



A Long Term Perspective on Transportation Models and Software

presented to

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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!