



# A Long Term Perspective on Transportation Models and Software

*presented to*

**Florida Model Task Force**

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## What is long-term?

- The MTF has defined short-term priorities that should be in place in the next 3-4 years
- Long-term: should be in place in around 2015'ish



# Putting software advances and modeling needs in context

In 2015, modelers will forecast transportation demand and flows for 2040. We see, even today, forecasts for 2065.

- **Considerations:**

- **Current/short-term FSUTMS is the starting point**
- **What will change about transportation demand and supply by 2040?**
- **How will data evolve?**
- **How will technology change how we model?**



# Changes to transportation demand/supply in 2040



## ‘Trip Generation’ and ‘Time of Day’

- Demographics
  - The graying of the population—but they will drive longer
  - Changes to the household dynamic of household size and vehicle availability
  - Workforce: part-time, full-time, ‘all the time’
- ‘Trip-Making’ behavior
  - See today: more people working at home
  - See today: people working from satellite offices
  - See today: more variable work hours
  - See today: more virtual meetings (go to meeting)
- Correcting issues with 4-step: vehicle sharing/competition; ‘related’ trips (‘tours’)

**This all ‘begs’ to be modeled as activities and not as trips**

**Time of departure becomes mandatory**





# Changes to transportation demand/supply in 2040



## ‘Car Ownership’

- **Private automobile:**
  - We see specialization of vehicles
  - We see car-sharing growing in cities
  - We see automobile ‘driving’ technologies evolving
  - We see changes in fuel type
- **Some think:**
  - Private vehicles will disappear over time as vehicle sharing becomes the standard.
  - The line between public and private transportation disappears—transportation becomes a super-efficient taxi service (automated driving or self-driven) with customizable vehicles (vehicle provided depends on needs).

**Improvement of vehicle ownership models: type, use, fuel type, technology**



# Changes to transportation demand/supply in 2040



## Transit technology

- Expanded transit guideways – separation of transit from congestion
- Increased use of ITS systems both on the passenger and vehicles sides
  - ◆ Vehicle routing and adaptive scheduling
  - ◆ Vehicle location: where is the bus? What time will it arrive?
  - ◆ On demand services
- The merging of car sharing/transit
- Express services/point to point
- High speed rail

Considerations on wait time, wait time perception, vehicle-technology utility



# Changes to transportation demand in 2040

- Travel patterns
  - Higher vehicle speeds and capacity due to vehicle technology and ITS
  - More variation in peaking / congestion as time of day changes
  - Home to work commuting modified by increased flexibilities (where you work, when you work, how you work)
- Correction in four-step: incorporation of land use in modeling
  - Will the traditional commute 'disappear'?
  - Will cities become more spread out?
  - Will cities become more focused on high-speed transit corridors?

**A need for land use-transportation modeling;  
combining steps such as mode/destination choice  
or more model integration**





# Changes to transportation demand in 2040

- Mode choice

- today: car/transit
- tomorrow: guided versus non-guided vehicles – transit?
- Or ‘smart vehicles’ versus ‘dumb vehicles’ – transit

- As ITS has more of an impact on vehicles the need to estimate amount of technology in the vehicles increases

- Self-driven versus ‘system’ driven
- Perhaps vehicle types: single passenger versus multi
- Privately owned versus shared







# Changes to transportation demand in 2040

## ● Assignment

- ITS/vehicle technology perhaps enabling higher speeds and smaller distances between vehicles
  - System routing versus assisted routing versus self-routing
  - ITS providing current traffic conditions and short-term forecasts
  - Pricing : congestion charging; tolling...what will be the business models?
  - Transit: flexible schedules and routing?
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- **Movement to system equilibrium but with some 'selfish' drivers/vehicles**
  - **Model knowledge of traffic conditions**
  - **Model queuing delay—dynamic conditions: DTA**
  - **Increased ability to model different pricing 'business models' and VMT by service provider/jurisdiction**





## What data will we have?

- Every person will be connected to the internet (example, a badge we wear). Today: internet-connected telephone
- Every vehicle will be connected to the internet—sending and receiving information to the ‘system’ and to other vehicles and people. Today: GPS receives traffic information.
- Personal information will become less and less private—trading off privacy for the provided benefits. Today: my bank is on-line





# What data will we have?

- Much more information about vehicle location and use
- Much more information about the individual's travel and location
- Potentially more information about the household and personal characteristics from private sources
- **Consequences on:**
  - How we estimate model parameters
  - How we validate models
  - How we store/share and protect data



# How will technology influence modeling?

## Technology

- Much higher communications speeds across the internet
  - Much faster grid/cloud computing resources enabling increased predictive modeling and more complex modeling
  - Predictive Modeling will be ‘everywhere’
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- **Yesterday: public hearings**
  - **Today: public hearings, streaming, twittering, blogging**
  - **Tomorrow: web-based public meetings with shared information—web-based collaborative planning**



# What Citilabs is doing today for modeling 2015

- The **geodatabase/multiple data formats**—enables all data to be geo-referenced. Today: where people live and work. Tomorrow: every vehicle or person by second.
- **Activity models:** premise being we can no longer directly model ‘trips’ but peoples activities and desires. The modes could become physically move or virtual movement.
- **Internet**—the software, data, calculations, results are all moved to a **web-accessed, cloud computing environment**. A much better place to receive and transmit data (then from a desktop PC); take advantage of grid/cloud computing speeds and storage; all of the information and models themselves can be much more easily shared and integrated into other models and systems.





# What the MTF Needs to Consider

- Movement to activity models
- Time of departure/day
- Movement to complex vehicle type modeling – private/shared, fuel type, technology of vehicle, type of vehicle
- Changes to transit: on-demand, transit system knowledge
- Modeling of pricing and pricing approaches (subscription..)
- Movement to dynamic traffic assignment/simulation
- Incorporation, storage and use of new data types
- Land use/transport interaction
- Use of internet in modeling/planning and use in other systems



## How can Citilabs and the MTF work together

- A definite need to establish a long-term development strategy and plan by the MTF or its tools and techniques will not be capable of testing long-term strategies or how the world 'will work' in 2040.
- Create a vision of Modeling and software in 2020 for scenarios to be evaluated for 2040
- Once the goal is established, then plan and budget for the intermediate steps to get to that goal and how the short-term plans relate to these long-term goals





**Thank you!**