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Working Paper

Arizona State Freight Plan

(ADOT MPD 085-14)

Future Scenarios and Implications for Freight Transportation

Prepared for:

Arizona Department of Transportation

Prepared by:

CPCS

In association with:

HDR Engineering, Inc.
American Transportation Research Institute, Inc.
Elliott D. Pollack & Company
Dr. Chris Caplice (MIT)
Plan*ET Communities PLLC (Leslie Dornfeld, FAICP)
Gill V. Hicks and Associates, Inc.

Solutions for growing economies

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Working Paper

This brief working paper summarizes the results of a scenario planning workshop, help in Phoenix on November 5th, 2015.

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Contact

Questions and comments on this working paper can be directed to:

Marc-André Roy
Project Director
T: +1.613.237.2500 x 306
mroy@cpcstrans.com

Donald Ludlow
Project Manager
T: +1.202.772.3368
dludlow@cpcstrans.com

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Executive Summary

This brief working paper contains an analysis of divergent and conjectural future scenarios in order to better analyze and understand the implications of these scenarios on freight planning and key industries in the economy.

This paper summarizes the results of a scenario planning workshop, held in Phoenix on November 5th, 2015. Three alternative future scenarios were developed for the year 2045.

- **Domestic Bliss**: This scenario manifests itself as a nationwide decrease in international trade and instead a resurgence of domestic manufacturing and logistics markets. There are many smaller scale urban clusters all along the Sun corridor. These populations are dense – but at a small scale.

- **#urbanizonia:** This scenario manifests itself as tremendous growth in the populations of Phoenix and Tucson. The majority of the new population is younger, highly skilled professionals, choosing to live in transit-oriented, high density locations in multi-unit housing. The shared economy has taken full root in Phoenix and Tucson and the number of vehicles owned per capita has been reduced. Arizona is still a major distribution hub for retailers bringing product from the coasts to the interior.

- **SOBO (South of the Border):** This scenario manifests itself as a re-focused economy looking south to Mexico and other Latin American countries for markets and products. Mexico has replaced China as the primary manufacturing hub for North America. There are more border communities serving this huge and still growing cross boarder economic activity.

These scenarios will inform the development of future forecasts and resulting implications for the Arizona freight transportation system. These future scenarios will complement base case forecasts and are intended to position the Arizona State Freight Plan to effectively *prepare* for an unknown future.

Acronyms and Abbreviations

ADOT	ARIZONA DEPARTMENT OF TRANSPORTATION
DCs	DISTRIBUTION CENTERS
GDP	GROSS DOMESTIC PRODUCT
JIT	JUST-IN-TIME
LTL	LESS THAN TRUCKLOAD
MPOs	METROPOLITAIN PLANNING ORGANIZATON
POEs	POINTS OF ENTRY
SOBO	SOUTH OF THE BORDER
STEEP DRIVERS	SOCIAL, TECHNICAL, ECONOMIC, ENVIRONMENTAL AND POLITICAL
TL	TRUCKLOAD
TPP	TRANS-PACIFIC PARTNERSHIP
WIP	WORK IN PROGRESS

1 Introduction

Key Messages

The Arizona Department of Transportation, Multimodal Planning Division, retained a team lead by CPCS Transcom Inc. to assist in the development of Arizona's State Freight Plan.

The State Freight Plan will define immediate and long-range investment priorities and policies that will generate the greatest return for Arizona's economy.

This working paper provides a summary of the scenario planning workshop, held in Phoenix on November 5th, 2015, and resulting scenarios. These scenarios will inform freight transportation forecasts and will complement the base case forecast in informing future freight transportation needs and issues in the state.

1.1 Arizona State Freight Plan Objectives

The Arizona State Freight Plan will define immediate and long-range investment priorities and policies that will generate the greatest return for Arizona's economy, while also advancing other key transportation system goals, including national goals outlined in MAP-21. It will identify freight transportation facilities in Arizona that are critical to the State's economic growth and give appropriate priority to investments in such facilities.

The State Freight Plan will ultimately provide Arizona with a guide for assessing and making sound investment and policy decisions that will yield outcomes consistent with the State's visions, goals, and objectives, and notably, promote regional competitiveness and economic growth.

1.2 Purpose of this Working Paper

This brief working paper summarizes the results of a scenario planning workshop, held in Phoenix on November 5th, 2015. The resulting scenarios are to inform the development of future forecasts and resulting implications for the Arizona freight transportation system (in Phases 6 and 7 in the development of the State Freight Plan). These future scenarios will complement base case forecasts and are intended to position the Arizona State Freight Plan to effectively *prepare* for an unknown future.

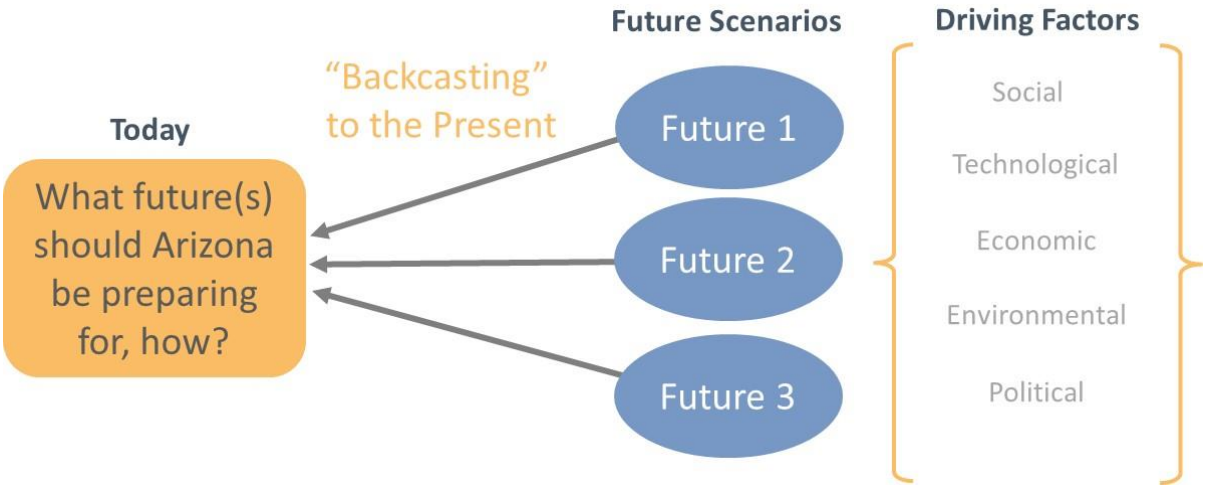
1.3 Framework for Scenario Development

1.3.1 Introduction to Scenario Planning

Unlike forecasting, which projects historic trends into the future, scenario planning imagines alternative but plausible hypothetical future(s) and "backcasts" these to the present.

Rather than try to "predict" the future, as is done in forecasting, scenario planning provides a means of "preparing" for alternative futures.

Figure 1-1: Backcasting Future Scenarios to the Present



Source: MIT Center for Transportation & Logistics; adapted by CPCS

1.3.2 Identification of Key Drivers of Future Scenarios

Many factors influence the competitiveness and growth of Arizona's freight sectors and associated freight flows, as well as Arizona's broader economy. Beyond the transportation issues identified in the Economic Context Report (Phase 3), these factors can be organized using the STEEP (Social, Technical, Economic, Environmental and Political) drivers framework.

Figure 1-2: The STEEP Framework

Driver	Description
Social	Broad societal factors including demographics, income, consumption patterns, population location and density, among others.
Technological	Technological factors that may generate new (alternative) products or services, increase the availability/lower the cost of current products or services, or change the nature of production processes, transportation and distribution activities, information flows, etc.
Economic	Economic factors that influence the ability of individuals' or businesses' capacity to invest or purchase goods or services, such as overall economic growth (global, regional) or the distribution of that growth, commodities prices, etc.
Environmental	Prevailing environmental factors that may influence the demand for or the production of goods and services, either positively or negatively.
Political	Political or legal factors that could influence the production, sourcing, flow or trade of goods (e.g. trade agreements), or investments in public infrastructure, such as highways, among other factors.

Source: Kyler; Competia.com; CPCS

1.3.3 From Drivers to Effects on Freight Flows

The STEEP drivers manifest themselves in five freight flow effects, as summarized in the figure below. These five effects are also used as a basis for assessing the implication of alternative future scenarios. This is done by assessing the expected impact of each effect with respect to the base case scenario forecast.

Figure 1-3: Translating Events into Effects

Effect	Description
Sourcing	Where are the products sourced from?
Flow	Where are products going to (where is the demand located)?
Routing	How are the products routed from source to destination (route, mode)?
Volume	How will the total volume of goods shipping into and through the region change?
Value Density	How will the product characteristics and related value density change?

Source: MIT Center for Transportation & Logistics; CPCS

1.4 Scenario Development Process

Three alternative scenarios were developed during an all-day scenario planning workshop, held in Phoenix on November 5th, 2015. There were more than 50 participants, representing a range of stakeholder groups from ADOT, MPOs, shipper and carrier organizations and associations, academia, and the consultant community.

Figure 1-4: Arizona State Freight Plan Scenario Planning Workshop

Source: Leslie Dornfeld

Source: Leslie Dornfeld

The process started with a review of the potential drivers identified in a pre-workshop survey. The key hallmarks of these drivers were that they are not influenced, controlled or known in advance by the planning entity. These external factors are the ones best used in framing and developing scenarios.

Generally speaking, different scenarios can reflect different levels of influence from markets, social trends and government control.

The potential driving forces were categorized into the STEEP groupings and ranked by the participants. Also, new potential driving forces were introduced and discussed. The net result was a priority ranking of those driving forces thought to have the most impact (positive or negative) on Arizona's freight mobility in the future. The top three-four driver forces under each STEEP grouping are noted in the table below.

Figure 1-5: Top STEEP Drivers as Identified by Participants

Driver	Top Drivers
Social	• Increased urbanization in Phoenix-Tucson corridor • Labor shortage for key industries professions (e.g. vocational training) ○ Bilingualism (for retailers) • Rise of the shared economy • Immigration policies (skilled and unskilled labor)
Technological	• Internet of things (how ecosystem ties together) • Alternative fuels (implications – whole funding system for transport based on fuel tax, capacity to deliver) • Autonomous trucks • Flexible manufacturing/automation/robotics

Driver	Top Drivers
Environmental	• Water demand/supply • Increase in extreme weather events • New environmental regulations / emissions
Economic	• Canamex Corridor • National economic conditions in the US • Opening of Mexican ports • Fuel prices
Political	• Funding (more or less) • Competition with neighboring states • Land use regulations and restrictions • Shifting of user fees instead of taxes

Source: Scenario Planning Workshop, November 5, 2015

These driving forces were then organized into three coherent initial scenarios by the facilitating team. The idea was to create three rough initial scenarios that the larger participant base could then debate and further flesh out. That was accomplished in the afternoon breakout sessions where each scenario was thoroughly debated, vetted, and improved by a breakout group.

Figure 1-6: Breakout Group Discussions

Source: Leslie Dornfeld

Source: Leslie Dornfeld

Source: Leslie Dornfeld

Following the breakout group sessions, representatives from each group reported back to the plenary workshop group on what their respective future scenarios looked like.

Figure 1-7: Breakout Groups Reporting Back

Source: Leslie Dornfeld

Source: Leslie Dornfeld

Each future scenario is described in the following chapter.

2 Arizona State Freight Plan Future Scenarios

Key Messages

The scenario planning workshop yielded three alternative future scenarios titled: **Domestic Bliss**, **#urbanizonia**, and **SOBO (South of the Border)**. These are described herein.

The expected implications of each scenarios on Arizona's four freight sector groups are also addressed herein.

2.1 Scenario 1: Domestic Bliss

The **Domestic Bliss** scenario envisioned a world where government and social forces dominate market influences.

This manifests itself as a weakening of international trade and instead a re-focusing on domestic markets. This is further enhanced by California's increasingly stringent regulations covering health, environmental, societal justice, and other non-economic objectives. The net effect is the migration of many firms from California to Arizona – but still supporting the California markets. Population growth has followed this to some extent with more border community growth, but it has mainly increased the strength of Arizona dairy farming, agriculture, mining, and other natural resource heavy industries.

Arizona is seen as the most business friendly state in the Southwest. This has helped it better serve the growing population in the Intermountain region. The completion and flourishing of the Arizona-component of the Canamex corridor has provided Arizona with easy access to these new markets, though Canamex connection into Canada and Mexico are not maintained.

In this hypothetical scenario, political tensions with Mexico and Latin America are typically high with trade still present, but not growing at its historical pace. The legacy of the failure of the Trans-Pacific Partnership (TPP) has not lifted. Arizona agriculture is growing tremendously to supplement Mexico's output. Immigration between the countries is very low – resulting in a labor shortage of workers in the agriculture and other industries.

There are many smaller scale urban clusters all along the Sun corridor. These populations are dense – but at a small scale. They have been exceptionally attractive to the "2nd Gray Wave" of retirees from the rest of the US – especially from California. These economic retired-refugees are escaping California's onerous taxes. The aging of Arizona is a growing problem, but the wealthy retirees are bringing in some welcome tax base. Unfortunately, they are causing the labor shortage in the healthcare space to get worse.

This is the world of **Domestic Bliss** – where Arizona finally faces domestic markets for greater economic growth and opportunity.

2.1.1 Domestic Bliss Scenario STEEP Drivers

As developed during the scenario planning workshop break-out sessions, the drivers of the **Domestic Bliss** scenario are as follows.

Figure 2-1: Domestic Bliss STEEP Drivers

Drivers	Overview of Key Drivers
Social	• Clusters of urban growth along Sun Corridor - Series of urban pockets (Tucson, Phoenix, Marana, Casa Grande, Prescott, etc.) • Influx of retirees from US Midwest and resulting growing older consumer base • Potential massive immigration from California (4-5 million) • Slowing immigration from Mexico
Technological	• Internet of things advances but privacy issues and associated regulations have dampened pace of progress

Drivers	Overview of Key Drivers
	• Widespread implementation of autonomous vehicles is dampened by government safety regulatory hurdles.
Economic	• Intermountain economy flourishes • Increasing trade with US states, particularly California, Texas, Midwest • Less trade with Mexico, South America and Asia-Pacific region • Growth of high tech and medical tech continues • Agricultural clusters (Yuma, Nogales, Pinal City, Prescott) with Products shipped to metro areas
Environmental	• Accelerated climate change and increased extreme weather events
Political	• Restrictive immigration policies • Federal regulations on privacy and safety have thwarted widespread adoption of autonomous vehicles, advanced robotics, and the Internet of things. • California becomes overregulated…. businesses move to Arizona

2.1.2 Domestic Bliss Implication for Key Arizona Sector Groups

The overall anticipated effects of the **Domestic Bliss** scenario on freight flows associated with Arizona's top freight sector groups are as follows.

Figure 2-2: Domestic Bliss Effects on Arizona Freight Sector Groups

Sector Group	Freight Flow Effects

Consumer Goods	• **Sourcing**: Retailing continues to be a large segment of the economy and related flows are largely inbound. Increasing flow of consumer goods and food products from California, Texas, Midwest at the expense of former flows from Mexico, Latin America and the Asia-Pacific Region.
	• **Flow**: Drop in international exports. Modest exports to California, New Mexico and Texas through inbound consumer goods dominate.
	• **Routing**: I-10 to California is the dominant corridor. Virtually all this traffic moves by truck. Some rail flows to markets in the Midwest and North East US. There is increased flow to the Intermountain states.
	• **Volume**: Overall volume of consumer goods sector flows tied primarily to population growth. Overall Ton-Miles decreases due to more geographically tight market base.
	• **Value Density**: The growing population of retirees in Arizona moving into smaller homes and apartments has led to a general increase in the quality/value of consumer goods products, custom-made for those in retirement.
	• **Other effects**:
	  ○ More complicated delivery in urban areas. Growth of distribution hubs outside of California – serving that state, but from outside its own boundaries.
	  ○ More distributed population leads to more super stores in rural areas.

Manufacturing	• **Sourcing**: Increasing share of manufacturing from neighboring states and Midwest and drop in international sources. Manufacturing businesses that relocated to Arizona from California have also added to the regional manufacturing base, particularly along the I-10. • **Flow**: Growth of manufacturing in western part of state to serve California (some of which is actually former California-based manufacturers). Within Arizona, most

Sector Group	Freight Flow Effects
	manufacturing sector flows are tied to markets in urban clusters in the Sun Corridor. The tech sector continues to flourish, serving markets throughout the US. • **Routing**: Truck is king, using combination of Truckload (TL) and Less than Truckload (LTL). Some rail of heavier manufacturing inputs and outputs to and from the Midwest. Some air transportation for high value product destined to Eastern US. • **Volume**: Overall volume not materially different than in 2015, but total ton-miles have dropped due to shorter distances of trips. • **Value Density**: No material change.
Natural Resources	• **Sourcing**: Drop in natural resources from international sources, notably agriculture from Mexico. Sourcing has largely been replaced by production in Arizona and neighboring states. • **Flow**: Drop in export of mining product (e.g. copper) to Mexico and other international destinations. Aggregate and other construction-related resources continue to be focused on urban clusters in Sun Corridor. • **Routing**: More regional production of agriculture, particularly Yuma region, moving to markets in Sun Corridor and neighboring states. This moves entirely by truck. Some limited rail transportation of copper material to markets in the Midwest. • **Volume**: Overall drop in volumes driven in large part by the loss of international markets for heavy mining. More internal flows of agricultural products. Construction boom in Sun Corridor urban islands drives aggregate flows, but very localized. • **Value Density**: Water shortage has led to a shift in higher value agriculture and crops requiring less water.
Transportation and Logistics	• **Sourcing**: Major drop in container flows from Ports of Los Angles and Long Beach and Mexico. Distribution Centers (DCs) and warehouses in Arizona shift from Phoenix centric to a mix of smaller and medium DCs and warehouses throughout the Sun Corridor. There is also a growing cluster of DCs and warehouses along I-10 near the California border. • **Flow**: Local market focus in the Sun Corridor with some increased flow between California and Texas. Shifting of facilities to serve Northern markets in Intermountain states. • **Routing**: Almost all TL/LTL truck. • **Volume**: High growth in transportation in the Intermountain region– mainly trucking • **Value Density**: N/A

2.2 Scenario 2: #urbanizonia

The **#urbanizonia** scenario envisions a world where market and social forces dominate governmental control and influence.

This manifests itself as tremendous growth in the populations of Phoenix and Tucson. The corridor between the two cities, although patch worked with non-developable land, has filled in tremendously. The majority of the new population is younger professionals attracted to the area by the lower prices, higher quality of living, and growing high-tech/bio industries in the area. The urbanization of these two cities has increased dramatically and has placed tremendous stresses on water rights, infrastructure use and other resources. The new residents tend to be well educated. The shared economy has taken full root in these urban meccas as the actual number of vehicles owned per capita has been reduced. The use of mass transit has also increased.

Even with the increased number of highly trained professionals, there is a shortage of high-tech workers. There is frequent poaching of professionals from one firm to the other. The growing economic influence of this professional class, and their high level of income, has also driven a rise in lower wage service jobs. This has led to more porous immigration policies for day workers from Mexico. It has not translated into many blue collar manufacturing or more substantial middle-class jobs, however. This has led to further alienation and disparity between the young hipster city dwellers and the more traditional rural and suburban population.

The products created and shipped from Arizona tend to be of higher value than previously. The value density ratio is quite high – which shifts to a faster mode of transportation. Arizona is still a major distribution hub for retailers bringing product from the coasts to the interior. Serving the growing population within the state, however, has become more difficult due to the rising urbanization. Last mile delivery in dense areas has further exacerbated congestion in these urban areas.

This is the world of **#urbanizonia**.

2.2.1 #urbanizonia Scenario STEEP Drivers

As developed during the scenario planning workshop break-out sessions, the drivers of the **#urbanizonia** scenario are as follows.

Figure 2-3: #urbanizonia STEEP Drivers

Drivers	Overview of Key Drivers
Social	• Increased urbanization in Phoenix and Tucson. • Labor shortage for high tech professionals. • Rise of the shared economy (e.g. Uber, Lyft, AirB2B, etc.). • Increased environmental awareness – but not translated into formal regulations. • Younger, more educated population in cities. • Alienation and growing disparity between urban vs. suburban/rural dwellers. • Increasing shift to vegetarian, vegan, and generally less beef-intensive diets.

Drivers	Overview of Key Drivers
Technological	• Internet of things fully functioning – although not all segments of the population fully leverage their value or potential. • Alternative fuels are widely used to include electric vehicles. • Tax base for fuel taxes has been degraded. • Autonomous trucks are widely used – addressing some portion of projected truck driver labor shortage. • Flexible manufacturing/automation/robotics are in wide use leading to decentralization of manufacturing and distribution into smaller facilities. • Availability of advanced 3D printing technologies- reducing the need for traditional logistics services for certain high value products that can now be produced at location
Economic	• National economic conditions in the US are generally positive over the long run. • Arizona is growing in terms of GDP – shifting from raw material and agriculture to more high-tech and bio-engineered products and services. • Retail distribution still a major component of the economy.
Environmental	• Water usage is highly concentrated in the cities. • Growing policy disconnect between urban areas and Greater Arizona. • Series of market based pricing mechanisms are being used to better allocate water – but this leads to further alienation between the winners and losers. • Increase in extreme weather events and general warming continues – but not at the level initially predicted. • Shift in land use from cattle and dairy to hardy vegetables and grains since diets include less meat.
Political	• There has been a general shifting to user fees instead of taxes. • Market based mechanisms are in place for water allocation and other scarce resources. • New population is generally socially liberal, financially conservative, and overall apolitical. • Government regulations are generally very loose with a focus on market efficiency.

2.2.2 #urbanizonia Implications for Freight Flows

The overall anticipated effects of the **#urbanizonia** scenario on freight flows associated with Arizona's top freight sector groups are as follows:

Figure 2-4: #urbanizonia Effects on Arizona Freight Sector Groups

Sector Group	Freight Flow Effects
Consumer Goods	• **Sourcing**: Increased global sourcing, via the Ports of Los Angeles and Long Beach, Mexico, and basically everywhere, via the "matternet" (moving products over the internet and printing (3D) at the destination, as well as and via drones, though increasing local production of hipster "consumable" products. • **Flow**: Some of what was produced and shipped in the past now sent via the internet to 3-D printers. Condo lobbies have become the new DCs, where building manager becoming effective DC managers, managing packages received from online orders. • **Routing**: Air is a major mode for increasingly high value goods destined to the Phoenix/Tucson mega-region.

Sector Group	Freight Flow Effects

	• **Volume**: Decrease in volume, but greater concentration of flows destined to consumer base in Phoenix/Tucson. Increased volume of delivery vehicles in downtown, but fewer passenger cars.
	• **Value Density**: Increasing value density with high tech.
	• **Other effects**:
	  ○ National distribution efforts have become much more efficient.
	  ○ Autonomous vehicles and enhanced flexibility for automation have lowered costs.
	  ○ Lower levels of employment in logistics and transportation as technology encroaches.
	  ○ Last mile delivery to urban areas a rising concern – costs increase.

Manufacturing	• **Sourcing**: Raw material sourcing is much further as the basic materials required have changed but sourcing of work in progress (WIP) is much closer as suppliers have entered the Arizona ecosystem. Much of what is sourced for the high tech sector is sourced regionally except for rare earths and other highly specialized products that are shipped in by plane from Asia. • **Flow**: Major increase in outbound trade from Arizona. • **Routing**: Regionally, smaller cube vans dominate – some with ironic spoilers, particularly for local deliveries. Air cargo service has become increasingly important for international trade and trade with states in the Eastern US. • **Volume**: Though trade in manufactured goods is increasing, the size of what is being physically shipped has decreased. "There's an app" for much what was physically delivered in 2015. • **Value Density**: Higher value added manufacturing within the state. New flexible manufacturing has enabled smaller scale facilities – able to locate closer to urban areas to be near populations. • **Other effects**: ○ Labor shortages for high end technical positions, but not for entry or blue collar work.

Natural Resources	• **Sourcing**: Local agriculture (the "10 mile diet") is favored, which has resulted in a drop of basic food imports.
	• **Flow**: Copper is highly demanded in many industries and has robust growth – much of which destined flourishing cities in Africa which has been growing at a consistent rate of 15% per year since 2020.
	• **Routing**: Agriculture moves from around Arizona to Phoenix and Tucson by truck.
	• **Volume**: Higher demand for many materials – construction aggregate is in high demand for growing urban construction – e.g. condos and related urban infrastructure. Forestry sector is diminishing as paper demand is falling due to the digital economy.
	• **Value Density**: No notable change
	• **Other effects**:
	  ○ Automation has significantly increased the efficiency of mining and agriculture operations.
	  ○ The need for low income workers in these industries have been shrinking for years as automation replaces low cost labor.

Transportation and Logistics	• **Sourcing**: Mix of local and international. • **Flow**: Mix of local and international. • **Routing**: Significant change from being mainly a "pass through" function to focusing on last-mile delivery

Sector Group	Freight Flow Effects
	• **Volume**: Overall increase in concentration serving Phoenix/Tucson but net reduction in volumes, driven in large part by consolidation of local deliveries and constrained condo space for "stuff". • **Value Density**: Increasing leverage of technology. • **Other effects**: ○ Lower employment rates as automated warehouses and autonomous trucks become more common

2.3 Scenario 3: SOBO – South of the Border

The **SOBO** scenario envisions a world where market and government forces dominate social influence.

This manifests itself as a re-focused economy looking south to Mexico and other Latin American countries for markets and products. Mexico has replaced China as the primary manufacturing hub for North America. The number of manufacturing clusters in Mexico has more than tripled. Mexican ports have been fully developed and expanded and are now threatening to overcome the combined volume of the entire West coast of United States.

This has placed tremendous burdens on borders crossings. The government (state and federal) has responded quickly and (relatively) efficiently by improving and streamlining the ability of finished goods and components to cross into and out of the US. This has also extended to more efficient immigration policies. Unfortunately for employers in the agricultural sector, the flow of day workers into the US has slowed slightly due to the tremendous opportunities within Mexico. Arizona has evolved into a very sophisticated industry of customization and final assembly of product where base manufacturing occurs in Mexico. This has driven up demand for blue collar and vocational type jobs. There are tremendous labor shortages, however, for these highly trained vocational positions – such as welding, machinists, etc. Interestingly, there has been a fairly steady stagnation of professional, white-collar jobs for several years. Transportation and logistics industries are booming as more intermediate and final product needs to be moved – not only in the traditional East-West direction, but also North-South.

Population is growing significantly in the Tucson/Nogales areas. Suburbia is growing faster than the urban area of Phoenix. There are more border communities serving this huge and still growing cross boarder economic activity. In this highly speculative, hypothetical scenario, not being bilingual (English and Spanish) is a severe limit to being able to conduct business in Arizona. The biggest threat to Arizona's economy is, interestingly, Texas. As Mexico has grown into a manufacturing juggernaut, all of the border states have begun competing to attract the supporting industries. The government has given tremendous tax relief packages to companies looking to bring more products from the south.

The growth in a more distributed population is putting strains both on water usage and electrical power supplies. There is some talk of increased health issues – both due to worsening environmental conditions and more visitors from Latin America.

This is the world of **SOBO**– where some optimistic and dystopian elements converge: many more people speak Spanish and the US-Mexico Land Ports of Entry (LPOEs) are busier than the Ports of Los Angeles and Long Beach (POLA/POLB).

2.3.1 SOBO Scenario STEEP Drivers

As developed in a breakout group, the drivers of the **SOBO** scenario are as follows.

Figure 2-5: SOBO STEEP Drivers

Drivers	Overview of Key Drivers
Social	• Increased immigration from Mexico and South America (porous border). • US commuters to Mexico resulting in more border communities. • Shortage of vocational skills (machinists, etc.) • Increase in Mexican middle class / consumer base. • Some health issues relating to spread of disease across US-Mexican border.
Technological	• Sonora water-electricity/power intermittency addressed. • Deeper penetration of manufacturing base in Sonora.
Economic	• National economic conditions in the US – boom. • Boom in Arizona component parts manufacturing. • All border areas grow. • Texas experiences off the charts growth. • Decrease in Asian/rest of world trade. • Arizona benefits from Mexican ports for inbound / outbound trade.
Environmental	• Increase in extreme weather events • Social demands for increased environmental regulations are not passing in the state or nationally.
Political	• New / Bigger points of entry (POEs). • TPP continues with additional similar agreements on the horizon. • Government regulations have generally been more about free trade and market efficiency and less about social issues over the last several years. • Mexico has invested heavily in infrastructure. • Mexican port labor resists unionization and performs at globally competitive levels of seaport productivity.

2.3.2 SOBO Implications for Freight Flows

The overall anticipated effects of the **SOBO** scenario on freight flows associated with Arizona's top freight sector groups are as follows:

Figure 2-6: SOBO Effects on Arizona Freight Sector Groups

Sector Group	Freight Flow Effects
Consumer Goods	• **Sourcing**: Significant share of consumer goods manufactured and sourced in Mexico and elsewhere in Latin America (supplants Asia as major source of consumer goods). • **Flow**: Some export of consumer goods from Arizona to Mexico, though not significant in the first place. • **Routing**: Most product movement shifted from E-W to N-S. Significant imports/exports via Mexican ports. Truck remains dominant mode though increasing rail flows between Arizona and Mexico. Also lots of trade with Texas and California – mostly by truck • **Volume**: Steady flows, keeping pace with population growth. Shifting consumer demand leads to increase in inventory selection

Sector Group	Freight Flow Effects
	• **Value Density**: No notable change
Manufacturing	• **Sourcing**: Tighter ties to Mexican counterparts. More closely intertwined Just-in-Time (JIT)-style supply chains, particularly for general manufacturing and aerospace. High tech sector remains dominant in Arizona manufacturing. • **Flow**: As above • **Routing**: Shift from E-W trade to N-S, thought linkages to California and Texas remain significant. North-South rail corridor to/from Mexico becomes very important. • **Volume**: Increasing trade activity on the North-South axis. • **Value Density**: No dramatic change. • **Other effects**: Shifting from pure manufacturing to assembly and customization.
Natural Resources	• **Sourcing**: Major shift of agricultural sourcing to Mexico, and the expense of Arizona and other domestic sources. • **Flow**: Increased demand to supply Mexico and Latin America. Copper demand is strong in Mexico and other markets in Latin America. • **Routing**: North-South trade dominates • **Volume**: Growing construction south of border for aggregates. • **Value Density**: No dramatic change.
Transportation and Logistics	• **Sourcing**: North-South demand increasing to include rail and trucking modes. • **Flow**: As above • **Routing**: Tremendous traffic increases from South to I-10 and then in all directions. • **Volume**: There is increased demand for heavier truck size and weight limits to handle the increased flow from Latin America and Mexico. • **Value Density**: The biggest change is that this has spread – there is tremendous volume at both the high and low ends of the value density scale. The transportation systems have grown to be able to handle all levels and classes of freight. • **Other effects**: Lessening of importance of I-10 East-West traffic from West Coast ports – but there is more traffic sending material from Mexico to both points east and west. • Ability to serve more remote population places strains on network • Labor shortages for logistics workers