggregate cost ranges/cost bands, as long as the future funding source(s) is reasonably expected to be available to support the projected cost ranges/cost bands.
    vi. For nonattainment and maintenance areas, the financial plan shall address the specific financial strategies required to ensure the implementation of TCMs in the applicable SIP.

Subsection 450.322 (i) requires the MPO to provide multiple stakeholders with a reasonable opportunity to comment on the transportation plan using the participation plan developed under §450.316(a).

The Transportation Improvement Program

Section 450.324 sets out how the TIP shall be developed and the requirements for content. Given that the TIP is developed out of the LRTP and MTPP and combined into the STIP, reviewing the specific rules for TIP development is not necessary for the purposes of this technical memorandum. What should be noted however is that the TIP can be amended at any time (450.326 (a)) and that after a TIPS approval by the MPO it shall be included without change, directly or by reference, in the STIP required under 23 U.S.C. 135. In nonattainment and maintenance areas, a conformity finding on the TIP must be made by the FHWA and the FTA before it is included in the STIP (450.326 (b)).

Under Section 450.330 (a) once a TIP that meets the requirements of 23 U.S.C. 134(j), 49 U.S.C. 5303(j), and §450.324 has been developed and approved, the first year of the TIP shall constitute an "agreed to" list of projects for project selection purposes and no further project selection action is required for the implementing agency to proceed with projects, except where the appropriated federal funds available to the metropolitan planning area are significantly less than the authorized amounts or where there are significant shifting of projects between years.

Texas Transportation Code

In Texas, the Texas Transportation Code (TC) sets out how TxDOT will conduct transportation planning. Section 201.103 requires the Transportation Commission (Commission) to plan and make policies for the location, construction, and maintenance of a comprehensive system of state highways and public roads. The director, under the direction and with the approval of the commission, shall prepare a comprehensive plan providing a system of state highways. Section 201.601 requires the department to develop a statewide transportation plan that contains all modes of transportation, including

- highways and turnpikes;
- aviation;
- mass transportation;
- railroads and high-speed railroads; and
- water traffic.

TxDOT is required, in developing the plan, to seek opinions and assistance from other state agencies and political sub-divisions that have responsibility for the modes of transportation (§201.601 (b)). TxDOT can enter into a memorandum of understanding with an agency or political subdivision relating to the planning of transportation services.

As in the federal rules, the plan must include a component that is not financially constrained and identifies transportation improvements designed to relieve congestion. In developing this component of the plan, the department is again required to seek opinions/assistance from officials who have local responsibility for modes of transportation (§201.601 (c)) The plan is required to include an annual component that describes the evaluation of transportation improvements based on performance measures, such as indices measuring delay reductions or travel time improvements. TxDOT is required to consider these performance measures in selecting transportation improvements (§201.601 (d)).

Section 201.6011 requires TXDOT to coordinate with entities to **develop an integrated international trade corridor plan,** which has to be updated biannually and reported to the legislature. It must include the following:

1. strategies and projects to aid the exchange of international trade using the system of multiple transportation modes in this state;
2. priorities based on the amount of international trade, measured by weight and value, using the transportation systems of this state, including:
   H. border ports of entry;
   I. commercial ports;
   J. inland ports;
   K. highways;
   L. pipelines;
   M. railroads; and
   N. deepwater gulf ports; and
3. implementation of the recommendations of the Border Trade Advisory Committee

Section 201.6012 requires TxDOT to facilitate the development and interconnectivity of rail systems in this state. This includes coordinating activities regarding the planning, construction, operation, and maintenance of a statewide passenger rail system. TxDOT is again, required to coordinate with other entities involved with passenger rail systems, including governmental entities, private entities, and nonprofit corporations. As part of this Section 201.6013 requires TxDOT to prepare and annually update a long-term plan for a statewide passenger rail system.[11]

TxDOT is also required to conduct cooperative planning with counties under Section 201.619's provisions. Corridor is defined in this section as a geographical band that follows a general directional flow connecting major sources of trips (201.619 (a)). The department can enter into agreements that identify future transportation corridors within the county. These can be derived from existing transportation plans adopted by the TxDOT, the Commission, the county, or an MPO.

Local Government Code

The Local Government Code (LGC) Title 12 Planning and Development, Chapter 391 Regional Planning Commissions (RPC) Section 391.001 sets out the purpose of the chapter, which is to encourage and permit local governmental units to

1. join and cooperate to improve the health, safety, and general welfare of their residents; and
2. plan for the future development of communities, **areas, and regions** so that:
   G. the planning of transportation systems is improved;
   H. adequate street, utility, health, educational, recreational, and other essential facilities are provided as the communities, areas, and regions grow;
   I. the needs of **agriculture, business, and industry** are recognized;[12]
   J. healthful surroundings for family life in residential areas are provided;
   K. historical and cultural values are preserved; and
   L. the efficient and economical use of public funds is commensurate with the growth of the communities, areas, and regions.

The general purpose of a commission is to make studies and plans to guide the unified, far-reaching development of a region, eliminate duplication, and promote economy and efficiency in the coordinated development of a region (391.001 (b)).

[11] Information contained in the plan must include:
1. description of existing and proposed passenger rail systems;
2. information regarding the status of passenger rail systems under construction;
3. an analysis of potential interconnectivity difficulties;
4. ridership projections for proposed passenger rail projects; and
5. ridership statistics for existing passenger rail systems.

[12] Many would argue that these may have megaregional impacts, and a megaregional customer base.

LGC Section 391.002 defines in sub-section (3) a region as a geographic area consisting of a county or two or more adjoining counties that have, in any combination:

a) common problems of transportation, water supply, drainage, or land use;
b) similar, common, or interrelated forms of urban development or concentration; or
c) special problems of agriculture, forestry, conservation, or other matters.

Any combination of municipalities or counties can agree by ordinance, resolution, rule, order, or other means to establish an RPC (§391.003 (a)). The agreement that designates an RPC for the commission (which is a political subdivision of the state) indicates that the RPC

1. consists of territory under the jurisdiction of the counties or municipalities, including extraterritorial jurisdiction; and
2. is consistent with the geographic boundaries for state planning regions or sub-regions that are delineated by the governor and that are subject to review and change at the end of each state biennium.

Recommendation: The definition of region in 391.002 could be enhanced to include a megaregion definition as well. Also recommended is changing the criteria to more than just "adjoining counties" and allowing non-contiguous counties to join. The definition could also specify relevant transportation problems and could include megaregional transportation connections.

This chapter permits participating governmental units the greatest possible flexibility to organize a commission **most suitable** to their view of the region's problems. The counties/municipalities making the agreement may join in the exercise of, or in acting cooperatively in regard to, planning, powers, and duties (§391.003 (d) and (e)).

The RPCS can plan for the development of a region and make recommendations concerning major thoroughfares, streets, traffic and transportation studies, bridges, airports, parks, recreation sites, school sites, public utilities, land use, water supply, sanitation facilities, drainage, public buildings, population density, open spaces, and other items relating to the commission's general purposes. The plan can be adopted in whole or in part by the governing body of the participating governmental unit, and the RPC can assist a participating governmental unit to carry out the plan, and prepare/carry out local planning consistent with the purposes of this chapter (§ 391.004 (a) through (c)).

Under Section 391.008, a review a comment procedure is delineated for any application for a loan or grant from a state or federal agency (if it requires review and comment by an area wide planning agency) before it is filed. For federally aided projects where an area wide review is required the RPC is required to review the application from the standpoint of consistency with regional plans and other considerations (including those specified in federal or state regulations) and enter its comments on the application.

Under 391.008 (c) for other federally aided projects or state-aided projects, the RPC shall advise the governmental unit on whether the proposed project for which funds are requested has regionwide significance. If yes, the RPC must determine if it conflicts with a regional plan or

policy, and may consider whether the proposed project is properly coordinated with other existing or proposed projects within the region. Again the RPC is required to record its views and comments on any application. If the project does not have region wide significance, the RPC shall certify that it is not in conflict with a regional plan or policy (e).

A mechanism is already in place to evaluate a project's place in a megaregional context and vice-versa.

Under LGC 319.0091if a state agency determines that a service provided by that agency should be decentralized to a multicounty region, the agency shall use a state planning region or combination of regions for the decentralization If the decentralized services is provided to more than one public entity, the state entity is required to consult with the RPC for that region in planning the decentralization. Section 319.0091 (d) requires that in planning for decentralization of a service in a region, it shall consider using an RPC for that service to

1. achieve efficiencies through shared costs for: executive management; administration; financial accounting; facilities and equipment; data services; and audit costs;
2. improve the planning, coordination, and delivery of services by coordinating the location of services;
3. increase accountability and local control by placing a service under the oversight of the commission; and
4. improve financial oversight through the auditing and reporting required under this chapter.

This section does not apply to a service (319.0091 (e) that continues to be operated by a state agency through a regional administrative office of that agency; or where the state agency determines that a law, rule, or program policy makes use of the geographic area of a single county or adjacent counties more appropriate.

This rule could set out authority, and a funding mechanism, to consider megaregional planning across state and international borders where contiguity can be found. For example, this could allow megaregional planning along the Gulf Coast Megaregion.

Under Section 319.013, with the governor's approval, an RPC that borders another state may join with a similar commission or planning agency in a contiguous area of the bordering state to form an interstate commission; or permit a similar commission or planning agency in a contiguous area of the bordering state to participate in planning functions. Under this section funds provided an RPC may be commingled with funds provided by the government of the bordering state.

Under Section 391.014 with advance approval of the governor, an RPC that borders the Republic of Mexico may spend funds in cooperation with an agency, constituent state, or local government of the Republic of Mexico for planning studies encompassing areas lying both in this state and in contiguous territory of the Republic of Mexico.

Recommendation

The DOTs and MPOs currently have latitude to begin to consider and incorporate a megaregional planning focus within their state transportation and transportation planning documents. They also have latitude to enter into compacts, agreements, and memorandums of understanding so that multiple MPOs, counties, or cities can also partner to achieve a megaregional focus. This outcome will, however, require a set of criteria, data analysis requirements, and other procedural elements to ensure conformity across the various documents that the MPOs and DOT produce. As the first recommendation in Chapter 8 noted, development of a specific definition of the freight megaregion is required in order to effectively plan for megaregional freight needs. The structural deficiencies that the legal and planning review highlighted regarding land use planning at the local level, however, would also need to be addressed in the long term if cities and counties are to effectively administer land use and other planning elements to strategically plan for their jurisdiction within the megaregion.

Appendix E: International Megaregions

Asian Megaregions

Asia's relationship with megaregions is far more intimate and longstanding than the ideas of megaregions being proffered by Western scholars and researchers. Asia, home to nearly two-thirds of the world's population, has been forced to plan at a larger scale in order to provide for the welfare of its people and the growth of its collective economy. Asian megaregions are necessary due to land and population factors: Japan has approximately 40% of the U.S. population but only 4% of the land area, and India and China each have more than three times as many people as the United States. Spatial planning must be conducted in a much more serious way to allow for an orderly built environment capable of serving Asia's dense resident population. Figure D.1 depicts the Asian megaregions.

Source: Florida, Gulden, Mellander 2007

Figure D.1: Asian Megaregions

In China, Japan, and South Korea, a very centralized top-down planning structure is not only the normal structure for spatial planning, but its necessity and appropriateness are rarely questioned. Catherine Ross attributes this to two key factors that bind these countries together: shared cultural ideology and constraints in available buildable land. This approach is in contrast

to some western cultures, such as the United States, which value a high degree of local autonomy and landowner rights. The Asian megaregions described by Florida are primarily located in the three countries noted above, as well as India, Thailand, and controversially, Singapore (Figure D.2).

Source: The Guardian (UK) from the Daily Mail (UK)

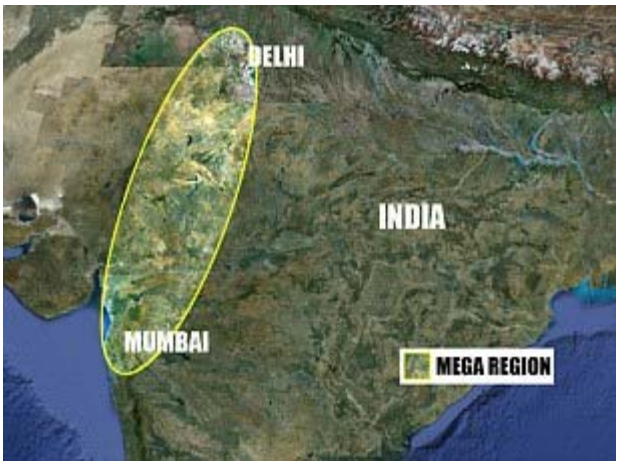
Figure D.2: Chinese, Japanese, and Korean Megaregions (UN)

Chinese megaregions center on the three major economic centers of the country: Beijing, Shanghai, and the Pearl River Delta, an agglomeration consisting of the metropolitan areas of Guangzhou, Shenzhen, Zhuhai, Hong Kong, and Macau. Each of these megaregions have specific areas of economic strength, with Beijing being the seat of government, Shanghai as a center of finance and banking, and the Pearl River Delta maintaining its position of strength in industry, gaming, and trade. Additionally, on the sovereign island of Taiwan, the heavily urbanized western coast forms a continuous urban megaregion around the cities of Taipei and Kaohsiung.

Japan, a highly urbanized country due to its large population and small physical size, is dominated by various contiguous megaregions. The Greater Tokyo megaregion fully encompasses half of Japan's total land area, and is one of the world's wealthiest agglomerations. On the northernmost island of Hokkaido, another megaregion extends north and west of the city of Sapporo. This megaregion is one of the smallest noted by Florida, as the entire island of Hokkaido is home to less than six million people. The megaregion south of Tokyo is the second most populated megaregion in Japan and encompasses the Chūbu and Kansai regions of Japan, along with their main cities of Nagoya, Osaka, and Kobe. Finally, on the southernmost island of Kyūshū, an industrial megaregion of 5.7 million people is anchored by the cities of Fukuoka and Kitakyūshū.

South Korea's 50 million inhabitants live in an area of only 38,691 square miles, an area slightly smaller than that of the U.S. state of Kentucky. This level of density and relatively uniform distribution of population across the country leads Florida to class most of the nation, with the exception of parts of the provinces of Gangwon-do and Gyeongsangbuk-do, as one contiguous megaregion.

Indian megaregions, like China's, are focused on the urban conurbations that drive the nation's economic output. The largest megaregion is centered in the northwest part of the country near the capital of New Delhi, and covers most of northwest India and east-central Pakistan, including the city of Lahore. This megaregion is unique as the only transnational Asian megaregion notated by Florida. However, the social and historical differences between India and Pakistan call into question whether this can be considered one region at all. Additional megaregions in India are seen on the west coast of the country around the cities of Mumbai and Pune, and on the southern tip of the country around Bangalore and Chennai, the nation's third and fifth largest cities, respectively. Figure D.3 depicts the Indian megaregions.



Source: The Guardian (UK) from the Daily Mail (UK)

Figure D.3: Indian Megaregions

Bangkok and Singapore are two additional megaregions noted, but both may be better classed as traditional regions. Bangkok is the only primary urban area in its megaregion. Singapore is an isolated city state, and the neighboring state of Johor in Indonesia is relatively sparsely populated. Both of these areas arguably straddle the line between region and megaregion.

Though all of these delineated megaregions possess the requisite agglomeration of people to be considered, at least on some level, a megaregion, those in Japan and South Korea are far more mature in terms of growth and transportation networks than are those in China and India. However, Japan's and South Korea's advantage in transportation accessibility could be diminishing quickly, as both India and China are investing heavily in transportation infrastructure. India is currently in the process of implementing its long-range highway plan, widening and modernizing more than 13,000 miles of national highway. As only about half of Indian roads are paved (World Bank, 2011), the country has chosen to address this through increased spending, which amounted to $4 billion on highways and $20 billion on roads overall in 2010 (Anand, 2009). Figure D.4 depicts the current airport expansions.

Figure D.4: Current Airport Expansion in Asian Megaregions

China, courtesy of its booming economy and large cash reserves, is embarking on an even more ambitious transportation upgrade campaign than India. China has about 40,000 miles of highways for "fast traffic," most built within the last two decades, and envisions reaching 62,000 miles of highway by 2020, approximately the same length of highway that exists in the United States today (China Daily, 2010). Additionally, as Figure D.4 shows, China is investing in strategic expansions of key airports, as well as building a high-speed rail system that is already the world's longest and will span 16,000 miles of new track when completed around 2020. In 2009, China spent $50 billion on high-speed rail alone (Powell, 2009). Comparatively, the United States spent $275 billion on transportation in fiscal year 2009, which includes maintenance as well as new construction. Of that number, only $45 billion was spent on all transit combined (GPO, 2011). China, with a much larger population and smaller existing system, clearly views a stronger intermodal transportation system as key to maintaining its economic growth and increasing the competitiveness of the country, primarily via its emerging megaregions.

Texas's cultural ideology could not be more different from that of southern and eastern Asia. Whereas Asia has a primary disposition toward central planning, for obvious reasons, Texas history and culture are inherently suspicious of large-scale government initiatives, proposals of new bureaucracy, and planning that infringes on the rights of individual landowners. In Japan, for example, the government has rarely conflicted with landowners in instances where the government saw a need to relocate residents to make way for construction of new public assets. However, a notable departure from the generally peaceful relationship between the people of Japan and the nation's government occurred in the 1960s and 1970s with the construction of New Tokyo International Airport (now Narita International Airport).

The proposed construction of New Tokyo International Airport in the village of Sanrizuka near the town of Narita caused widespread unrest among residents. Part of this unrest was social, while part was political. After negotiating with home- and landowners throughout the

1960s with some success, in 1971 the Japanese government eventually resorted to invoking eminent domain, a rare event in Japan at that time, in order to forcibly acquire properties that angry owners did not want to vacate. Upon taking this step, Japan was hit by protests and riots that endured for a year. When the airport began operations in 1978, it was opened under heavy and unprecedented security (Time, 1978). To this day, animosity remains among some members of the communities near the present airport, as well as among those who were forced to relocate. The fallout from the method Japan used to acquire the land necessary for the airport's construction directly led to the strategy of using reclaimed land to build floating airports, which has been done repeatedly in Japan, as well as Hong Kong and Macau, beginning in the 1990s. Airports built on artificial islands in Japan using reclaimed land have been built to serve Osaka, Kobe, Kitakyūshū, and Nagoya. The Japanese government saw reclaiming land from the sea as a politically safer undertaking than risking social unrest by using eminent domain.

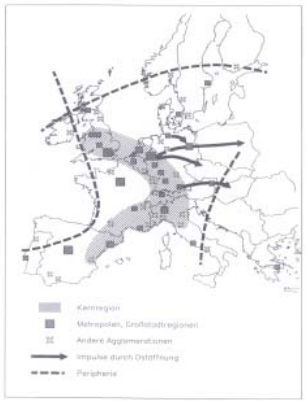
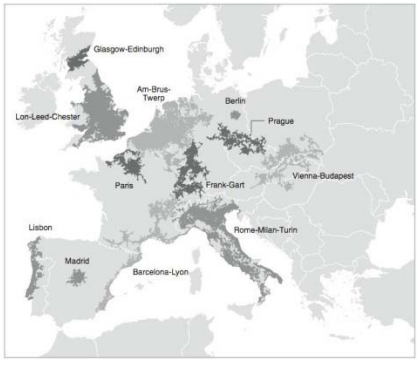
A similar situation was seen in Texas with the fallout resulting from the Trans-Texas Corridor proposal. In 2002, Governor Rick Perry proposed a network of privately funded corridors up to 1,200 feet wide that would host a variety of different modes of transportation as well as broadband internet and utility lines, and cost up to $180 billion (Corridor Watch, 2007). However, this project was shelved after intense opposition by a number of different interest groups, including environmentalists concerned about the effects of such wide corridors, rural landowners concerned about the disposition of their properties, and other landowners, adjacent to the proposed corridors, that had concerns about noise and pollution near their properties. This perfect storm of opposition ended the project prematurely.

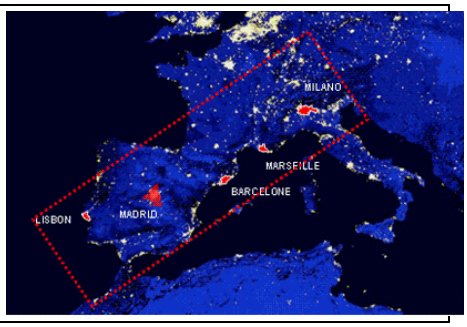
Both the construction of Narita International Airport and the planning and proposed construction of the Trans-Texas Corridor (TTC) hold profound lessons for megaregional planning. Both projects were damaged in the eyes of the public by poor dissemination of information, as well as poor communication of the benefits and consequences of the projects. Those who are being affected by decisions appreciate being treated as stakeholders rather than as an inhibiting force that must be placated in order for the project to move forward. Making a strong, honest case to the public about the benefits and consequences of large projects, especially in democratic nations such as the United States and Japan, has tangible benefits. Using effective communication is a lesson that the Japanese government learned from the Narita incident, and that the State of Texas must learn if we hope to avoid another TTC-style revolt the next time a megaproject is proposed.

European Megaregions

A number of megaregions have been identified in Europe. Table D.1 shows the main megaregions identified over the past 20 years.

Table D.1: Evolving European Megaregions

In 1989 the Blue Banana was identified. This megalopolis was considered the backbone of Europe from NW England to Milan.	
In 1993 Schatzel identified what is known as the Blue Banana and Beyond. This megaregion now comprises the Blue Banana and the Sunbelt South Region from Milan to Valencia, and the Yellow Banana East, which stretches from Paris via Cologne and Berlin to Warsaw. The underlying criteria for this new view were economic.	
The European Union's Spatial Development Perspective in 1999 created the Pentagon.	
Richard Florida identified a series of megaregions in Europe in 2007.	

In 2007 the University of Pennsylvania with Fundación Metrópoli also developed the European Diagonal, which stretches from Spain through France to Italy.	

Within the EU, work has been ongoing since the late 1980s in the area of spatial planning—in essence, megaregional planning. Regional planning was a factor in the development of the EU's programs and policies from the early days of the Common Market (France, Germany, Italy, Luxembourg, Netherlands, and Belgium) to the integration of the UK, Denmark, and Ireland in the early 1970s, then Greece, Spain, Austria, Finland, Sweden, and Portugal in the mid-1980s, and finally through to the large expansion that took place in the 2000s of former Iron Curtain countries in Eastern Europe, which took the EU membership to 25 countries.[13]

Regional planning naturally arose in the EU after World War II, when European countries sought to align heavy industry development under common management—the Coal and Steel Treaty—so that no single entity could make weapons and turn against another. This led to the development of the Treaty of Rome in 1957 and the creation of the European Economic Community (EEC) so that people, goods, and services could move freely across borders. At the EU, the Transport Directorate under the Commission sets the tone and pace for various strategies developed for mobility and transport within the EU. Through the sheer number of member countries and because EU membership requires member states to adhere to EU Regulations and Directives, regional planning has been in place for decades. The hierarchy of EU laws can be seen in Figure D.5.

[13] Membership now comprises Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

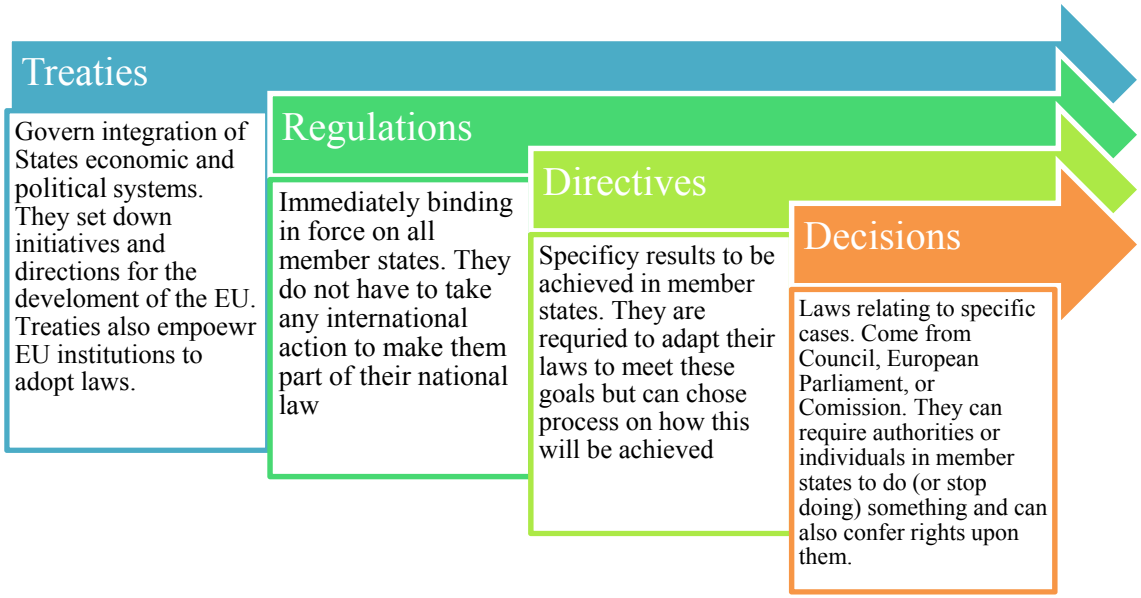
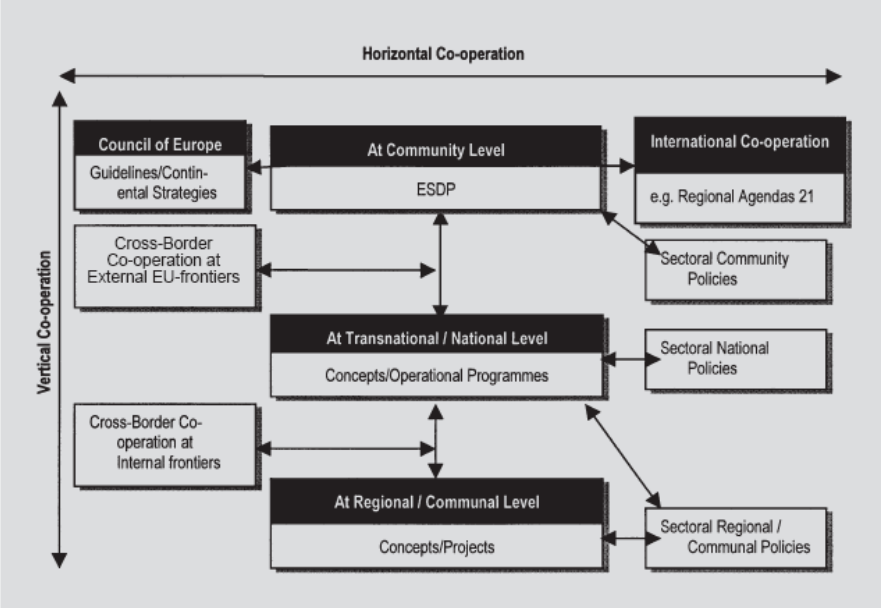


Figure D.5: Hierarchy of EU Laws

The Trans-European Networks were initially promoted by the Transportation Directorate as a mechanism to connect large urban conurbations and regions within Europe and to promote economic growth and employment during the 1990s. These were given a formal legal base in the Maastricht Treaty in 1993; in 1994, 14 specific initial projects were drawn up by the Commission. Known as the *Ten-T*, these are strictly focused on transportation, communications, and energy infrastructure. The initiative is backed by financial instruments from the Cohesion Fund, European Regional Development Fund, and the European Investment Bank loan and credit guarantee programs. The Ten-T project has undergone regular reviews and updates as the EU has grown larger. As priority projects have been developed, new priorities have been added to the list. Thirty priority projects were due to begin development in 2010 covering all modes and including some key missing links.

Figure D.6 illustrates the Cooperation for Spatial Development (ESDP) within the EU. This ongoing policy program is partially based on the rationale that development projects in the different member states complement one another best if they are directed towards common objectives for spatial development. Development guidelines for ESDP were drawn up by the Member states for future development objectives and projects to create a new dimension of European Policy focused around the "Territory." According to a 1999 ESDP update:

> ESDP provides the possibility of widening the horizon beyond purely sectoral policy measures, to focus on the overall situation of the European territory and also take into account the development opportunities which arise for individual regions. New forms of co-operation proposed in the ESDP should, contribute towards a co-operative setting up of sectoral policies – which up to now have been implemented independently – when they affect the same territory. The Community also requires the active co-operation of cities and regions in particular to be able to realize the objectives of the EU in a citizen-friendly way (EU, 1999, pg. 7).



Source: EU, 1999

Figure D.6: Ways of Cooperation for Spatial Development

During the 1990s, sustainability also became a key focus in the development of transportation laws, strategies, and policies within the EU, leading to a Greening Transport White Paper in 2008. The latest initiative is the 2011 white paper called *Roadmap to a Single European Transport Area*. It outlines 40 initiatives for the next decade to build a competitive transportation system to increase mobility, remove barriers in key areas, and fuel growth and employment. The proposals are also coordinated to reduce Europe's dependence on imported oil, and to cut carbon emissions by 60% by 2050. Key goals include the following:

- No more conventionally fueled cars in cities.
- 40% use of sustainable low carbon fuels in aviation; at least 40% decrease in shipping emissions.
- A 50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport (EU, 2011).

The white paper is accompanied by a commission-developed strategy with key metrics and measures that must be developed during the 2011–2014 time period, which include the following:

- Major overhaul of the regulatory framework for rail
- Analysis of core network of strategic infrastructure to create a multimodal network and a single European Transport Area
- Remove bottlenecks in air, marine, and maritime areas, including an e-maritime initiative

- Create a fair financial environment to approach transport charges—including "polluter pays" principal
- Guidelines for application of infrastructure costs to passenger cards and internalization of costs to all road vehicles
- EU Strategic Transport Technology Plan
- Multimodal travel planning and integrated ticketing plan

United Kingdom

The UK has also seen devolution of central government functions to regional governments since 1997. During this time the Scottish Parliament, National Assembly for Wales, and Northern Ireland Assembly were given greater powers and authority, although were still subordinate to the UK Parliament. At the same time, 10 Government Office Regions in England were created in 1994 to work in partnership with local stakeholders to maximize prosperity and quality of life. These indirectly elected Regional Assemblies undertook a series of coordinating, lobbying, and strategic initiatives. They were closed as of April 2010, as part of the Comprehensive Spending Review that took place when the Conservative-Liberal Democrat coalition took power in 2010 (National Statistics, not dated).

Latin American Megaregions

The feasibility of megaregional planning in Latin America must be examined within the context of the cultural and geographical constraints in this area. Culturally, Central America consists of 7 sovereign nations that boast a combined population of 41 million over an area of 202,000 square miles—thus, a population slightly larger than that of the state of California living within an area that is about 25% larger. Unlike California, which has two commonly defined megaregions delineated, Central America has no commonly delineated megaregions.

Further, Central America does not have strong symbiotic interconnections between population centers, which is apparent when examining each of the nations that comprise Central America. Each nation has its own identity and economic base, with only cursory connections to neighbors. Megaregions are typically defined outside of simply serving as an agglomeration of human activity, with attention given to various types of linkages. A potential Central American megaregion would be difficult to justify given the weak infrastructural, cultural, and economic linkages.

Mexico, while having a population of more than 110 million people, has only one justifiable megaregion: Mexico City and its surrounding area. The Federal District and the State of México, which is normally taken to mean the entire Mexico City region, is home to 24 million people. However, a Mexico City megaregion, consisting of the entire state of México and Federal District, as well as parts of the states of Morelos, Aguascalientes, Tlaxcala, Hidalgo, Queretaro, Guerrero, Michoacán, and Guanajuato, is home to about 46 million people. Some of the large cities in these states, such as Toluca, Puebla, Pachuca, and Cuernavaca are Mexico City suburbs or exurbs, and the states surrounding Mexico City tend to have economies that depend on the economy of the Valley of Mexico, making them prime candidates for megaregional inclusion. Figure D.7 depicts the Latin American megaregion.

South America possesses only one commonly defined megaregion, which stretches between Rio de Janeiro and Sao Paulo in southeast Brazil and links the largest and second-largest metropolitan areas of the country. Alternatively, the third- and ninth-largest metropolitan regions in Brazil, those of Belo Horizonte and Curitiba, respectively, are both within a potential megaregional commute-shed, lying 270 miles from Rio de Janeiro and 250 miles from Sao Paulo, respectively. This megaregion would have a population approaching 40 million.

Source: The Guardian (UK) from the Daily Mail (UK)

Figure D.7: Latin American Megaregion

In South America, geography plays the opposite role in the delineation of megaregions compared with Central America. In Central America, the close proximity of the countries to one another belies the cultural distance between them. The idea of a Central American megaregion would be, more than most other delineations, simply a convenient agglomeration of people due to their geographic proximity. In South America, however, the geography of the continent plays the opposite role. Mountain ranges and rainforests have historically served as barriers to international interactions, and they continue to serve as barriers to linking large conurbations of people economically or physically.

Mercosur, an international customs union, aims to promote South American integration through economic cooperation and promotion of free trade through free flows of people, goods, and currency throughout the continent. Though admittedly this is not a customs union focused on any specific megaregion, it is the first step in creating a framework that can allow for the provision of future megaregional planning.[14]

Africa's Megaregions

To date one megaregion has been identified in Africa: the West Africa megaregion that stretches along the coast from Ghana to Nigeria (Figure D.8). The African Union (AU) has in many ways spearheaded regional and continent-wide initiatives vis-à-vis infrastructure development. Created in 1999, the AU's main objectives are listed in Figure D.9.

[14]Mercosur's membership includes Brazil, Argentina, Paraguay, and Uruguay as full members and Bolivia, Chile, Ecuador, Colombia, and Peru as associate members.

Source: The Guardian (UK) from the Daily Mail (UK)

Figure D.8: West Africa Megaregion

- To achieve greater unity and solidarity between the African countries and the peoples of Africa;
- To accelerate the political and socio-economic integration of the continent;
- To promote and defend African common positions on issues of interest to the continent and its peoples;
- To encourage international cooperation,;
- To promote peace, security, and stability on the continent;
- To promote democratic principles and institutions, popular participation and good governance;
- To promote and protect human and peoples' rights;
- To establish the necessary conditions which enable the continent to play its rightful role in the global economy and in international negotiations;
- To promote sustainable development and integration of African economies;
- To promote co-operation in all fields of human activity to raise the living standards of African peoples;
- To coordinate and harmonize the policies between the existing and future Regional Economic Communities for the gradual attainment of the objectives of the Union;
- To advance the development of the continent by promoting research in all fields,
- To work with relevant international partners in the eradication of preventable diseases and the promotion of good health on the continent.

Source: African Union (not dated)

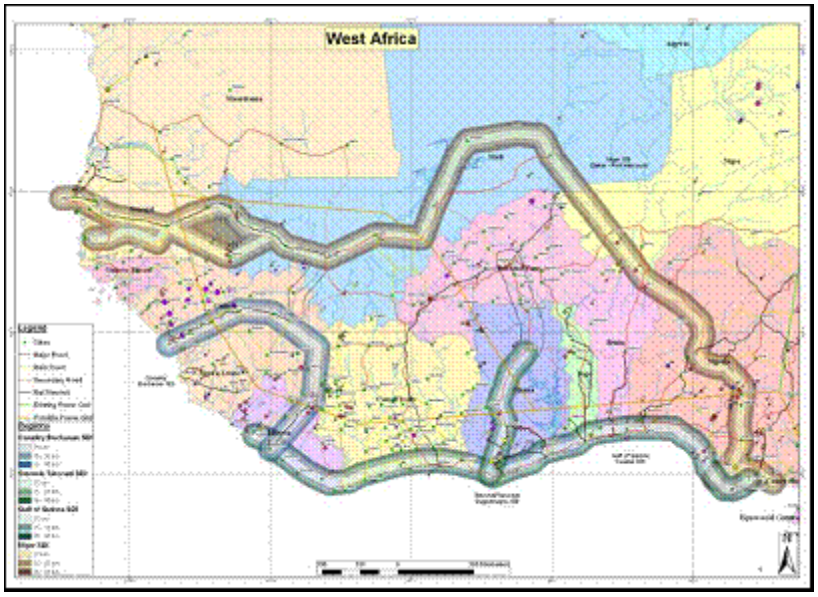
Figure D.9: African Union Main Objectives

The African Union in some ways mirrors the European Union, as it has an Assembly composed of Heads of State, an executive council, commission, and Pan-African Parliament, Court of Justice, African Central Bank(s), technical committees, and other advisory councils.

Regional infrastructure development within Africa is being led by the New Partnership for Africa's Development (NEPAD). This entity was created in 2001 by the African Union. One of NEPAD's core principles is *"acceleration of regional and continental integration."* It should be noted, however, that this entity has no governing or binding powers to commit states to any activities, and funding thus far has been on a small scale for individualized projects. In 2008 the Declaration of Algiers developed a wide-ranging transportation policy framework for the continental level. The declaration contained a series of objectives that were translated into Action Plans for the modes of transport. This was followed by the Declaration of Transport and Energy Infrastructure in Africa of Heads of State in Addis Ababa during February 2009. This reaffirmed the need to

- include in national priorities the network interconnections at the regional and continental levels.
- harmonize laws, regulations, and standards.
- create appropriate institutional frameworks to carry out reforms to better maintain integration projects.
- contribute financial to NEPAD infrastructure projects preparation facility.
- promote public-private partnerships.

In 2006 NEPAD published profiles of 12 potential spatial development initiatives (SDI), including the Maghreb Coastal SDI, which would link Morocco, Algeria, Tunisia, Libya, and Egypt. These SDIs conducted an inventory of each area's infrastructure, economy, and energy assets. The goal of the SDIs was to align resources for regional projects that would move NEPAD towards its goal of regional integration. Figure D.10 shows some of the potential West African SDIs that NEPAD has been reviewing.



Source: NEPAD, 2006

Figure D.10: West Africa Megaregion Spatial Development Initiatives

During 2010 the AU/NEPAD Africa Action Plan was released for 2010–2015 and contained over 80 flagship programs and projects for regional and continental integration in Africa, mostly focused on infrastructure. This was followed with the Study Program for Infrastructure Development in Africa (PIDA), which was released in May 2010 (Sofreco, 2010). The objectives within this study were to

- establish a strategic framework for development of regional and continental infrastructure in four sectors (energy, transport, ICT, and TWR).
- establish an infrastructure development program to run through 2040 that would include a priority action plan.
- prepare an implementation strategy and process (institutional architecture for infrastructure).

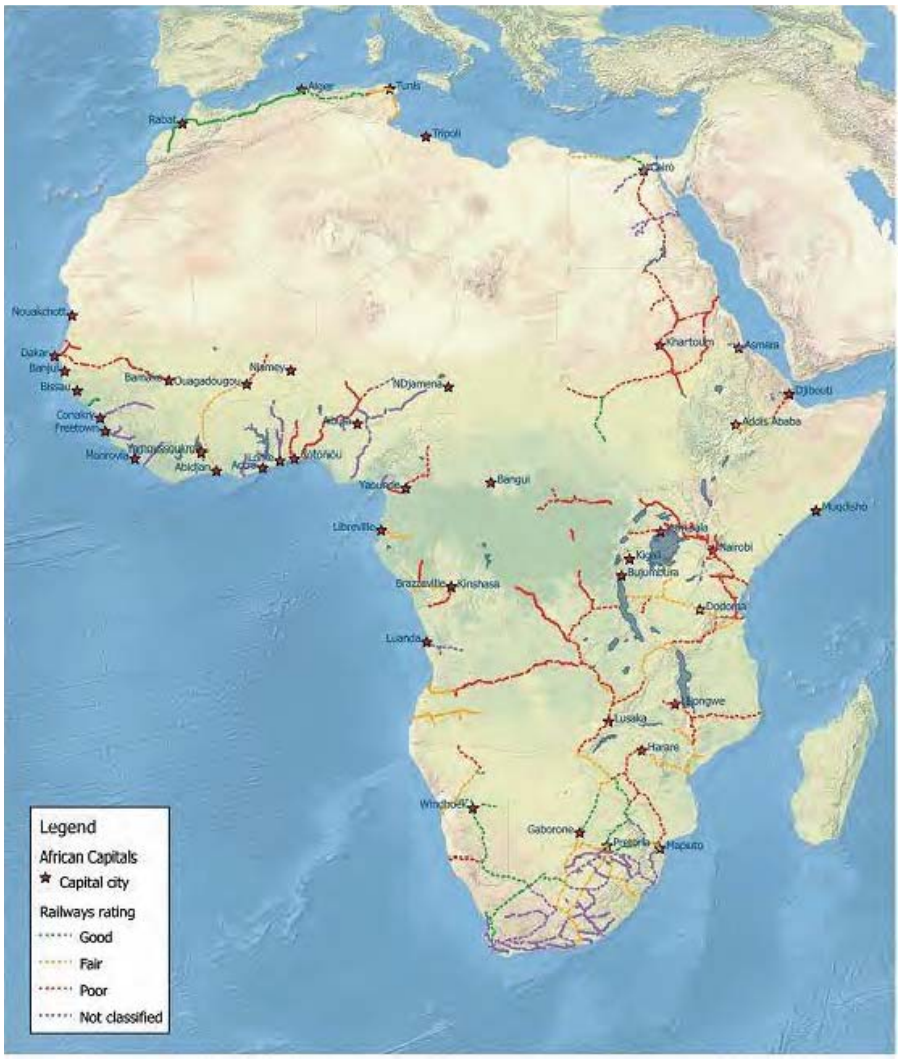
The PIDA study reviewed both infrastructure investments, as well as accompanying "soft" activities that required cooperation of at least two countries. The Transportation Sector Review (Sofreco, 2010 (a)) catalogued existing policies, strategies, regulations, and laws, and made multiple recommendations for transportation improvements. These included, in many instances, reductions in barriers and roadblocks, cooperation on border security and crossing policies, as well as multimodal strategies for roads, rail, air, and marine. They also made a recommendation to develop a Common Aviation Policy, Common Rail Policy, Common Marine Policy, and Common Highway Transport Policy. The African Multimodal Network is described briefly in this section, with an overview of the major cooperative institutions who have been involved in regional development of this network. The Trans Africa Highway (Figure D.11), which has been a policy goal for over 35 years, is severely behind schedule, with 65% of its missing links sited in Central Africa; only a third of existing roads are paved in this region.

The transportation sector review also looked at the regional highway corridors and ranked them in terms of network condition. Overall they found that the road network was inadequate in length and quality, and constituted a *major constraint for the continent's regional integration*. Out of the total road network of 2.09 million kilometers, only 21% was paved. The network does not serve many market areas, and in many countries capitals are not linked with paved roads. The project reviewed corridor institutions, bodies, and agencies that controlled transportation corridor development. The Southern African region (South Africa/Namibia/Mozambique) was clearly ahead in terms of institutions that took a multimodal and regional approach and also were aggressive in PPP development of projects.

Africa's railway corridors infrastructure is in generally poor condition, due to lack of maintenance and rehabilitation over the years. Many tracks have been abandoned and are closed to traffic (Figure D.12).

Source: Sofreco, 2010

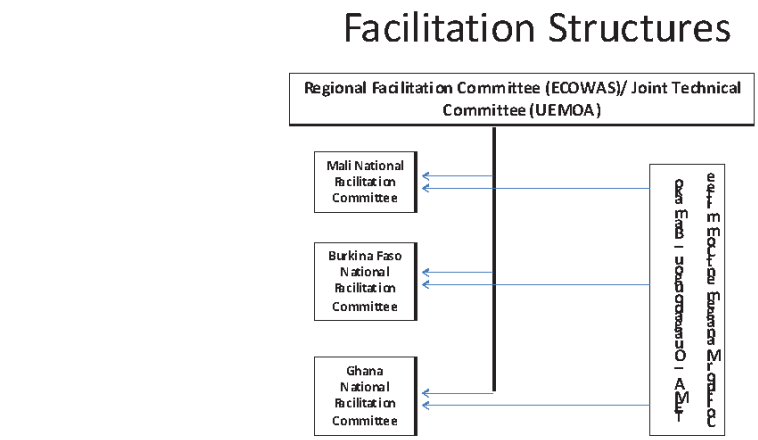
Figure D.11: Trans Africa Highway



Source: Sofreco, 2010

Figure D.12: Africa's Rail Corridors

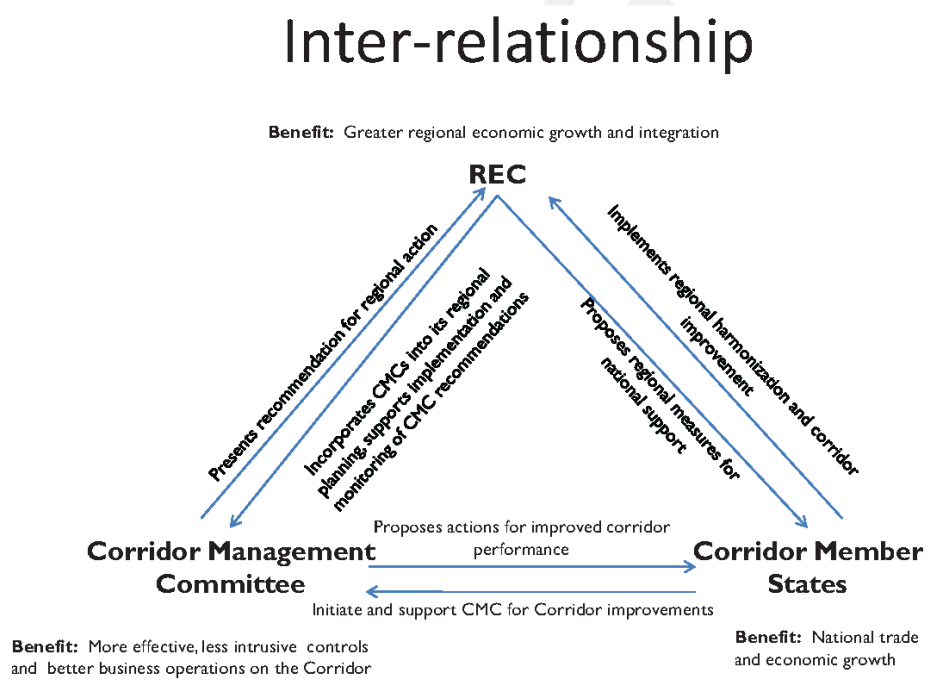
In West Africa a regional approach was created and had an institutional model for highways that consisted of a Regional Facilitation Committee and a Joint Technical Committee with national facilitation committees in member countries. This governance structure is now being utilized to promote projects and foster stakeholder meetings with the private sector users of the network. This institutional model, while more recent, has the potential to change some of the regulatory controls that have hitherto affected performance and to foster development of the logistics sector to compete for cargo handling projects. Figures D.13 and D.14 show how this institutional model works.



These Corridors committees are now established. Their PPP nature is particularly important to their success. There is also a strong synergy between the RECs, national government and corridor groups that enhances results.

Source: Sofreco, 2010

Figure D.13: Facilitation Structures

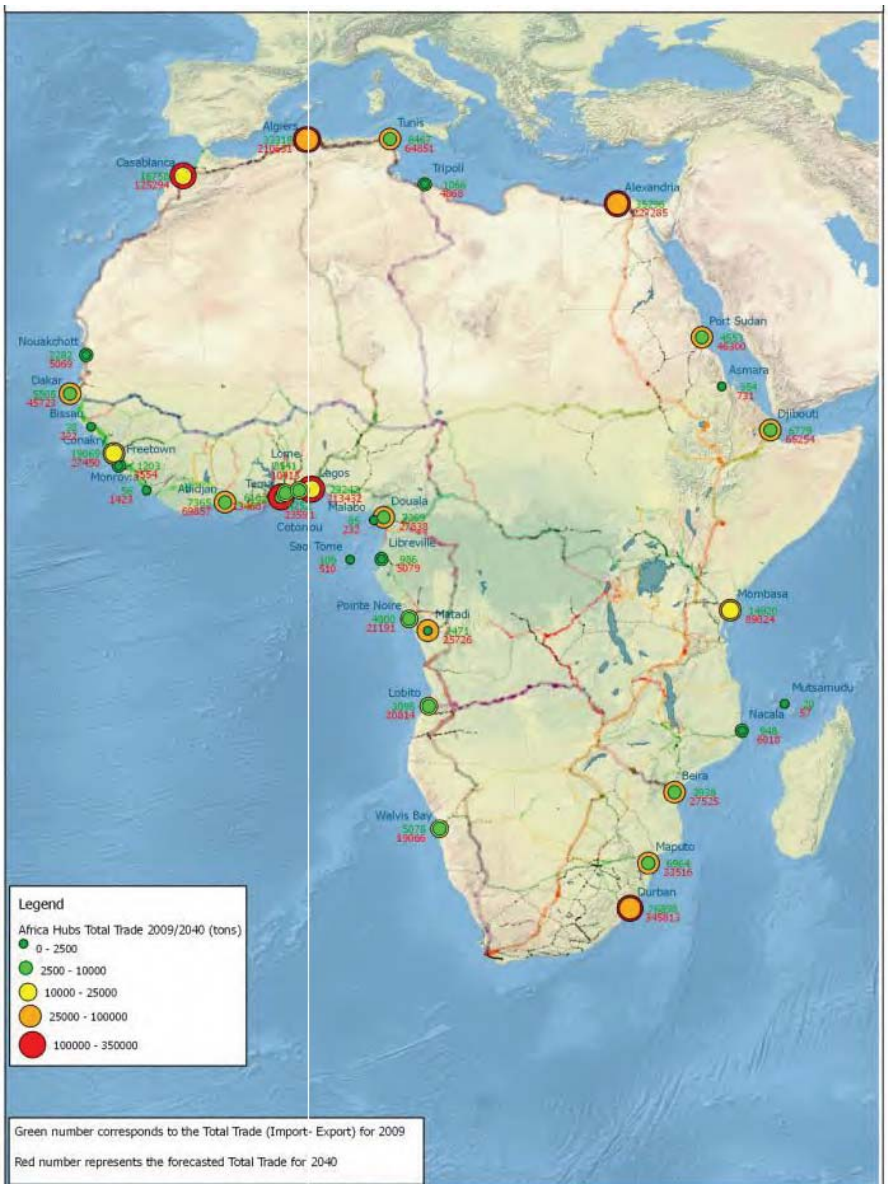


Source: Sofreco, 2010

Figure D.14: Inter-Relationships

Finally, the Transport Sector Review developed trade demand forecasts. Figure D.15 shows the projected hubs for trade in 2009 and forecast out to 2040. Five countries account for more than half of total African trade by volume, and will continue to dominate in the future.

However, the increase in mineral exports from central African countries such as Zambia and the Democratic Republic of the Congo are expected to reduce this dominance by 2040.



Source: Sofreco, 2010

Figure D.15: Trade Hubs 2009 and 2040

As this brief review of Africa illustrates, while some initiatives have been put in place for regional development, the poor state of Africa's infrastructure and its lack of connectivity between its large urban conurbations will continue hamper its development for a considerable time. However, the AU and NEPAD initiatives along with the development structure seen in West Africa do provide a mechanism for inter-regional planning for the continent as it plans and develops infrastructure projects.