metroplan orlando
A REGIONAL TRANSPORTATION PARTNERSHIP

2045

Metropolitan Transportation Plan

Technical Series #8

Scenario Planning -

Background & Development

Adopted: 12/09/2020

What is in this document?

This technical series outlines the process for identifying four potential futures to guide the development of the MetroPlan Orlando 2045 Metropolitan Transportation Plan (MTP). This document includes an overview of the methodology, data analysis, key drivers, and results of the scenario development process used to identify the four potential futures – Traditional Trends, Disruption Dilemmas, Technology Transformations, and Climate Consequences.

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Introduction

A scenario planning exercise was conducted to support the development of the MetroPlan Orlando 2045 Metropolitan Transportation Plan (MTP). This process identified a variety of potential futures based on a detailed analysis of trends and uncertainties, and evaluated needs, priorities, and strategies against each of these futures. Scenario planning allows the region to "future proof" the MTP, incorporating strategies and projects that apply to a range of potential outcomes and ensuring the prosperity of the region.

Scenario Planning Development

Previous MetroPlan Orlando MTPs – formerly long range transportation plans (LRTPs) – were primarily focused on evaluating roadway volume and capacity metrics, which ultimately produced a list of needs and projects focused on roadway capacity improvements. While effective for identifying and programming projects that resolve highway capacity challenges, this process may not fully capture the impacts associated with changing market forces. MetroPlan Orlando turned to a scenario planning process to evaluate a wider range of needs and opportunities than have been considered in previous MTPs. Scenario planning allows an MPO to better understand the forces driving change, approaches for how to quantify and manage change, and to inform strategic, long-term decisions to navigate such change.

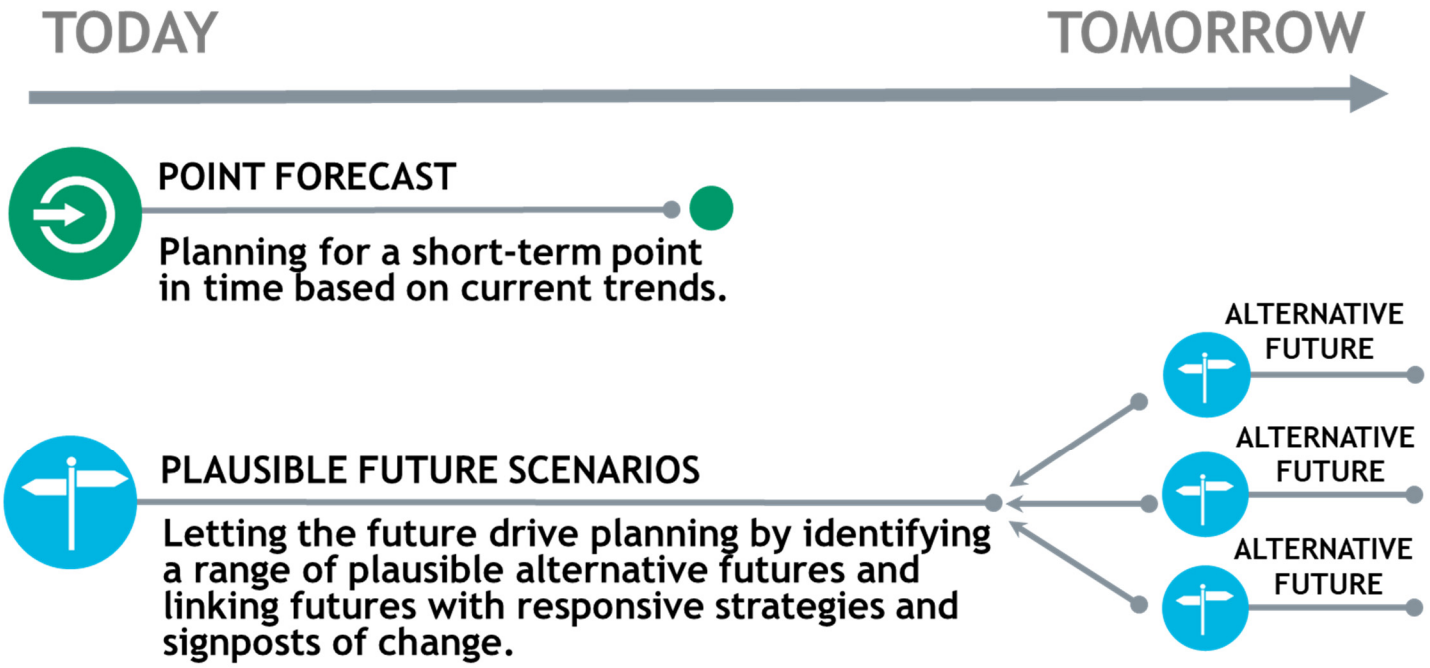
Scenario planning can be applied in a variety of ways and can describe a series of futures shaped by economic, environmental, land use, technology, demographic, and other forces which affect growth and transportation demand, and transportation patterns. A good scenario should be plausible, internally consistent, and challenging for strategic purposes. It should describe the fundamental drivers that create future uncertainty and convey the risk of relying on traditional forecasts and methods. It also should allow decision makers and the public to see the future in new ways and question their unspoken assumptions. Successful scenario planning involves engaging stakeholders, management teams, leadership, partners, and the public on a broad scale through a discussion of trends and trade-offs that captures and incorporates values and feedback into future plans.

Ultimately, scenario planning allows for the identification of strategies, policies, and projects that apply in multiple potential futures, advance desirable outcomes of potential futures, and mitigate negative impacts of potential futures. Figure 8.1 illustrates a typical planning approach compared with a scenario planning approach[1].

MetroPlan Orlando has identified the following four steps to develop and apply scenarios to the 2045 MTP Figure 8.2 The scenario planning process does not need to result in a preferred scenario, but instead, can be a valuable tool for evaluating potential strategies and projects against a range of potential futures. Understanding a range of potential futures allows for a more robust evaluation of needs, strategies, and projects, prioritizing those that make sense for all potential futures, advancing the most beneficial elements of some potential futures, or mitigating the risks associated with other. The evaluation of needs, strategies, and projects against multiple futures can lead to a long-range transportation plan that is resilient to a range of potential outcomes.

[1] NCHRP Report 750: Strategic Issues Facing Transportation, Volume 1: Scenario Planning for Freight Transportation Infrastructure Investment

Figure 8.1 | Scenario Planning Illustration



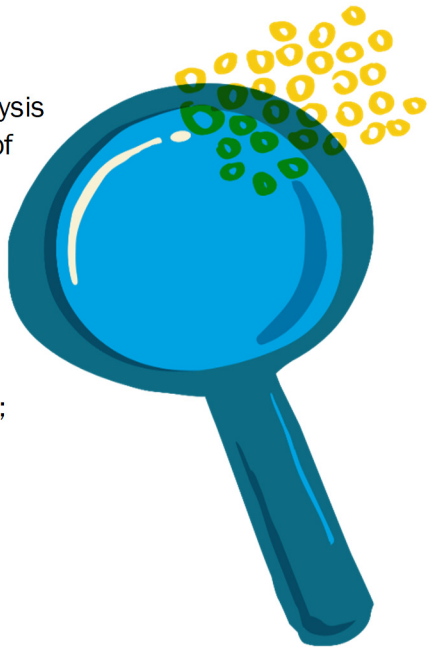
Source: NCHRP Report 750: Strategic Issues Facing Transportation, Volume 1: Scenario Planning for Freight Transportation Infrastructure Investment

Figure 8.2 |2045 MTP: Scenario Planning Steps

1. Where are we today?	Historic Trends and Existing Conditions
2. Where could we be going?	Signs of Change and Plausible Futures
3. How do we prepare?	Potential Needs, Impacts, and Indicators
4. What's our best path?	Robust Strategies and Priority Projects

Source: Cambridge Systematics, 2020

Data Collection and Analysis



The scenario development process began with extensive data collection and analysis to understand the national, state, and regional trends impacting the future of transportation in Central Florida. MetroPlan Orlando developed a comprehensive database of regional trends and conditions that was used as a foundation for the development of potential futures, including:

- Roadway network by functional class, number of lanes, annual average daily traffic (AADT), pavement condition, and travel speeds;
- Multimodal network, sidewalk/trail network, transit network, and rail network;
- Population and socioeconomic information;
- Visitor information;
- Truck bottlenecks;
- Regional activity centers;
- Land use and conservation areas; and
- Crash Data.

Trends at the global, national, and state levels were evaluated to gain a better understanding of how the MetroPlan Orlando region is impacted by large scale shifts due to technology and innovation, demographics, the economy, and climate. In addition to trends and conditions, the 2045 MTP Goals, Objectives, and Indicators were evaluated to inform the development of the potential futures. Each of the four potential futures were developed with the understanding that the region is focused on:

- Providing a safe and secure transportation system for all users;
- Leveraging innovative solutions to optimize system performance and improve transportation reliability;
- Enhancing communities through improved access and connectivity to opportunities;
- Protecting and preserving the region's public health and environment; and
- Supporting economic prosperity through strategic transportation investment.

Key Drivers

As detailed in Technical Series # 8; six key drivers emerged as having the greatest impact on the region's future:

- Population - How many new people can the region expect and how quickly will they arrive? Will there be a shift in the region's demographic makeup? Where will these new residents come from?
- Economy – What core industries will make up the backbone of the region's economy and how will shifting industry clusters impact transportation?
- Visitation – How many visitors can the region expect and where will they come from? How will they get to the region and how will they get around once they arrive? Will the major destinations remain the same or will new destinations emerge?
- Technology – How will technology and innovation impact the transportation system? Will automated and connected vehicles reduce or eliminate crashes and improve efficiency? How will cybersecurity impact safety concerns? Will the increasing ease of travel contribute to higher vehicle miles traveled and more congestion? Will improved broadband connectivity lead to increased telework/working from home?
- Land Use and Development – How will land use decisions made today impact the transportation system of the future and vice versa? How should land use and transportation best be integrated to help guide our future?
- Climate – How will the impacts of extreme weather events, rising temperatures, rising sea levels, flooding, and other risks affect the region's transportation system?

A range of potential outcomes and how those outcomes could impact the region were identified for each key driver. Each potential future identified in this scenario planning process was developed based on adjustments to these key drivers to better understand the potential impacts of changes in population, economy, visitation, technology, land use, and climate on the region.

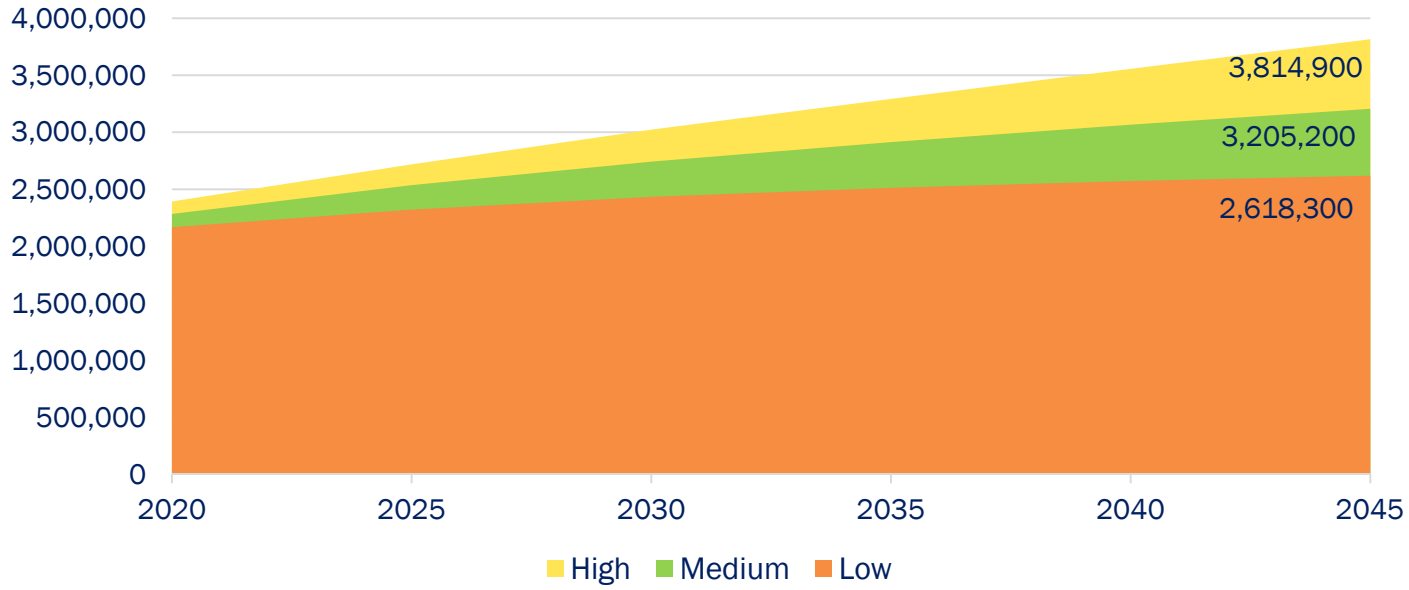
Population

The region's population is perhaps the most critical driver, as it impacts nearly every other key driver across all four potential futures. Changes in population are closely tied to the region's economic prosperity, land use, and development patterns. Where this population chooses to live and how they choose to commute shapes the transportation system and land use choices of the region.

Shifts in the population mix also have an impact on the transportation needs in the region. The aging population, for example, has different transportation needs and preferences than younger population groups. The aging population may be less comfortable using technology such as automated vehicles (AV) or shared mobility apps, even if those options allow for greater independence or provide new mobility options for those that no longer drive. Alternatively, the region's younger population may be more inclined to give up their cars in favor of shared mobility options, assuming those options provide better efficiency or connectivity between their desired origins and destinations.

The University of Florida Bureau of Economic and Business Research (BEBR) projects population in the MetroPlan Orlando region to increase between 17 percent (low) and 71 percent (high) between 2020 and 2045[2] (Figure 8.3).

Figure 8.3 | MetroPlan Orlando Region Population Projection (2020-2045)



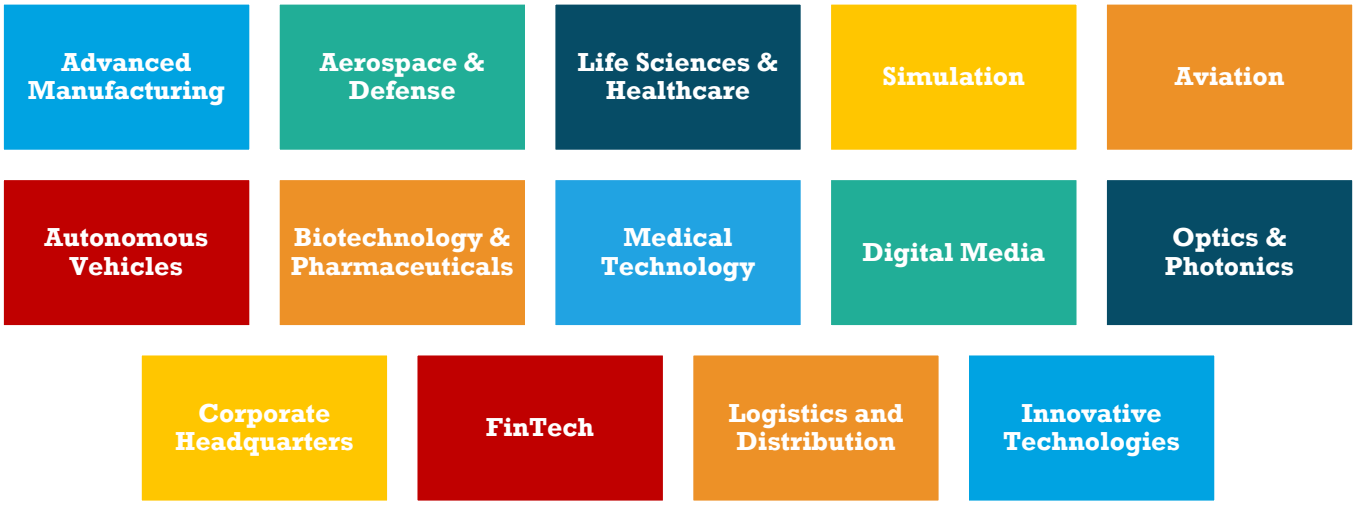
Source: University of Florida Bureau of Economic and Business Research, 2020

[2] University of Florida Bureau of Economic and Business Research, 2020

Economy

The region's economy directly impacts the transportation system. A strong and growing economy creates demand on the transportation system for both people and freight. Economic fluctuations impact the region's jobs, commuting patterns, and use of transit. At a statewide level, Enterprise Florida is focused on growing key priority industries (Figure 8.4).

Figure 8.4 | Enterprise Florida Priority Industries

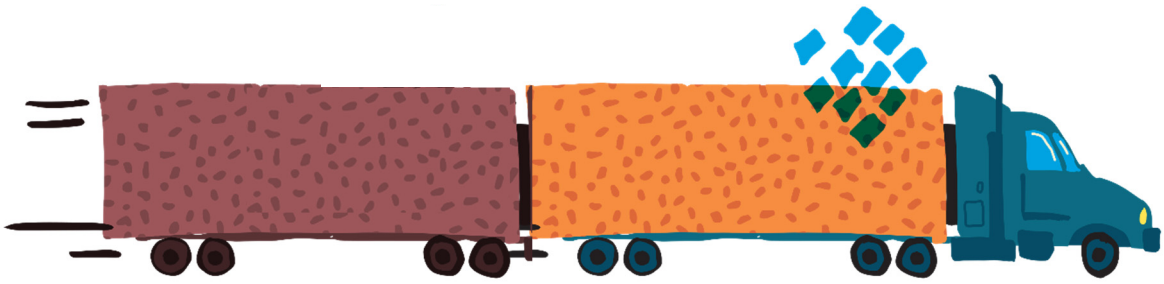


Source: Enterprise Florida, 2020

The region's economy is heavily reliant on the tourism and service industries. To improve economic resilience and diversity, the region's economic development partners have advocated for transportation improvements that create and attract a more diverse range of businesses and jobs. The industries the region invests in and those that experience the greatest employment growth have a substantial impact on the needs of the transportation system.

Increased emphasis on manufacturing, warehousing, and freight movement in and around the region can lead to more truck traffic and increased development in industrial centers, while continued expansion of the region's medical technology and healthcare industries shift development to major hospitals, healthcare centers, and research centers within the region.

The region's economy also has an impact on the socio-economic distribution of the population. A region focused on high-tech industries like aerospace or automated and connected vehicle (AV/CV) technology, for example, has a greater demand for high-skilled and high paying jobs, demanding a more specialized workforce than a region built around the service industry.



Visitation

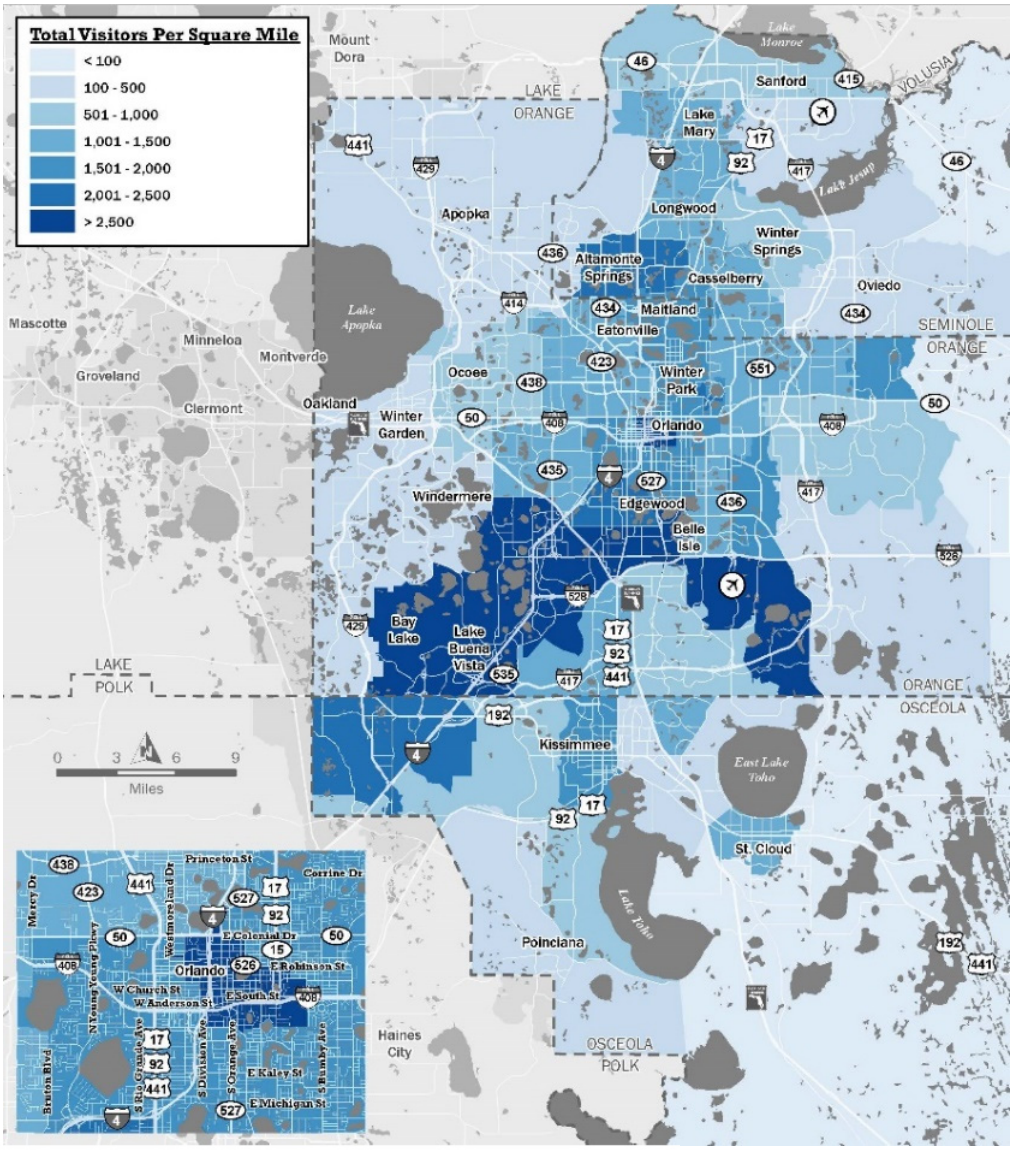
The region's tourism industry is one of the foundational components of the economy and one of the driving factors impacting the region's future. The region's major attractions act as key origins and destinations impacting congestion and reliability on the system due to seasonal fluctuations.

In 2018, 75 million visitors traveled to the MetroPlan Orlando region, representing 34 visitors for every one resident in the region. Figure 8.5 illustrates total visitors per square mile in the MetroPlan Orlando Area.

If the visitation trends continue to grow, the tourism industry will remain a central pillar to the region's economy. However, if the region's visitation were to decline, major trip origins and destinations could shift dramatically, creating different transportation needs throughout the region.

The region is also impacted by a shift in the type of visitors choosing to visit the MetroPlan Orlando area. Tourists coming to experience the attractions, for example, have different transportation needs and destinations than business travelers.

Figure 8.5 | MetroPlan Orlando Region Visitors



Source: FDOT Central Florida Visitors Study, Airsage, 2018

Technology

Technological innovations such as AV/CV technology, new vehicle safety features, mobility apps, and broadband connectivity are changing the way people travel and work. The region has more mobility options than ever and technology is making those options safer and more efficient. However, these advancements also present new data and cybersecurity challenges.

Guidance for Assessing Planning Impacts and Opportunities of Automated, Connected, Electric, and Shared-Use Vehicles, published by FDOT, evaluates the potential impacts of automated, connected, electric, and shared-use vehicles (ACES). This report provides a detailed analysis of the safety, roadway system, transit system, and funding impacts of various ACES market penetration and adoption rates. Part of FDOT's evaluation involved an ACES scenario planning process that built on the following six scenarios developed by FHWA:

Slow Roll (minimal plausible change) – Continued advances in safety technology, transportation systems management and operations (TSM&O), and mobility services. Level 2 driver assist features (i.e. lane tracking and automatic braking) reduce fatalities and serious injuries and electrification continues, reducing emissions. Greater access to mobility services reduce vehicle ownership in urban areas and create reliable options for transportation disadvantaged. Widespread use of real-time traveler information reduces the cost of congestion.

Niche Service Growth (high AV/CV in certain cases) – Niche applications for AV/CV dominate the landscape with "AV Zones" identified throughout the region. Prevalence of AVs allows "Vision Zero" to be realized in AV Zones while Level 2 driver assist features improve safety everywhere else. Vehicle ownership declines drastically in AV Zones as residents shift to local mobility services. Quality of life improves in AV Zones leading to concerns about access to technology benefits outside of niche areas.

Ultimate Driver Assist (ultra-connectivity) – AV adoption stalls and CVs become ubiquitous. CV communications reduce crashes by 80 percent and nearly eliminate congestion through cooperative dynamic routing and pricing incentives. Public transportation improves efficiency, competitiveness, and customer service due to real-time pricing, universal trip planning, and multimodal integration.

Managed Autonomous Lane Network (AV lane networks) – AV travel is considered to be at a large-scale network with significant consumer adoption. CV communications lead to reduced crashes systemwide and AV-only lanes on interstate and urban expressways paired with separate freight corridors allow for safe, efficient, and automated travel. Businesses locate outside of the urban core and people move to the suburbs and exurbs with access to managed lane corridors.

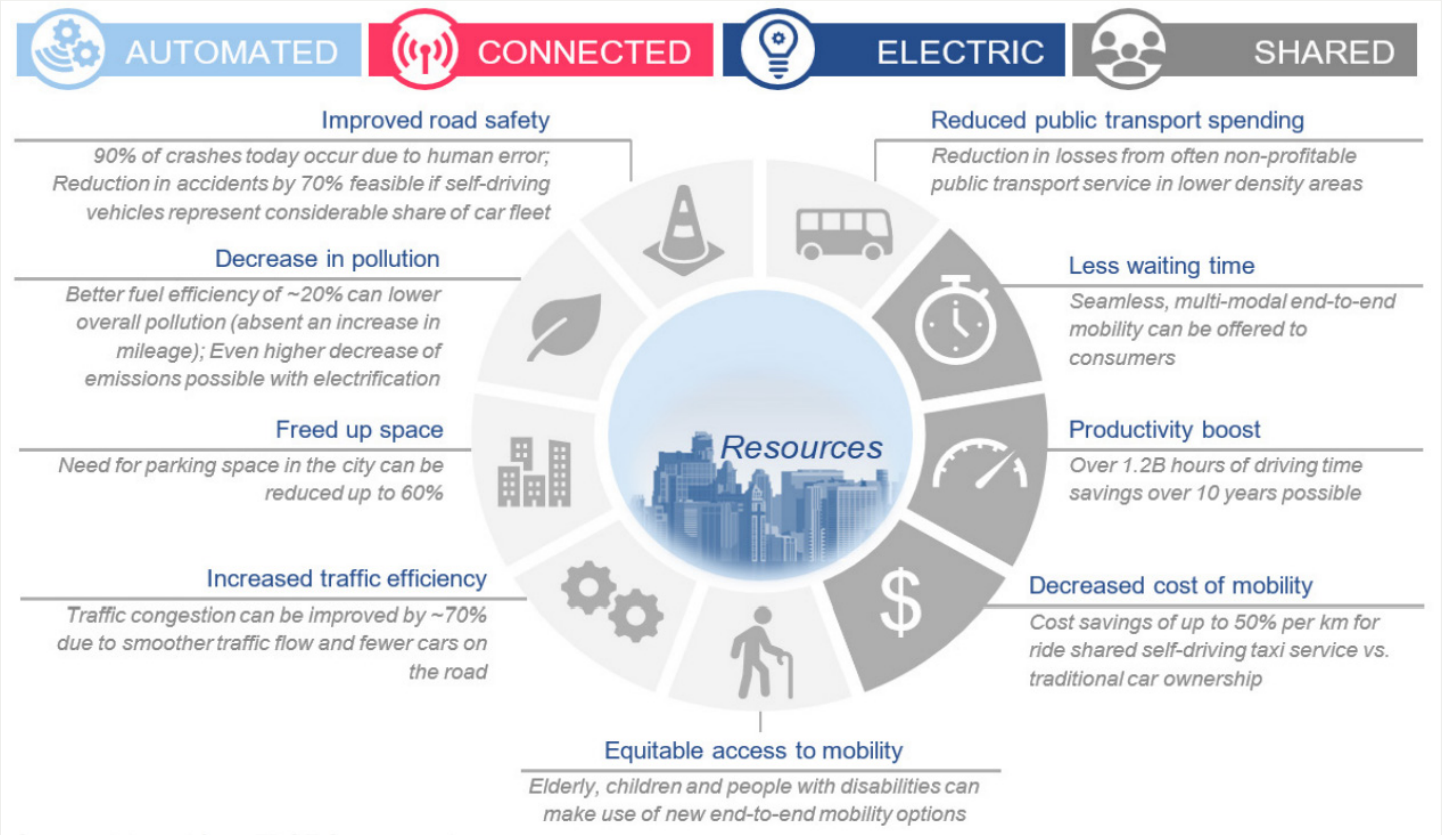
Competing Fleets (automated fleets compete) – Level 4 automation is safe for most trips but dominated by competing fleets. Strong competition between mobility service providers leads many toward car-free lifestyles. Door-to-door transportation is available for as low as $0.20 per mile in most contexts, outcompeting traditional transit. Parking is converted to other uses in urban and suburban areas.

Robo-Transit (automated mobility-as-a-service) – Strong public-private partnerships for system optimization. Personal mobility becomes a commodity, integrating door-to-door and fixed guideway transit in urban corridors. Automated long-haul and local freight makes immediate consumption universal. The region offers universal shared mobility services as low as $0.20 per mile.

The above scenarios each identify potential adoption rates for CV and AV technologies as well as potential implications for varying electric vehicle fleet penetration rates and assumptions for shared-use vehicle reliance.

Figure 8.6, adapted from the FDOT SunTrax project, demonstrates how ACES can work together to address common transportation problems.

Figure 8.6 | Benefits of Automated, Connected, Electric and Shared (ACES) Vehicles



Source: FDOT, Guidance for Assessing Planning Impacts and Opportunities of Automated, Connected, Electric, and Shared-Use Vehicles

The lack of certainty and inconsistency in technology adoption rates create challenges in preparing for the future. There are a wide range of expectations for AV and CV technology adoption rates. Some projections suggest more than $33 million in AV sales by 2040, accounting for 26 percent of new vehicles;[3] while others suggest that 95 percent of U.S. passenger miles traveled will be served by on-demand autonomous electric vehicles by 2030 owned by fleets in a transportation-as-a-service model.[4]

[3] IHS Markit

[4] RethinkX

Land Use and Development

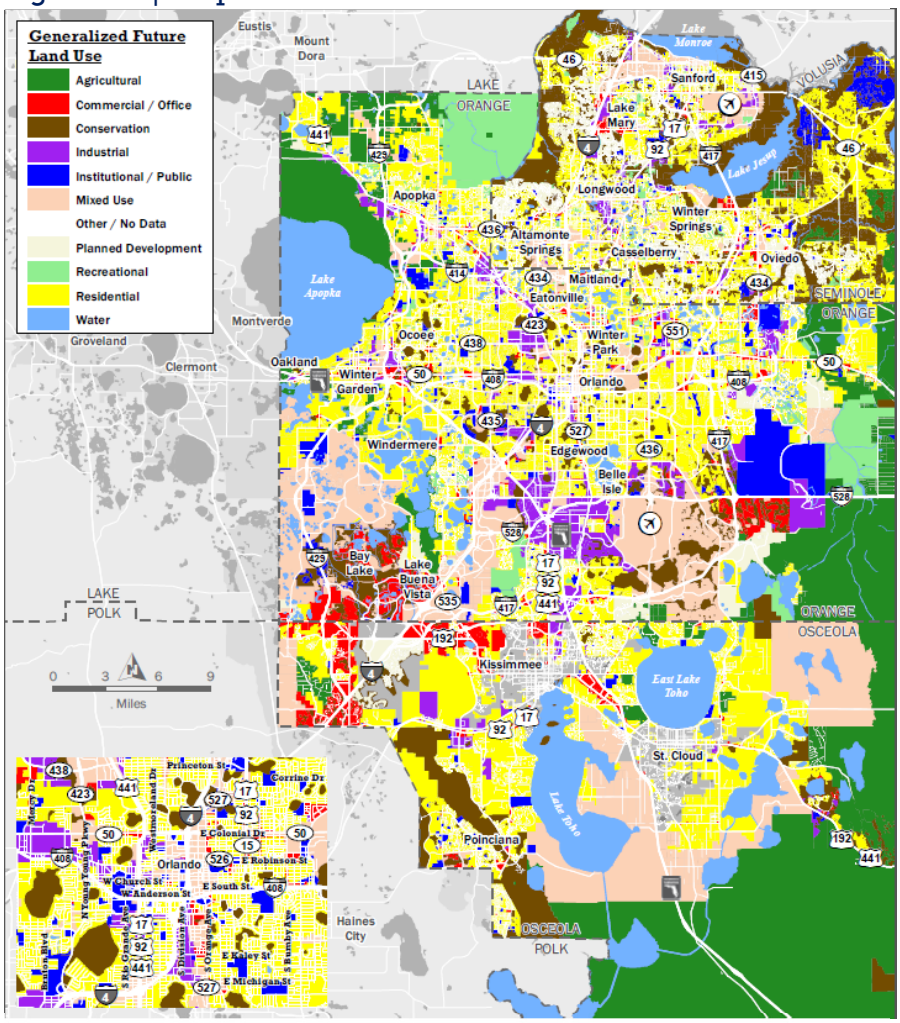
Land use and development decisions are closely tied to transportation. Where people choose to live and the activity centers they choose to visit are strongly influenced by the transportation system and vice versa. As new development and redevelopment occur in the region, the transportation system will need to be designed to support it. Alternatively, transportation decisions impact future land uses and development patterns. The region must ensure these decisions are compatible.

Considerations for how land use is impacted by AV and CV; increased/decreased transit, micro-mobility, bicycle, and pedestrian activity; teleworking and telemedicine; industrial capacity and freight movement; housing preferences; master planned development; and urban infill are critical to understanding the potential futures of the MetroPlan Orlando region. It is also important to understand that land use decisions also influence each of the above considerations. Future land use map is represented by Figure 8.7.

The land use decisions made between 2020 and 2045 will have a substantial impact on the region's transportation future. Higher density development, for example, is a key component for supporting a thriving transit system and is supportive of shared and micro-mobility options. Development around existing activity centers can impact congestion and create the need for new capacity while the emergence of new activity centers can shift travel patterns and create demand where there previously was none.

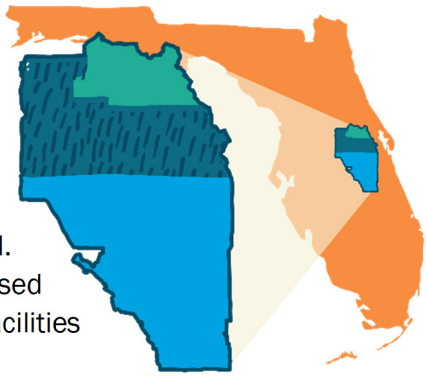
The types of land use can also impact the transportation system. More industrial land uses that rely on freight activity like manufacturing and warehousing, for instance, can increase the share of trucks on the region's major transportation corridors.

Figure 8.7 | Proposed Future Land Use



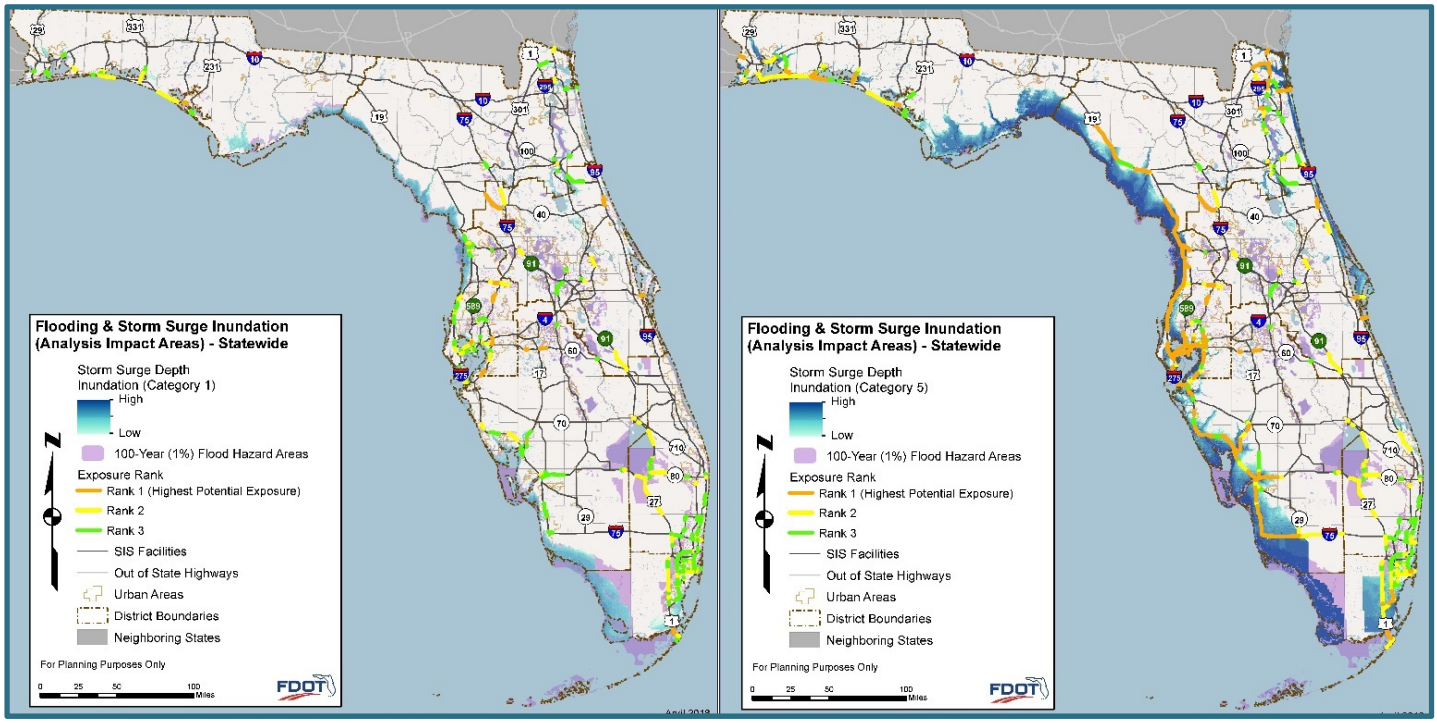
Source: East Central Florida Regional Planning Council, 2020

Climate



Changing climate is a risk the region must consider to ensure the transportation system is resilient to extreme weather events, flooding, and sea level rise. Increased frequency and/or intensity of these events can impact emergency evacuation and infrastructure conditions, and in some cases, affect where people choose to live, including potential in-migration from areas more severely impacted. Figure 8.8 identifies projected impacts of flooding and storm surge inundation based on category 1 and category 5 hurricanes[5]. As indicated, key transportation facilities located in Florida's largest urban areas are most likely to be impacted.

Figure 8.8 | Florida Flooding & Storm Surge Inundation – Category 1 and 5 Hurricanes



Source: FDOT, 2018

Rising sea levels could lead to displaced populations moving inland from coastal communities, rapidly increasing the population in the MetroPlan Orlando region. However, instances of inland flooding could also increase, threatening the region's most critical transportation infrastructure. Climate impacts could increase the demand for resilient infrastructure to ensure that even during the most extreme weather events, the region's critical corridors remain operational to ensure efficient emergency evacuation and provide access to emergency services returning to the region after the event.

This key driver explores some of the potential risks on the horizon for the MetroPlan Orlando region and provides an opportunity to consider policies, strategies, and projects that could mitigate these risks and ensure a resilient transportation future.

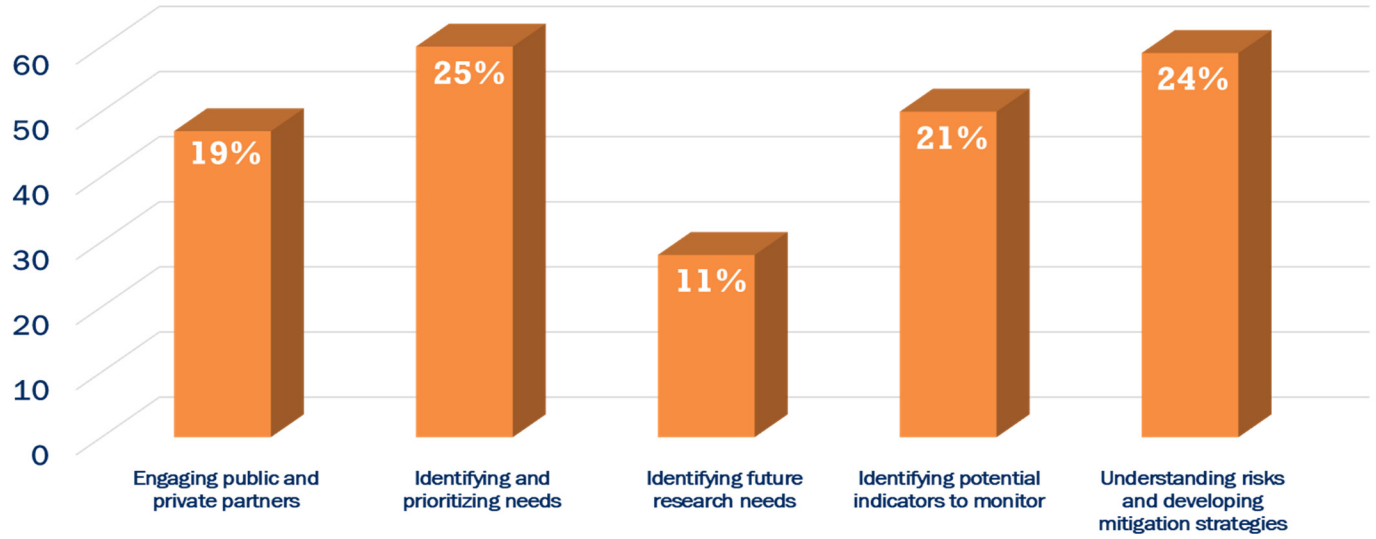
[5] Florida Department of Transportation, Florida Division of Emergency Management, Federal Emergency Management Agency, April 2018.

Alternative Futures

Four scenarios outlining potential futures for the MetroPlan Orlando region were developed by making adjustments to the six key drivers and considering the priorities outlined in the 2045 MTP Goals, Objectives, and Indicators. These potential futures were presented to and discussed with the MetroPlan Orlando 2045 MTP Working Group, Technical Advisory Committee, Community Advisory Committee, Municipal Advisory Committee, Transportation Systems Management & Operations Advisory Committee and the MetroPlan Orlando Board to gather feedback and make adjustments based on valuable partner and public input. During each of these meetings, polling software was used to collect feedback on how scenario planning could best be used to support the MTP and on the perceived viability and likelihood of each potential future.

When asked "How should the 2045 MTP best account for and incorporate these futures?" participants selected "identifying and prioritizing needs" and "understanding risks and developing mitigation strategies" most often. Figure 8.9 illustrates the polling results in response to that question.

Figure 8.9 | Advisory Committee Feedback on Uses for Scenario Planning in 2045 MTP



Source: MetroPlan Orlando, Advisory Committee Polling, April 2020

Note that based on the input provided, two modifications were made to the four scenarios. The original list of four had a scenario focused on global expansion that was determined to have significant overlap with multiple growth futures. In addition, due to the ongoing impacts of COVID-19, there was an interest in exploring a truly low growth future that included potential negative impacts of economic fluctuations, public health crises, and slower population growth. As a result of this input, a new scenario was created to demonstrate a potential future where the region experiences slower growth due to major economic and public health disruptions (Disruption Dilemmas) and the freight considerations included in the previous potential future were distributed across the remaining options.

Figure 8.10 illustrates the four alternative futures that were developed through this extensive analysis and outreach process. Contextual information about each potential future and the adjustments made to each of the six key drivers is included in the following pages.

Figure 8.10 | 2045 MTP Alternative Futures

Source: MetroPlan Orlando, 2045 MTP, August 2020

Traditional Trends

Traditional Trends is the baseline scenario identified for the MetroPlan Orlando region. This scenario suggests the region will continue its historic trends based on strong growth in population, visitors, and the economy. In this scenario, the automobile remains the primary means for transportation, and major corridors and activity centers remain the same (Table 8.1).

Table 8.1 | Traditional Trends: Key Drivers

Key Driver	Description
Population	Increase 40 percent by 2045 (BEBR Medium).
Economy	Steady economic growth focused on tourism and service industry.
Visitation	Steady growth in visitors with major destinations remaining the same
Technology	The region embraces technology and AV/CVs account for 40 percent of the vehicle fleet by 2045.
Land Use	Development focused around major transportation corridors and on the fringes of the region with some urban infill.
Climate	Gradual increases in temperatures and more frequent extreme weather events. The region experiences impacts of moderate sea level rise.

In this future, the region should consider the impact continued growth and development along established trends will have on the transportation system. Many of the region's key transportation corridors are already heavily congested and will only get worse as the population and visitation grows and vehicle miles traveled increase. While strategic investments in major transit corridors are considered in this potential future, the region's primary mode of transportation is overwhelmingly the single occupancy vehicle, contributing to increasing vehicle miles traveled. Future development is projected to occur around existing major transportation corridors and activity centers with additional development occurring on the fringes of the region, creating longer commute times and distances.

The impacts of technology are projected to have a substantial impact on the transportation system. In this potential future, it is expected that 40 percent of vehicles in the fleet will include some sort of CV technology with between 50 and 60 percent of vehicles equipped with driver assistance features such as lane departure warnings/lane keep assist and automatic braking. These technological advancements are expected to improve safety and reduce fatal crashes in the region.

Emerging business models, especially those related to mobility services (transportation network companies, micro-mobility and shared mobility options, etc.) could reduce the need for vehicle ownership in the region's most densely populated activity centers and create new mobility options for those transportation disadvantaged populations such as the disabled or elderly.

This future will require investment in the region's critical infrastructure to improve resiliency to extreme weather, flooding, and emergency evacuation events. The region must consider how a larger population will efficiently evacuate during emergencies and how emergency personnel and supplies will reach the region following the evacuation event.

Disruption Dilemmas

Disruption Dilemmas is a scenario designed to consider the impacts that potential disruptors, such as economic fluctuations or public health crises, could have on the future of the region's transportation system. This scenario suggests the region's population, visitor, and economic growth are lower than the baseline and assumes shifts in travel behavior due to a heightened number of people choosing to work remotely (Table 8.2).

Table 8.2 | Disruption Dilemmas: Key Drivers

Key Driver	Description
Population	Increase 20 percent by 2045 (BEBR Low).
Economy	Lower economic growth due to impacts from economic fluctuations, decreased tourism, and lower demand for construction.
Visitation	Slower than baseline growth in domestic visitors and decline in the number of international visitors.
Technology	The region has 40 percent AV/CV fleet with few vehicles completely automated. Greater focus on AV/CV service in specific "AV Zones."
Land Use	Greater emphasis on lower density and redevelopment.
Climate	Gradual increases in temperatures and more frequent extreme weather events. The region experiences impacts of moderate sea level rise.

In this future, the region must consider how slower growth in population and the economy will impact the region. This future assumes one or more economic fluctuations occur between 2020 and 2045 and a heightened focus on public health due to major public health crises impacting the region. These disruptors lead to slower growth in the region's population and economy and a reduction in visitor travel, especially internationally. While these reductions could create lower than expected increases in vehicle miles traveled, they could also reduce transportation revenues primarily collected through fuel and sales tax levies. This scenario also assumes the public is more hesitant to use public transportation and shared mobility options due to increased public health concerns.

Reduced population and economic growth could lead to lower density development but could create opportunities for redevelopment around major transportation corridors and activity centers. These lower densities and hesitation to be in enclosed public spaces (like a bus or train) could lead to reduced transit ridership. However, public health concerns could also contribute to increased active transportation, such as walking and bicycling, leading to improved public health and reduced reliance on single occupancy motor vehicles.

The impacts of technology in this potential future could help shift travel patterns in the region and support a greater share of the region's population choosing to work remotely. Major investments in broadband connectivity throughout the region could make working remotely and telemedicine more common, reducing the overall vehicle miles traveled and congestion on major transportation corridors. Similar to the baseline, about 40 percent of the vehicle fleet is expected to include some sort of CV technology with between 50 and 60 percent of vehicles equipped with driver assistance features such as lane departure warnings/lane keep assist and automatic braking. In this scenario, between one and five percent of vehicles are fully automated and these vehicles are operated in specific activity centers designated as "AV zones" dramatically improving mobility, safety, and efficiency in these activity centers (master planned communities, attraction areas, etc.).

This future will require investment in the region's critical infrastructure to improve resiliency to extreme weather, flooding, and emergency evacuation events. The region must consider how to prioritize these investments with fewer resources.

Technology Transformations

Technology Transformations is a scenario designed to consider the potential impacts that large scale technology adoption and implementation could have on the region's transportation future. This scenario assumes strong growth in AV and CV technologies with a high rate of adoption (Table 8.3). This scenario also suggests greater reliance on emerging micro-mobility options and improved broadband access across the region.

Table 8.3 | Technology Transformations: Key Drivers

Key Driver	Description
Population	Increase 40 percent by 2045 (BEBR Medium) with a larger share of the population age 18-34
Economy	Higher economic growth with a greater focus on high-tech industries (aerospace, simulation, research/development, technology).
Visitation	Visitor growth similar to baseline with a greater emphasis on business travel.
Technology	The region has 80 percent AV/CV fleet by 2045 with multiple AV subscription services. Greater focus on automated transit.
Land Use	Both urban and rural areas experience growth as AVs and telework allow people to live wherever they desire.
Climate	Gradual increases in temperatures and more frequent extreme weather events. The region experiences impacts of moderate sea level rise.

In this future, the region's population growth is similar to the baseline scenario, but a larger share of the population is between 18 and 34 years old. This future assumes the region has embraced advanced technology leading to increased growth in high-tech industries such as aerospace, simulation, and research and development. These economic shifts could lead to a larger number of business travelers coming to the region and shift the common destinations from the attraction areas to the convention centers and major employment centers.

Significant investments in AV and CV infrastructure leads to nearly 80 percent of the vehicle fleet with some sort of CV technology and as much as 30 percent of vehicles fully automated, leading to dramatic reductions in fatal crashes throughout the region. CV data provides advanced trip planning capabilities and allows for unprecedented network efficiency. However, the increased reliance on AVs and CVs increases overall vehicle miles traveled due to rising AV subscription services and resulting trips by empty vehicles. Due to the ability to focus on tasks other than driving while using AVs, extreme commutes could become more common and peak periods could shift. Transit providers could embrace AV and CV technologies to improve headways and network planning to best serve the region while partnering with shared mobility providers to support seamless first-/last-mile connectivity.

Heavy reliance on AVs and the ability to work remotely gives residents more flexibility in where they live and work, meaning both urban and rural areas experience increased development.

This future will require investment in the region's critical infrastructure to improve resiliency to extreme weather, flooding, emergency evacuation events, and cybersecurity attacks. Greater consideration for the capacity and availability of supporting infrastructure, such as electric vehicle charging stations, are necessary to ensure efficient emergency evacuation for those choosing to use an alternative fuel vehicle. The portion of the population choosing to rely on shared mobility services and vehicle subscriptions will also need to be considered in emergency evacuation events to ensure adequate capacity is available during emergency evacuations.

Climate Consequences

Climate Consequences is a scenario designed to consider rapid growth in the region due to in-migration from coastal communities displaced by sea level rise. This scenario suggests climate impacts are severe, requiring the region to accommodate a large influx of people while prioritizing the resiliency of critical transportation infrastructure within the region (Table 8.4).

Table 8.4 | Climate Consequences: Key Drivers

Key Driver	Description
Population	Increase 60 percent by 2045 (BEBR High).
Economy	Strong economic growth with booming construction and service industries to accommodate new population growth.
Visitation	Higher visitor growth than baseline with increase in both domestic and international tourism.
Technology	The region embraces technology and AV/CVs account for 40 percent of the vehicle fleet.
Land Use	Denser development along major transportation corridors and activity centers with new development in neighboring counties.
Climate	Gradual increases in temperatures result in higher frequencies of extreme weather events. The region experiences impacts of high sea level rise.

In this scenario, increased extreme weather events, flooding, and higher than anticipated sea level rise has driven population away from coastal communities and into the MetroPlan Orlando region. This rapid increase in population has led to a booming economy built on the construction and service industries to accommodate these new residents. Higher density development occurs around the region's major transportation corridors and activity centers, leading to a larger share of walking, bicycling, and transit activity in these areas.

The region's existing roadway network cannot effectively accommodate this rapid influx in population. Premium transit investments such as bus rapid transit are prioritized to provide an alternative. While transit ridership increases, the growth is not enough to offset increases in overall vehicle miles traveled. In this future, about 40 percent of the vehicle fleet is expected to include some sort of CV technology with between 50 and 60 percent of vehicles equipped with driver assistance features such as lane departure warnings/lane keep assist and automatic braking. Between one and five percent of vehicles are fully automated and these vehicles are operated in specific activity centers designated as "AV zones" dramatically improving mobility, safety, and efficiency in these activity centers (master planned communities, attractions areas, etc.).

Higher frequencies of extreme weather events, flooding, and higher than expected sea level rise all require more substantial investments in infrastructure resilience and emergency evacuation planning. Increased population and a stronger economy lead to increased revenues for transportation improvements. Hardening the most critical transportation corridors is a top priority to ensure safe mobility is not impeded before, during, and after extreme weather events, especially those that require emergency evacuation.

Summary of Scenarios

While each of these potential futures is built around a different theme, there are similarities in the drivers across the futures. For example, Traditional Trends and Technology Transformations use the same BEBR Medium population projections. In addition, within specific futures there are drivers with opposite impacts. For example, in the Technology Transformation future, an increase in CAV adoption is anticipated to reduce single-occupancy vehicle trips, but in doing may actually increase VMT. This is due in part to inefficient/empty vehicle trips and new trips enabled by providing mobility options to underserved populations who traditionally have limited transportation choices. Figure 8.11 provides a comparison of the key drivers by scenario illustrating where they have common key drivers and where the key drivers are applied differently.

Figure 8.11 | 2045 MTP Key Driver Adjustments

	Traditional Trends	Disruption Dilemmas	Tech Transformations	Climate Consequences
Population	Increase by 40%	Increase by 20%	Increase by 40%	Increase by 60%
Economy (Main Sector)	Moderate growth Tourism/Service	Lower growth Healthcare/ Manufacturing	Moderate growth High-tech/research	High growth Construction/Tourism
Visitation	Moderate growth	Lower growth	High growth More business travel	High growth Both international and domestic tourism
Technology	Minimum AV/CV impacts	AV/CV focused on targeted AV/CV zones Increased broadband access	High rate of AV/CV adoption Increased broadband access and transit automation	AV/CV focused on targeted AV/CV zones
Land Use and Development	Aligned with existing land use	Lower density Shifts to manufacturing employment centers	Shifts to technology-based employment centers	Higher density along key corridors and in key activity centers promotes increased transit use
Climate	Moderate sea level rise and frequent extreme weather events	Moderate sea level rise and frequent extreme weather events	Moderate sea level rise and frequent extreme weather events	High sea level rise and higher frequency of extreme weather events

Next Steps

The four potential futures presented in this technical memorandum will inform and support the transportation system needs assessment, and help identify potential strategies that advance, influence, or mitigate the impacts of these potential futures.

Forthcoming technical documentation will discuss how the potential futures and associated key drivers will be reflected in the Central Florida Regional Planning Model (CFRPM) through key adjustments to the model input files and parameters. The results of the scenario-specific model outputs will inform the needs assessment, and strategy development, ultimately supporting the overall development of the 2045 MTP Cost Feasible Plan.

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