

2016

FRA Rail Program Delivery

Meeting

Developments in Planning

Ryan Bash

Jessie Fernandez-Gatti

Peter Schwartz

Agenda

- ▶ CONceptual NETwork Connections Tool (CONNECT) Update
- ▶ Regional Planning Studies
 - ▶ Southwest Region
 - ▶ Midwest Region
- ▶ Service Planning and Alternatives Analysis Guidance

CONceptual NETwork Connections Tool (CONNECT)

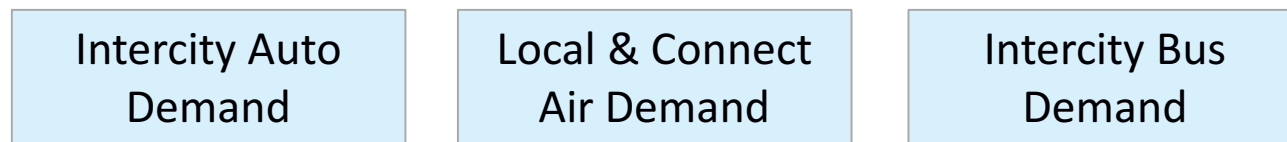
Ryan Bash

CONNECT is a sketch planning tool

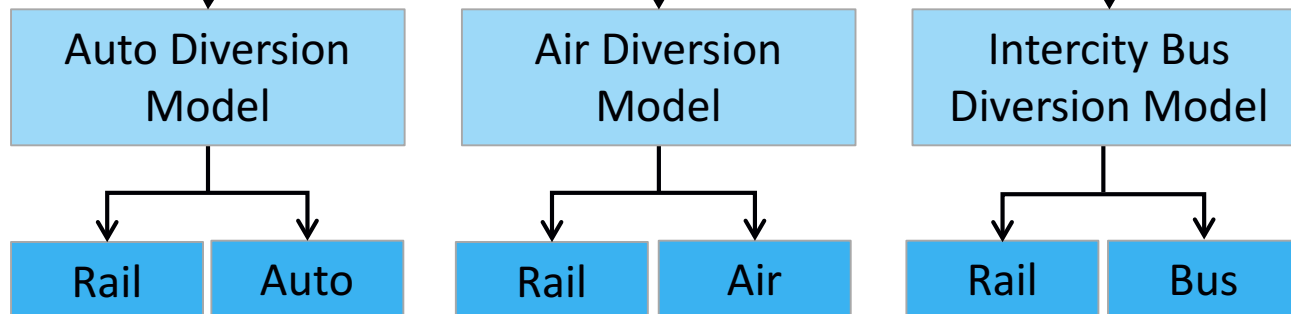
- ▶ Originally developed in 2012
- ▶ Estimates the overall performance of user-defined corridors and networks
- ▶ Intended for use at the outset of the planning process
- ▶ Enables the user to:
 - ▶ Describe a potential network,
 - ▶ Develop high-level service plans,
 - ▶ Generate operational data, and
 - ▶ Estimate the financial and operational performance of the network

Inputs/Outputs

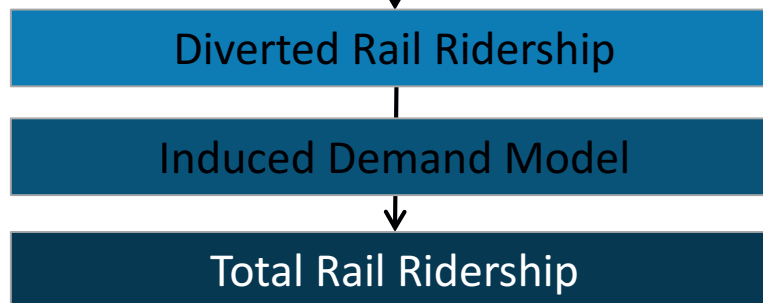
Stage 1:
Demand
Models



Stage 2:
Mode
Choice
Models



Stage 3:
Induced
Demand
Model



Early stages of HSIPR planning

- ▶ A quantitative basis for decision making
- ▶ Enables comparisons between alternative configuration and service options
- ▶ “Coarse screen” to help stakeholders identify the compelling options from a range of scenarios
- ▶ Can provide a sense of the importance of connecting markets and their potential impact on a corridor
- ▶ Analyzes CBSA pairs between 50 to 800 miles
- ▶ Accounts for potential markets outside of the detailed study area

Existing Features

- ▶ Network and service plan definition
- ▶ Travel demand and revenue
- ▶ Operating & maintenance cost
- ▶ Capital cost - new infrastructure and upgrades of existing infrastructure
- ▶ Financial performance - cost recovery, revenue analysis, and intercity travel market share

Define/Update Network

C1 | C2 | C3 | +

CBSA Service Characteristics

	CBSA Name	Express Service	Airport Connection
CBSA 1	Richmond, VA	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 2	Raleigh	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 3	Charlotte	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 4	Atlanta	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CBSA 5		<input type="checkbox"/>	<input type="checkbox"/>
CBSA 6		<input type="checkbox"/>	<input type="checkbox"/>
CBSA 7		<input type="checkbox"/>	<input type="checkbox"/>
CBSA 8		<input type="checkbox"/>	<input type="checkbox"/>
CBSA 9		<input type="checkbox"/>	<input type="checkbox"/>
CBSA 10		<input type="checkbox"/>	<input type="checkbox"/>

Corridor Service Characteristics

Service Type	Daily All-stop Trains	Daily Express Trains
Emerging	4	4
Regional	4	4
Core Express	4	4

Clear Corridor

OK Cancel

Current Updates

- ▶ Refresh the underlying database
- ▶ Incorporate intercity bus mode
- ▶ Extend the study area geography beyond the continental US to portions of Canada and Mexico
- ▶ Enable the tool to analyze 15 study corridors
- ▶ Add high-level cartographic output functionality
- ▶ Add benefit-cost analysis (BCA) functionality



Instructions

- STEP 0** Enable Macros (See CONNECT User Manual or Excel Help Menu For Instructions)
- STEP 1** Press the "Begin" button above or go to *Define Corridors* tab and press "Enter/Define Corridor Inputs" button
- STEP 2** Enter market and service inputs into user form
- STEP 3** Enter corridor physical inputs in *Corridor Segments* tab
- STEP 4** Press "Update Corridor Segment Inputs"
- STEP 5** Adjust Advanced Settings if desired
- STEP 6** Select analysis mode in *CONNECT menu*

For further instructions, please refer to the CONNECT User's Manual.

CONNECT overview and instructions page

The screenshot shows the Microsoft Excel interface for the CONNECT.xlsm spreadsheet. The ribbon includes File, Home, SDG, Insert, Page Layout, Formulas, Data, Review, View, Developer, and CONNECT. The CONNECT ribbon contains buttons for: Define/Edit Network, Edit Segment Info, Edit Advanced Settings, Network Configuration, Summary Run, Detailed Run, Run, Custom Sensitivity Analysis, Benefit-Cost Analysis, Analysis, Launch Interactive Map, Export KML, and Cartographic Outputs.

The spreadsheet content includes:

- CONNECT BETA VERSION** logo and title.
- CONCEPTUAL NETWORK CONNECTIONS TOOL** subtitle.
- CONNECT Sheet Reference** table with the following data:

Sheet Color	Tool Element
BLACK	TOOL OVERVIEW
YELLOW	USER INPUTS
RED	DASHBOARD AND SUMMARY OUTPUTS
GREEN	GRAPHICAL OUTPUTS
DARK BLUE	O&M / CAPITAL OUTPUT SUMMARIES
PURPLE	RIDERSHIP/NETWORK OUTPUTS
- Instructions** section with the following steps:
 - STEP 0** Enable Macros (See CONNECT User Manual or Excel Help Menu For Instructions)
 - STEP 1** Press the "Begin" button above or go to *Define Corridors* tab and press "Enter/Define Corridor Inputs" button
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 - STEP 3** Enter corridor physical inputs in *Corridor Segments* tab
 - STEP 4** Press "Update Corridor Segment Inputs"
 - STEP 5** Adjust Advanced Settings if desired
 - STEP 6** Select analysis mode in *CONNECT* menu
- Footer text: **For further instructions, please refer to the CONNECT User's Manual.**
- Navigation tabs at the bottom: Overview (selected), Define Corridors, Corridor Segments, Advanced Settings.

User-defined corridors and network

CBSA	CBSA Name	CBSA ID	Status	2015 Population	2055 Population	Express Service to Major Station?	Service to Airport	Straight from Pi
1	Richmond, VA	40060	Start	1,234,058	2,003,759	Y		
2	Raleigh	39580	Intermediate	1,189,579	2,536,946	Y		
3	Charlotte	16740	Intermediate	2,298,915	4,183,761	Y		
4	Atlanta	12060	End	5,455,053	9,529,197	Y		
Total		4		10,177,605	18,253,663			

All numbers are fictitious and are presented for illustrative purpose only

Define/Update Network

C1 | C2 | C3 | +

CBSA Service Characteristics

CBSA Name	Express Service	Airport Connection
CBSA 1: Richmond, VA	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 2: Raleigh	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 3: Charlotte	<input checked="" type="checkbox"/>	<input type="checkbox"/>
CBSA 4: Atlanta	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CBSA 5	<input type="checkbox"/>	<input type="checkbox"/>
CBSA 6	<input type="checkbox"/>	<input type="checkbox"/>
CBSA 7	<input type="checkbox"/>	<input type="checkbox"/>
CBSA 8	<input type="checkbox"/>	<input type="checkbox"/>
CBSA 9	<input type="checkbox"/>	<input type="checkbox"/>
CBSA 10	<input type="checkbox"/>	<input type="checkbox"/>

Corridor Service Characteristics

Service Type	Daily All-stop Trains	Daily Express Trains
Emerging	4	4
Regional	4	4
Core Express	4	4

Clear Corridor

OK Cancel

User-defined corridor segment inputs

CONNECT - Microsoft Excel

File Home SDG Insert Page Layout Formulas Data Review View CONNECT

Calibri 14 A A Wrap Text General

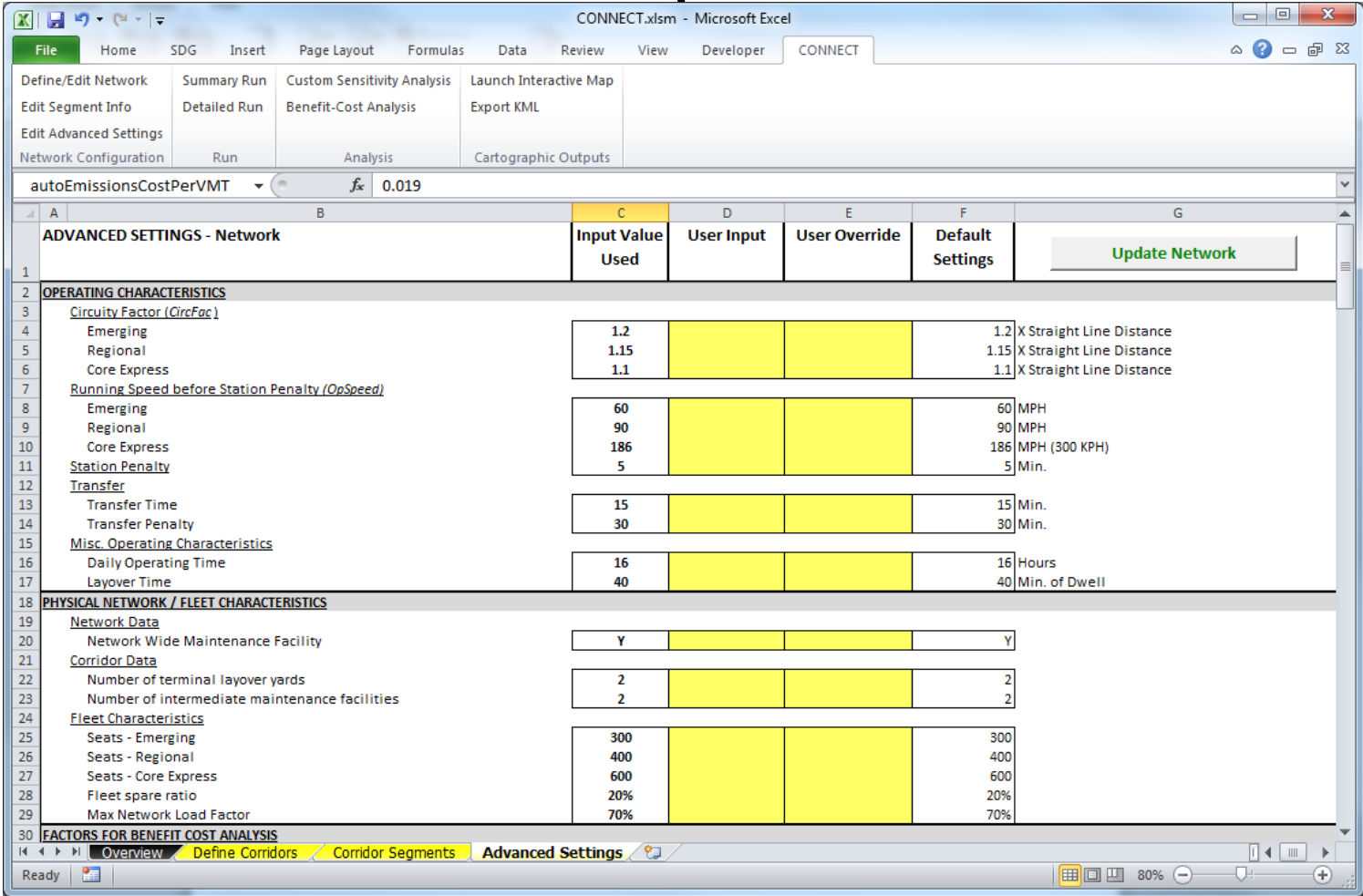
Clipboard Font Alignment Number Styles Cells Editing

C2

Update Corridor Segment Inputs		Clear All Corridor Segment Inputs											
PRIMARY CORRIDOR Emerging					Corridor Length/Circuity		Corridor ROW Distribution			New Alignment ROW Acquisition			
Number	Corridor Segment	Seg. ID	Straight Line Distance	Intermediate Stations on Segment	Circuity Factor	Route Miles	New Alignment	Existing RR	Total	Public ROW	New Acquisition - Rural	New Acquisition - Urban	Total
1	Raleigh-Richmond, VA	39580-40060	139		1.2	167	0%	100%	100%	100%	0%	0%	100%
2	Charlotte-Raleigh	16740-39580	130		1.2	156	0%	100%	100%	100%	0%	0%	100%
3	Atlanta-Charlotte	12060-16740	226		1.2	271	0%	100%	100%	100%	0%	0%	100%
4							0%	100%	100%	100%	0%	0%	100%
5							0%		0%				0%
6							0%		0%				0%
7							0%		0%				0%
8							0%		0%				0%
9							0%		0%				0%
PRIMARY CORRIDOR Regional					Corridor Length/Circuity		Corridor ROW Distribution			New Alignment ROW Acquisition			
Number	Corridor Segment	Seg. ID	Straight Line Distance	Intermediate Stations on Segment	Circuity Factor	Route Miles	New Alignment	Existing RR	Total	Public ROW	New Acquisition - Rural	New Acquisition - Urban	Total
1	Raleigh-Richmond, VA	39580-40060	139		1.15	160	0%	100%	100%	100%	0%	0%	100%
2	Charlotte-Raleigh	16740-39580	130		1.15	150	0%	100%	100%	100%	0%	0%	100%
3	Atlanta-Charlotte	12060-16740	226		1.15	260	0%	100%	100%	100%	0%	0%	100%
4							0%	100%	100%	100%	0%	0%	100%
5							0%		0%				0%
6							0%		0%				0%
7							0%		0%				0%
8							0%		0%				0%
9							0%		0%				0%
PRIMARY CORRIDOR Core Express					Corridor Length/Circuity		Corridor ROW Distribution			New Alignment ROW Acquisition			
Number	Corridor Segment	Seg. ID	Straight Line Distance	Intermediate Stations on Segment	Circuity Factor	Route Miles	New Alignment	Existing RR	Total	Public ROW	New Acquisition - Rural	New Acquisition - Urban	Total
1	Raleigh-Richmond, VA	39580-40060	139		1.1	153	0%	100%	100%	100%	0%	0%	100%

Ready | Define Corridors | Corridor Segments | Advanced Settings | 70%

Users can modify default assumptions

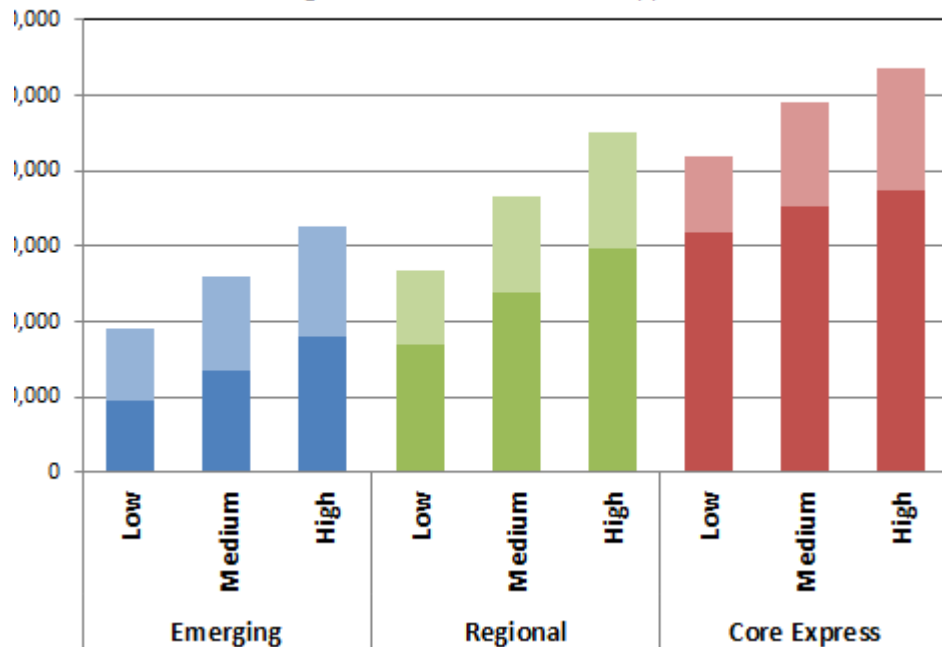


Dashboard and Summary Outputs

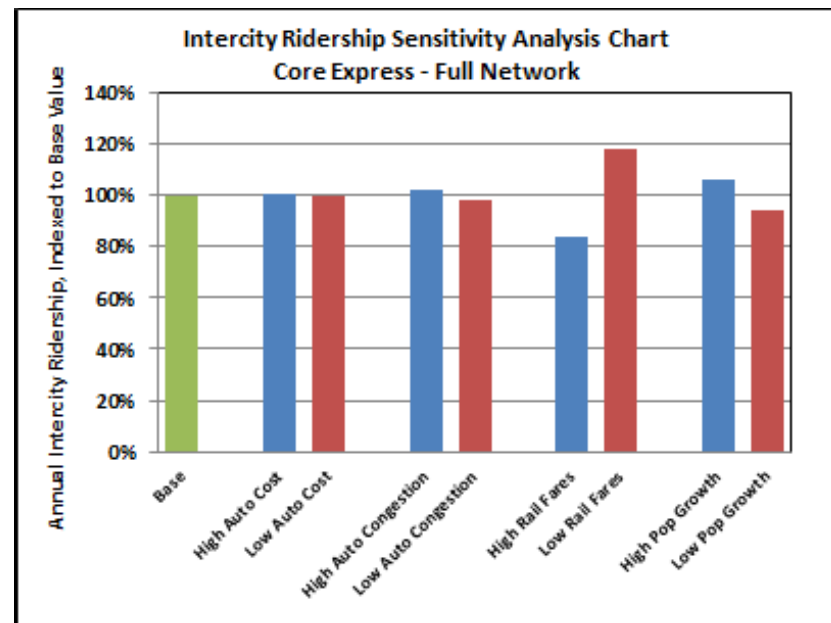
		Primary Analysis Corridor:			Richmond, VA-Atlanta		
		EMERGING Range for Each Output Low - Medium - High			REGIONAL Range for Each Output Low - Medium - High		
Performance of Primary Corridor in Standalone Context							
Frequency - All Stop		4			4		
Frequency - Express		4			4		
Ridership (Annual Passengers)		1,000,000	1,400,000	1,800,000	1,700,000	2,400,000	3,000,000
O&M Cost Recovery Ratio		0.34	0.58	0.94	0.77	1.29	1.93
Initial Capital Investment		\$3,506,000,000	\$3,522,500,000	\$3,539,000,000	\$2,976,000,000	\$3,317,500,000	\$3,659,000,000
Annual Ticket Revenue		\$39,517,496	\$59,000,000	\$83,000,000	\$116,000,000	\$173,000,000	\$226,000,000
Annual O&M Cost						\$134,000,000	\$151,000,000
Annual O&M Profit/(Subsidy)						\$39,000,000	\$109,000,000
Annual O&M Subsidy/Passenger-Mile						-	-
Rail Share of Total Intercity Travel M:						13%	
		Richmond, VA-Atlanta			Forecast year:	2055	
		REGIONAL Range for Each Output Low - Medium - High			CORE EXPRESS Range for Each Output Low - Medium - High		
Performance of Primary Corridor in Network C							
Ridership (Annual Passengers)		4			4		
O&M Cost Recovery Ratio		4			4		
Initial Capital Investment		4			4		
Annual Ticket Revenue		1,700,000	2,400,000	3,000,000	3,200,000	3,500,000	3,700,000
		0.77	1.29	1.93	1.71	2.15	2.58
		\$2,976,000,000	\$3,317,500,000	\$3,659,000,000	\$3,114,000,000	\$3,114,000,000	\$3,114,000,000
		\$116,000,000	\$173,000,000	\$226,000,000	\$377,000,000	\$425,000,000	\$452,000,000
		\$117,000,000	\$134,000,000	\$151,000,000	\$175,000,000	\$198,000,000	\$221,000,000
		(\$35,000,000)	\$39,000,000	\$109,000,000	\$156,000,000	\$227,000,000	\$277,000,000
		\$0.07	-	-	-	-	-
			13%			19%	
		1,700,000	2,500,000	3,100,000	3,300,000	3,700,000	4,000,000
		0.79	1.34	2.03	1.77	2.26	2.75
		\$2,916,000,000	\$3,300,000,000	\$3,599,000,000	\$3,084,000,000	\$3,100,000,000	\$3,084,000,000
		\$118,000,000	\$177,000,000	\$234,000,000	\$383,000,000	\$436,000,000	\$467,000,000
		\$115,000,000	\$132,000,000	\$149,000,000	\$170,000,000	\$193,000,000	\$216,000,000
		(\$31,000,000)	\$45,000,000	\$119,000,000	\$167,000,000	\$243,000,000	\$297,000,000
		-	-	-	-	-	-

Graphical Output

Annual Intercity Ridership by Scenario
 (Dark Color - Primary Corridor Standalone Context;
 Light Color Full Network Ridership)



All numbers are fictitious and are presented for illustrative purpose only



Detailed Ridership Outputs

Annual Intercity Fare Revenue by CBSA Pair - Tentative and Preliminary - For Discussion Purposes Only

All CBSA Pairs on Full Network (All figures presented in 2015 \$)

ID	CBSA Pair	Emerging			Regional		
		Low	Medium	High	Low	Medium	High
		Total	Total	Total	Total	Total	Total
12060-16740	Atlanta-Charlotte	\$24,035,959	\$31,432,268	\$36,967,921	\$50,897,991	\$58,789,375	\$64,600,000
12060-16860	Atlanta-Chattanooga	\$4,161,829	\$5,121,229	\$5,980,884	\$4,161,829	\$5,121,229	\$5,980,884
12060-27260	Atlanta-Jacksonville, FL	\$796,584	\$1,934,371	\$4,372,699	\$796,584	\$1,934,371	\$4,372,699
12060-31420	Atlanta-Macon, GA	\$215,292	\$233,666	\$248,343	\$215,292	\$233,666	\$248,343

Annual Intercity Ridership by Segment - Tentative and Preliminary - For Discussion Purposes Only

Primary Corridor Only Standalone Context

Corridor(s)	ID	Segment Name	Emerging			Regional		
			Low	Medium	High	Low	Medium	High
1	12060-16740	Atlanta-Charlotte	624,357	968,166	1,390,813	1,277,366	1,920,800	2,490,000
1	16740-39580	Charlotte-Raleigh	320,336	523,267	842,114	819,172	1,359,386	1,860,000
1	39580-40060	Raleigh-Richmond, VA	176,518	226,801	327,634	318,351	635,113	1,050,000

Annual Intercity Load Factor by Segment - Tentative and Preliminary - For Discussion Purposes Only

Full Network (All figures presented in 2015 \$)

Corridor(s)	ID	Segment Name	Emerging			Regional		
			Low	Medium	High	Low	Medium	High
1	12060-16740	Atlanta-Charlotte	36.4%	57.3%	84.3%	55.9%	85.6%	113.2%
2	12060-16860	Atlanta-Chattanooga	41.2%	51.7%	59.7%	42.0%	53.8%	62.8%
3	12060-31420	Atlanta-Macon, GA	9.9%	15.4%	20.0%	10.1%	15.6%	20.5%
1	16740-39580	Charlotte-Raleigh	18.5%	30.3%	48.9%	35.4%	58.9%	81.2%
2	16860-34980	Chattanooga-Nashville	33.9%	41.8%	47.3%	34.2%	43.2%	49.5%
3	27260-42340	Jacksonville, FL-Savannah, GA	2.2%	3.7%	6.6%	2.3%	3.8%	6.7%
3	31420-42340	Macon, GA-Savannah, GA	9.3%	14.6%	19.2%	9.4%	14.8%	19.6%
1	39580-40060	Raleigh-Richmond, VA	10.1%	13.1%	18.9%	13.7%	27.4%	45.8%

Cost Outputs

Corridor	Service Type	Start	End	Network Context (service Corridor)		Network Context (service Corridor)	
				Primary: Emerging		Primary: Regional	
				Low	High	Low	High
1	Core Express	Richmond, VA	Atlanta	\$3,386,000,000	\$3,419,000,000	\$2,916,000,000	\$3,599,000,000
2	Emerging	Atlanta	Nashville	\$2,118,000,000	\$2,147,000,000	\$2,088,000,000	\$2,117,000,000
3	Emerging	Atlanta	Jacksonville, FL	\$3,053,000,000	\$3,100,000,000	\$3,023,000,000	\$3,070,000,000

O&M Cost

Primary Corridor Only Standalone Context

Corridor	Start	End	Emerging		Regional	
			Low	High	Low	High
			1	Richmond, VA	Atlanta	\$88,000,000

Capital Cost

Primary Corridor Only Standalone Context

Corridor	Start	End	Emerging		Regional	
			Low	High	Low	High
			1	Richmond, VA	Atlanta	\$3,506,000,000

Annual Capital Cost

Primary Corridor Only Standalone Context (All figures presented in 2015 \$)

Corridor	Start	End	Emerging		Regional	
			Low	High	Low	High
			1	Richmond, VA	Atlanta	\$144,000,000

Benefit-Cost Outputs

- ▶ Generates a user-defined time stream of project annual benefits and costs
- ▶ Discounted benefit-cost ratio and NPV
- ▶ Methodology follows FRA Guidance

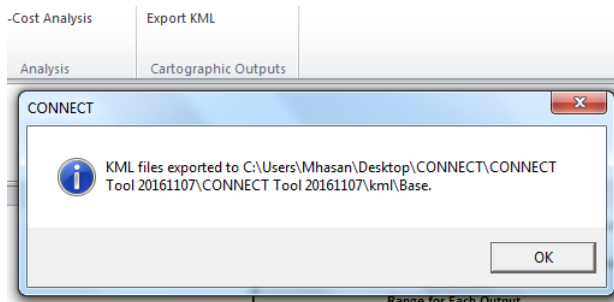
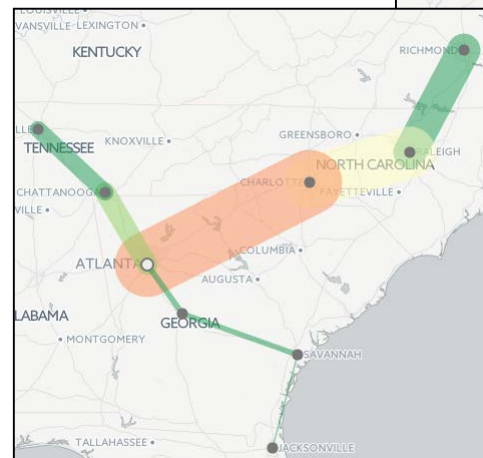
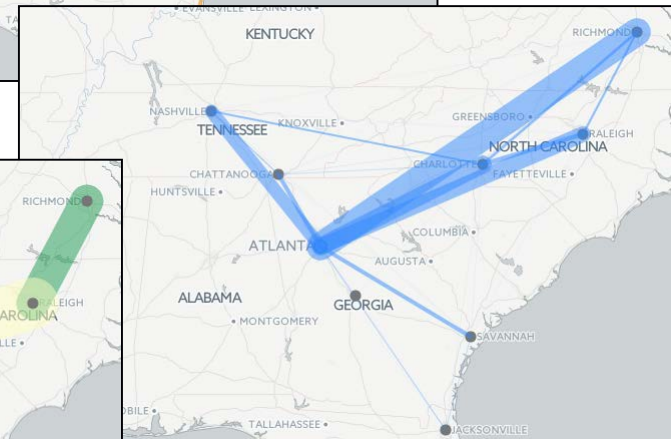
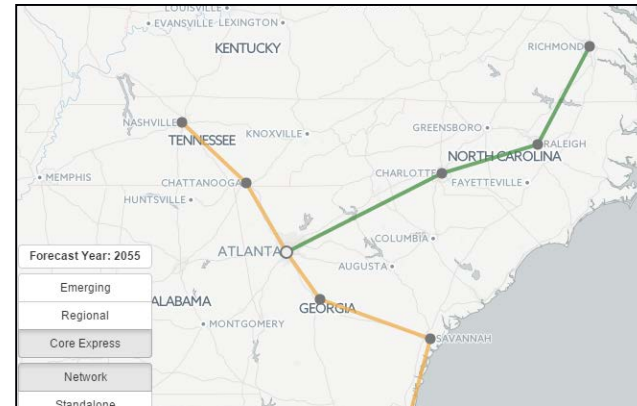
Benefit-Cost Analysis Network Context					
Low Scenario					
Year	Benefits	Costs	Construction Costs	Net Benefits	Discounted Benefits
2017	\$ -	\$ -	\$ 1,405,000,000	\$ (1,405,000,000)	\$ (1,629,000,000)
2018	\$ -	\$ -			
2019	\$ -	\$ -			
2020	\$ -	\$ -			
2021	\$ -	\$ -			
2022	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (273,000,000)
2023	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (265,000,000)
2024	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (257,000,000)
2025	\$ 7,000,000	\$ 279,000,000	\$ -	\$ (272,000,000)	\$ (249,000,000)
2026	\$ 7,000,000	\$ 279,000,000	\$ -	\$ (272,000,000)	\$ (242,000,000)

High Scenario					
Year	Benefits	Costs	Construction Costs	Net Benefits	Discounted Benefits
2017	\$ -	\$ -	\$ 1,391,000,000	\$ (1,391,000,000)	\$ (1,613,000,000)
2018	\$ -	\$ -	\$ 1,391,000,000	\$ (1,391,000,000)	\$ (1,566,000,000)
2019	\$ -	\$ -	\$ 1,391,000,000	\$ (1,391,000,000)	\$ (1,520,000,000)
2020	\$ -	\$ -	\$ 1,391,000,000	\$ (1,391,000,000)	\$ (1,476,000,000)
2021	\$ -	\$ -	\$ 1,391,000,000	\$ (1,391,000,000)	\$ (1,433,000,000)
2022	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (273,000,000)
2023	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (265,000,000)
2024	\$ 6,000,000	\$ 279,000,000	\$ -	\$ (273,000,000)	\$ (257,000,000)
2025	\$ 7,000,000	\$ 279,000,000	\$ -	\$ (272,000,000)	\$ (249,000,000)
2026	\$ 7,000,000	\$ 279,000,000	\$ -	\$ (272,000,000)	\$ (242,000,000)

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Cartographic Outputs

- ▶ Users can view ridership, revenue, and cost details on interactive maps at a CBSA, segment, or corridor level
- ▶ Users can export standard GIS files into GIS software of the user's choice for further processing



Limitations

- ▶ Intentionally applies approximate and simplified methods
- ▶ Only appropriate for early-stage planning
- ▶ High-level service plan assumptions used
- ▶ Coarse representation of a particular rail corridor or network
- ▶ Coarse geographic representation
- ▶ Capital cost calculations consist of a very simplified costing model
- ▶ All outputs in CONNECT are presented in ranges

CONNECT Summary

- ▶ Intended for use at the outset of the planning process before detailed alignment and operational plans are developed
- ▶ Expanded functionality for 2016
- ▶ Goal to expand use and usability of CONNECT Tool

Regional Planning Update

Jessie Fernandez Gatti

FRA Regional Planning Studies:

- ▶ **Southeast** (Fall 2017)
- ▶ **Midwest** (Winter 2018)
- ▶ **Southwest** (2014)

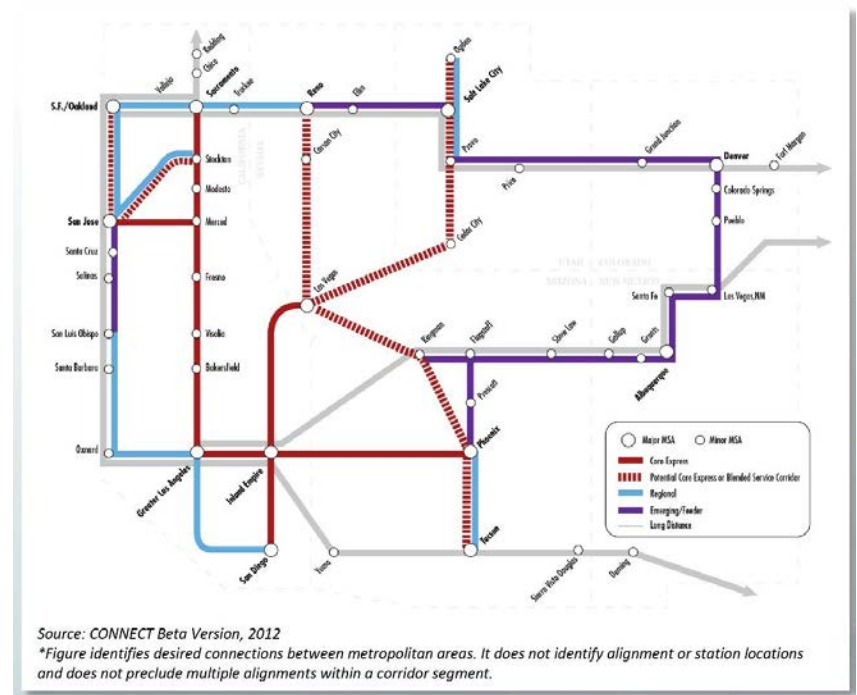


Study Goals

- ▶ Develop conceptual, multi-state rail network
- ▶ Identify institutional/ governance models to implement network vision

Study Purpose

- ▶ Long-Term Vision
- ▶ Feeds National Rail Planning Objectives
- ▶ Supports State and Local Planning
- ▶ New Tier 1 Studies



Study Framework

- ▶ Long-Range Planning Horizon
 - ▶ 2040/2050 Planning Horizon
- ▶ Integrated Network
 - ▶ Multi-Modal Connections
 - ▶ System impacts to other modes
- ▶ High-Level Network Design Concepts
 - ▶ Travel Demand- Corridor Connections
 - ▶ No Alignments

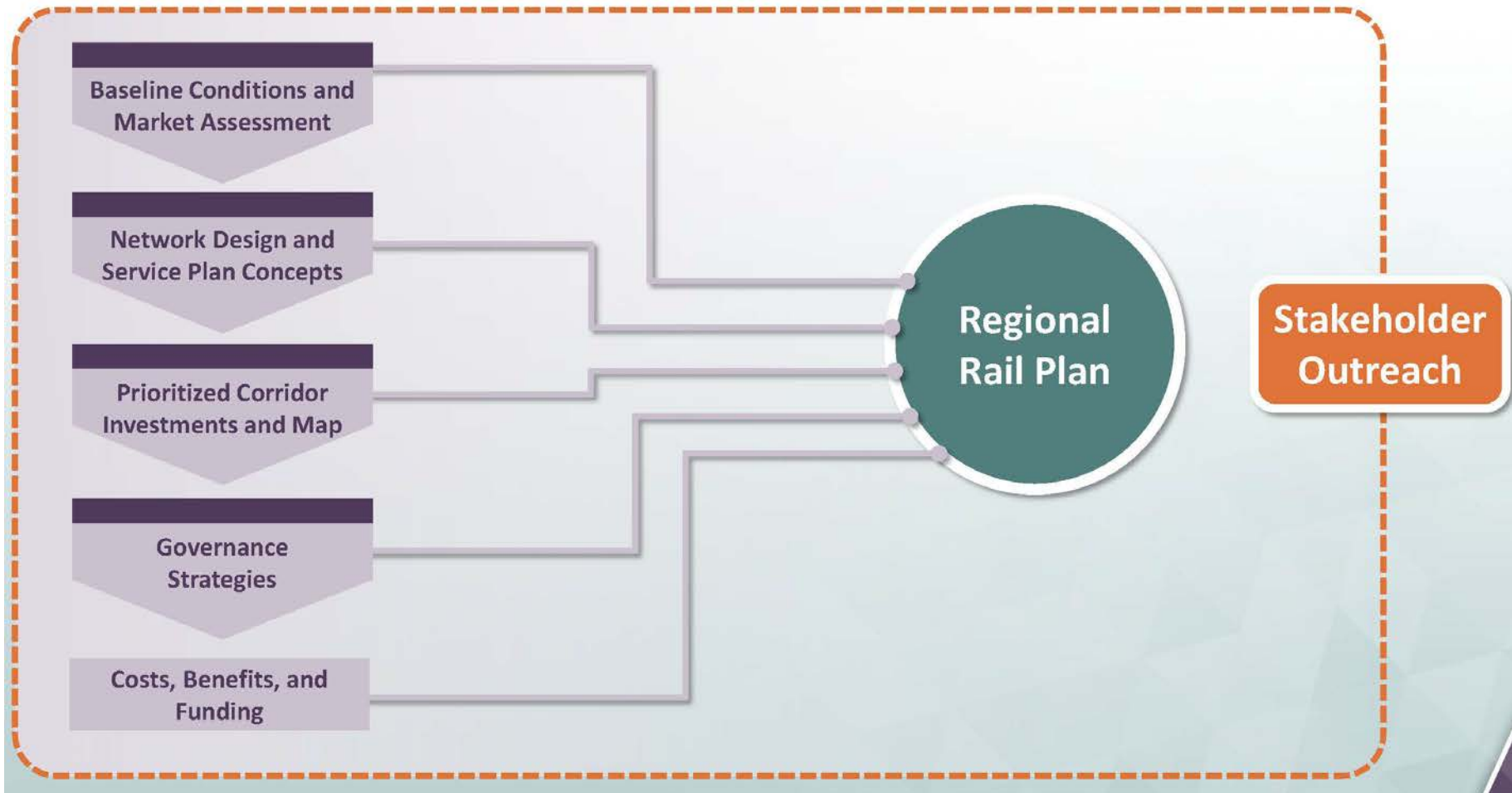
Governance Model

- ▶ Identify governance model to implement regional rail network:
- ▶ Phases of implementation:
 - ▶ Planning & Funding
 - ▶ Design & Construction
 - ▶ Operations and Maintenance
- ▶ Research models and develop criteria to evaluate

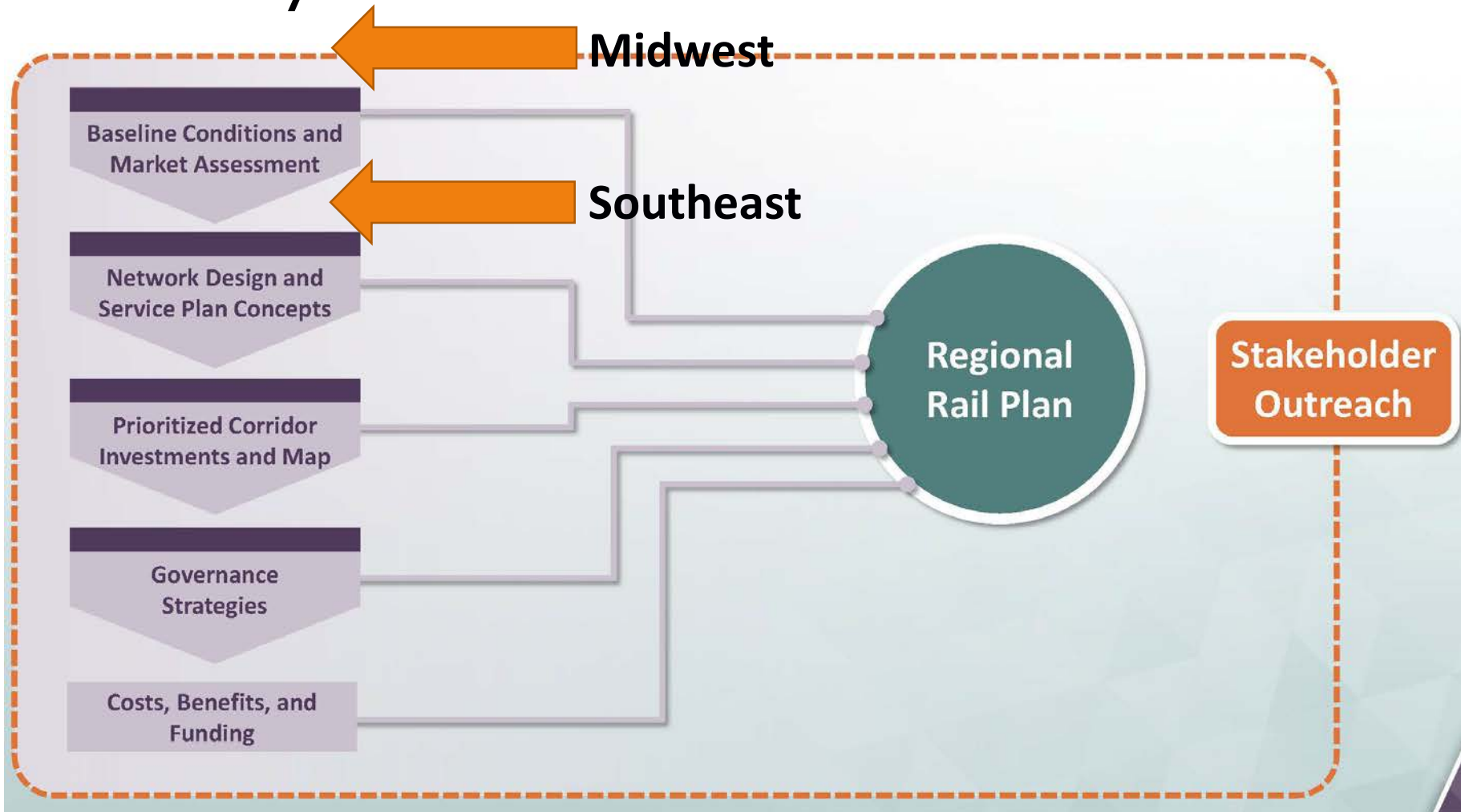
Regional Rail Planning to Operations - Phases -



Study Process



Study Process



Upcoming Activities

- ▶ Midwest 1st Workshop, February 2017
 - ▶ Baseline Conditions and Market Analysis
- ▶ Southeast 2nd Workshop, December 2016
 - ▶ Confirm Opportunities and Constraints
 - ▶ CONNECT Demonstration
 - ▶ Candidate Corridors for CONNECT Analysis
- ▶ Volpe
 - ▶ Internal and External Regional Rail Planning Guidance

Service Planning and Alternatives Analysis Guidance

Peter Schwartz

Need for Overarching Service Development Guidance

- ▶ The bridge between “service objectives” and a detailed service and investment plan
- ▶ Service Planning and Alternatives Analysis working hand-in-hand
- ▶ Addressing two major elements of service planning methodology
 - ▶ Decision-making framework
 - ▶ Technical analysis

Alternatives Analysis (AA)

- ▶ Purpose and Need to support decision-making
- ▶ What constitute “alternatives” for a rail project?
 - ▶ Route
 - ▶ Service
 - ▶ Investments
 - ▶ Design
- ▶ Relationship between AA and the NEPA process
 - ▶ Range of “reasonable alternatives”
 - ▶ Timing of AA and NEPA
- ▶ Methods for establishing alternatives as “reasonable,” or not

Service Planning

- ▶ Technical analysis supporting service development and AA
- ▶ General overview of component elements of service planning
- ▶ Emphasis on iterative nature of service planning, and relationships between various components
- ▶ Detailed guidance for two high-priority elements
 - ▶ Demand forecasting
 - ▶ Operations Analysis for infrastructure requirements

Estimated Roll-Out

- ▶ Alternatives Analysis
 - ▶ Fall/Winter 2017
- ▶ Service Planning
 - ▶ Winter 2017/Spring 2018

2016

FRA Rail Program Delivery

Meeting

Thank you!

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