Arizona Freight Advisory Committee
Arizona State Freight Plan: Scenario Planning, Goals and Performance Measures

August 19th, 2015
Meeting Agenda

1:00 – 1:15 Welcome and introductions
1:15 – 2:10 Introduction to scenario planning
2:10 – 2:25 Arizona State Freight Plan policy and strategies
2:25 – 2:50 Industry performance measures
2:50 – 3:00 Future meeting and ongoing tasks
The Purpose of FAC Meetings

• Overview key points from work to date
• Validate conclusions and provide industry perspective

Meeting Objectives

• Summarize key findings since last meeting
• Obtain input on supply chain performance measures
Role of the Freight Advisory Committee

• Primary role
  ➢ Provide industry input to ADOT (for State Freight Plan and other issues)
  ➢ Validate conclusions with industry knowledge

• Secondary role
  ➢ Deliverables review and comment

• Expectations for the FAC
  ➢ Meeting attendance and participation
  ➢ Insight into the transportation issues/needs/challenges
# FAC Meeting and Deliverable Schedule

<table>
<thead>
<tr>
<th>FAC Meeting Date</th>
<th>FAC Meeting Theme</th>
<th>FAC Homework</th>
<th>FAC Deliverables Received During Previous Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-Nov-15</td>
<td>Future Freight Scenarios</td>
<td>Define Transportation System Strengths and Weaknesses</td>
<td>Working Paper: Inventory on State Freight Transportation System Assets, Nodes and Corridors (Phase 2)</td>
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<td></td>
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<td>Working Paper on Arizona freight transportation system strengths and weaknesses and policy priorities (Phase 8)</td>
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<td>17 Aug 16</td>
<td>Implementation Strategies and Funding Approaches</td>
<td>How can the FAC Promote the Freight Plan and Increase the Importance of Freight in Arizona</td>
<td>Working Paper on Arizona’s Strategic Framework for Decision Making Process, Prioritization (Phase 9)</td>
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<td></td>
<td>Working Paper on Strategic Options, Rationale, Linkage to Goals, Expected Outcomes (Phase 9)</td>
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<td>11 Jan 17</td>
<td>Next Steps and FAC role in Implementation</td>
<td>Identify the Next Steps for the FAC</td>
<td>Arizona Freight System Improvement Strategy (Phase 10)</td>
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<td>Arizona State Freight Plan - Implementation Plan (Phase 11)</td>
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Arizona State Freight Plan: Enabling Economic Competitiveness and Growth

Introduction to Scenario Planning

Freight Advisory Committee Meeting
August 19, 2015
Phoenix, AZ
What future should Arizona be planning for?
Overview

Need to look beyond point forecasting

Introduction to scenario planning

Homework
Basic Approach to Point Forecasting (in a Nutshell)

- **Point Forecast**: Today
- **Risk Management**: Today

Future

Future horizon with risk management scenarios:
- +5%
- -5%

Source: Chris Caplice, MIT
How Accurate are Long-Term Point Forecasts?

Oil price forecasting has failed

The oil industry’s expectations in:
- 1981
- 1984
- 1987
- 1989
- 1991
- 1993
- 1995

US$/bbl (1990)

Even Short-Term Forecasts are Often Way Off....

Source: Chris Caplice, MIT
Classic Cases of Short Sightedness

Great Horse Manure Crisis of 1894
- More than 150,000 horses in NYC producing over 2,000 tons of manure per day
- Estimates of manure reaching 3rd floors by 1930 & nine feet in London by 1950
- 1st International Urban Planning Conference held in NYC in 1894

Interestingly, over 4000 cars were sold in the US in 1900. By 1916 more cars than horses were registered in NYC

Source: Chris Caplice, MIT
We are inherently influenced by [recent] history

History is not a good predictor of the future

Point forecasts ignore the “known unknowns”, are blind to the “unknown unknowns”...and sometimes even overlook the “known knowns”

Bottom line: point forecasts are always wrong and are on their own an inadequate tool to plan for the future.
Overview

Need to look beyond point forecasting

Introduction to scenario planning

Homework
Two key lessons from TRB’s NCHRP 750 project:

- Macro-economic and technology forces are impossible to predict and can have tremendous impact on supply chains.
- **Preparing** for potential effects is more effective than **Predicting**.

Source: Chris Caplice, MIT
Think “STEEP” drivers

- Social
- Technological
- Environmental
- Economic
- Political

What STEEP drivers could influence the future of freight transportation in Arizona?
How will scenarios impact freight flows?

- Impact on sourcing patterns
- Impact on flow destination
- Impact on routing
- Impact on flow volume
- Impact on value density

Source: Chris Caplice, MIT
Crude, Conceptual Example of Alternative Scenarios

Source: Chris Caplice, MIT
<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
<th>High</th>
<th>Low (physical)</th>
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<tbody>
<tr>
<td><strong>Global Trade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Resource Availability</strong></td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Energy Cost Level</strong></td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Energy Cost Variability</strong></td>
<td>Low</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Level of Environmental Awareness</strong></td>
<td>Same as Today</td>
<td>High</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Population Dispersion</strong></td>
<td>Growth in SW</td>
<td>Growth in Biggest Cities</td>
<td>Growth in Biggest Cities</td>
<td>Rise in Mid Tiered Cities</td>
</tr>
<tr>
<td><strong>Energy Sources</strong></td>
<td>Majority NA</td>
<td>Mix Foreign &amp; Domestic</td>
<td>Majority Foreign</td>
<td>Majority Domestic</td>
</tr>
<tr>
<td><strong>Level of Migration</strong></td>
<td>High w/in Bloc, Low between</td>
<td>High</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Migration Policy</strong></td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Currency Fluctuations</strong></td>
<td>Low w/in Bloc</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
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</table>

Source: Chris Caplice, MIT
Are there common actions for all scenarios?

Today

What future(s) should we be preparing for?

Common Actions are “No Brainers”

Future 1
Future 2
Future 3

Otherwise what are the preparedness “triggers” that should cause action as one future or another starts to materialize?
Overview

- Need to look beyond point forecasting
- Introduction to scenario planning

Homework
On November 5th, 2015, Dr. Chris Caplice of MIT will facilitate a workshop with the Freight Advisory Committee to develop three or four Arizona-specific 25-year outlook scenarios.

These scenarios will in turn be used to help position the Arizona State Freight Plan to prepare for the future.
Homework for Freight Advisory Committee

• What STEEP drivers could have the biggest impacts on the future of freight transportation in Arizona?

• How could different combinations of drivers manifest themselves in extreme, but plausible future scenarios for Arizona?

• What will be the likely effect of these drivers and related scenarios 25 years from now?

Reflect on these questions and come prepared to discuss them at the Scenario Planning workshop on November 5th.
Questions and Discussion

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For More Information on Scenario Planning for Freight

Arizona State Freight Plan: Enabling Economic Competitiveness and Growth

Policies, Strategies and Performance Measures

Freight Advisory Committee Meeting
August 19, 2015
Phoenix, AZ
Presentation Overview

Key findings from policies and strategies working paper

FAC input on work currently underway

Immediate next steps
Single broad policy: To increase the prominence of freight in ADOT planning and programming

Vision, goals, policies and strategies development process
### Key Findings – Policies and Strategies

**Six strategies:** Developed from policy to achieve goals and objectives of the freight plan

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>1</strong></td>
<td>Merit-Based Prioritization&lt;br&gt;Freight transportation system improvements to be prioritized on the basis of merit, in line with the goals and objectives of the Arizona State Freight Plan</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Preservation, Modernization, Expansion&lt;br&gt;Freight transportation system investments to prioritize asset preservation first, modernization to optimize the existing system second, and network expansion third</td>
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<tr>
<td><strong>3</strong></td>
<td>Key Commerce Corridors&lt;br&gt;Freight transportation system improvements to bolster the performance of Key Commerce Corridors</td>
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<tr>
<td><strong>4</strong></td>
<td>Improve Freight Information&lt;br&gt;Freight transportation system management to be informed on the basis of solid research, data and system performance monitoring</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Coordination, Partnerships, Communication&lt;br&gt;System planning and improvements to be coordinated with all stakeholders that have a role in enabling the goals and objectives of the Arizona State Freight Plan</td>
</tr>
<tr>
<td><strong>6</strong></td>
<td>Sustainable Freight Funding&lt;br&gt;Priority freight projects to have access to a dedicated and sustainable source of funding and seek to leverage partner funding and private capital, where appropriate</td>
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Key Findings – Policies and Strategies

• Next Step
  – Develop a decision making and project prioritization process
    • Built-on vision, goals, policies and strategies
• Central issue for consideration
  – How does the freight plan and projects fit into ongoing project evaluation and prioritization efforts within ADOT?
Presentation Overview

Key findings from policies and strategies working paper

FAC input on work currently underway

Immediate next steps
Working Paper 2: Inventory of State Freight Transportation System Assets

Designed to answer key questions

- How well is the transportation system performing?
- What are the chief mobility constraints affecting the transportation flow of Arizona supply chains?
- What is the nature and role of border gateway facilities and cross-border supply chains?
- What are the location and character of major clusters of warehousing, intermodal, and/or transload facilities?
- Which multimodal corridors connect major warehousing, terminal, and border freight activity clusters and how well do these facilities serve freight-dependent industries?
Key Findings – Highway

Concentrated traffic

Some localized congestion
Key Findings – Rail

Current constraints

- At-grade crossings and the border crossing at Nogales were cited as other bottlenecks in the rail system.

Traffic profile

- Annual carloads for short line railroads are approximately 105,000 compared with the Class I railroads’ total of 461,400 annual carloads.
Key Findings – Air

Key findings

- Phoenix Sky Harbor moves nearly 90 percent of all air cargo
- Tucson International Airport (TUS) handles nearly ten percent of the state’s air cargo

Sufficient air capacity

- Estimates suggest no new on-airport cargo infrastructure will be needed until 2031
- Highway access to air cargo facilities at PHX will need to be addressed

Overall decline in air cargo
Key Findings

- Over 85 percent of exports and 88 percent of imports use Nogales
- All rail traffic uses Nogales
- Congestion due to limited Port of Entry capacity

Declining trucking market share
- Increase in absolute number of trucks
- Decline in market share 1995-2014

Increasing rail market share
- Increase in absolute number of trains
- Increase in market share 1995-2014
- Nearly constant market share post-recession
Transportation funding is the greatest challenge going forward

- Transportation performance is projected to degrade over the next 25 years
  - Population growth, limited alternate routes and network redundancy
- $89 billion needed over the next 25 years for transportation infrastructure
Work Currently Underway – Phase 3

- Phase 3: Freight characteristics and economic context
  - Under review
  - Focus on top 10 sectors
  - Transportation needs/trends/issues
  - Defines explicit link between economy and system performance

Top 10 Sectors for Focus

- Wholesalers and Retailers
- Food and Beverage
- High-Tech Manufacturing
- General Manufacturing
- Transportation Equipment
- Transportation and Logistics
- Mining (except oil and gas)*
- Energy (oil and gas)*
- Agriculture*
- Forestry*
Work Currently Underway – Phase 3

- Geographic concentration
  - Identifies transportation flows
- Sector and statewide
  - Trends and outlook will inform scenarios

![Pie chart]

- Inflows to Arizona: $1,496 (19%)
- Outflows From Arizona: $2,889 (38%)
- Intra-Arizona Flows (Internal State Flows): $3,262 (43%)
Work Currently Underway – Phase 3

- Supply chain and infrastructure based analysis
  - Identifies transportation by sector
  - Highlights needed improvements
Phase 5: Condition and Performance Report

Phase Output: Set of performance measures, data and approaches to benchmark freight performance, inform improvement decisions and to measure progress

- Short-term focus
  - Identify actionable performance measures
  - Linked measures to freight plan goals

- Next steps
  - Develop baseline performance
  - Focus on strategic infrastructure
Phase 5: Industries use of Freight Performance Measures

- Which performance measures are used in your industry to assess supply chain performance?

- What are the most important performance measures for your supply chain (cost, speed, reliability, safety, environment)?

- Which infrastructure assets in Arizona increase the cost or variability in your supply chain?
Phase 5: Industries use of Freight Performance Measures

• Which private sources of data should ADOT use to assess system performance?

• How should ADOT communicate performance measures to industry?
Key findings from policies and strategies working paper

FAC input on work currently underway

Immediate next steps
Next FAC meeting

• Next FAC meeting November 5th
  – Focus on scenario planning development

• FAC input
  – What STEEP drivers could have the biggest impacts on the future of freight transportation in Arizona?
  – How could different combinations of drivers manifest themselves in extreme, but plausible future scenarios for Arizona?
  – What will be the likely effect of these drivers and related scenarios 25 years from now?
Working paper schedules

- Next working paper to be sent
  - Phase 2: Inventory on state freight transportation system assets, nodes and corridors
- Read through relevant sections and provide comments as needed about the validity of conclusions.
Questions and Discussion