EXAMPLES OF THE NEED TO POLISH MODEL RESULTS

MTMUG

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POLISHING OF MODEL RESULTS

Purpose of this presentation

- Forecasting is one of the most common uses for a Travel Demand Model
- The dynamic nature of a model does what we cannot do
- But a model, no matter how well calibrated it is or the quality of the input data, CANNOT BE USED AS IS! Certain items make it unusable in terms of instant use
  - Flows or Adjusted Flows or Growth applied to a base for figures?
  - How well the model performs at the sub-area level versus the success of calibration/validation
  - How well the model represents the actual road system and other inputs including centroid connectors, link characteristics
  - Etc.

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Purpose of this presentation

- Items to we will discuss here
  - Review some detailed examples of how polishing of the model results is needed to get a reasonable forecast result
  - Review of high-level model uses or scenarios and the potential pitfalls that you should look for
  - Remember that a model or a forecast is highly debatable, so well structured evaluation and processing IS REQUIRED to have a defensible and logical result

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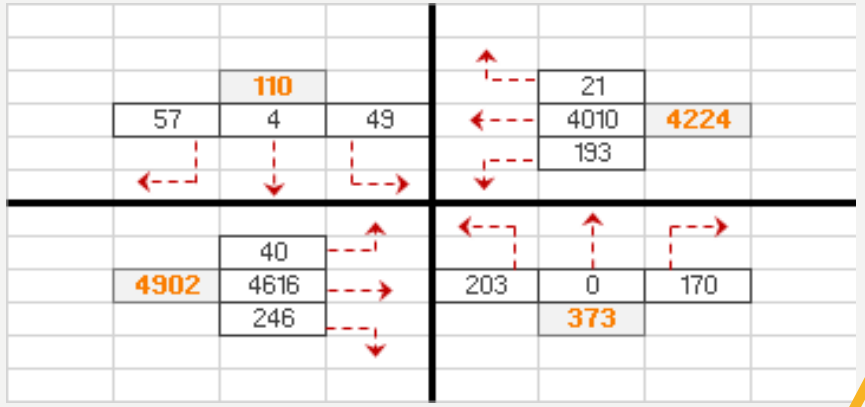
Example 1 – Turning Movement Diagrams [TMDs]

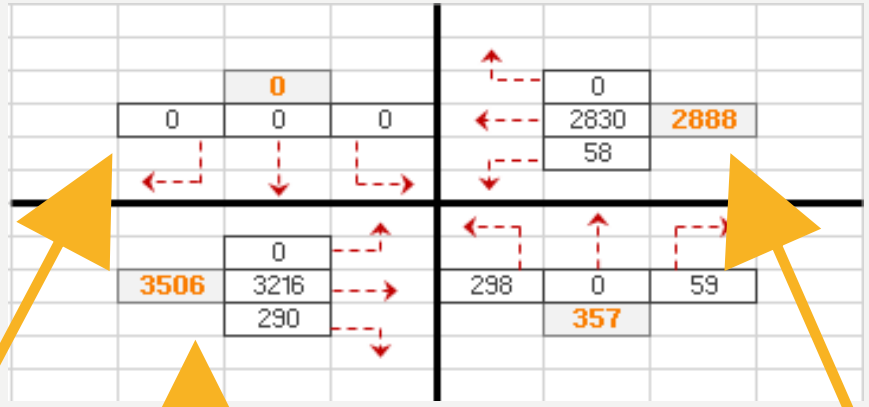
TMDs represent basic flows and are only as good as your network

Compare a 2011 diagram to the base year diagram

2011 Count



Model 2010 Base



North Leg does not exist

Flows not balanced

So will this impact the forecast figure? YES!

- The ability of the model to replicate a known value is tough, especially when models cannot incorporate an adjustment down to the movement level.

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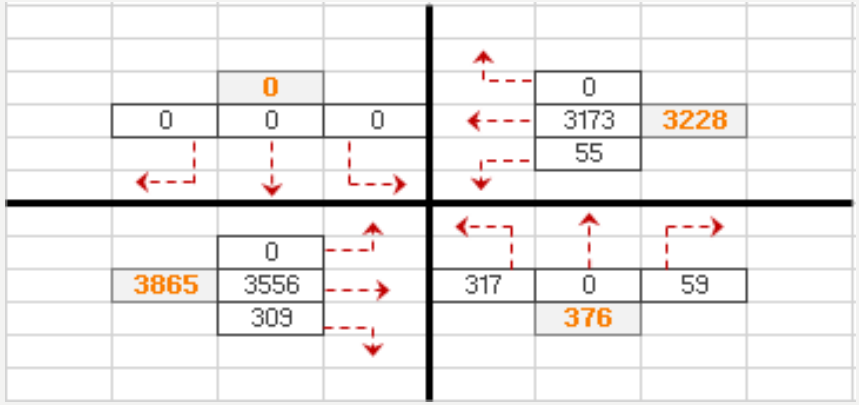
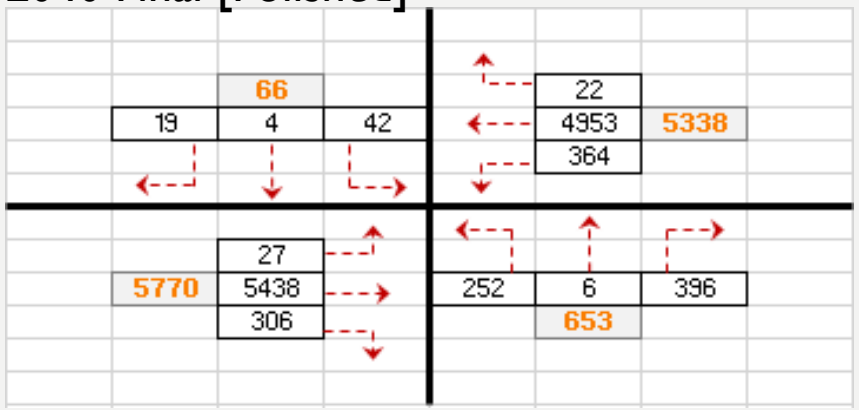
Example 1 – Turning Movement Diagrams [TMDs] Continued

Compare the Model 2040 flow to a Final 2040 Figure

Model 2040 Forecast



2040 Final [Polished]



So what, isn't it basically the same? Well...;

- The model does allow the influence of LOS and traffic redistribution
- The model does allow the influence of socio-economic changes/influences

But... A well polished forecast;

- Allows for the correction of over/under estimation in the base condition when applicable
- Balancing of movements, as is expected to be a continued aspect of travel patterns
- Gives you a chance to review model irregularities [network, Time-of-Day, etc.]

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Example 1 – Turning Movement Diagrams [TMDs] Continued

Example of the Polishing Process;

1. Establishment of a common count year for all needed figures
2. Review of the validation and screen line results to see how well the model is working
3. Review the scale of the model in the geography in question including the links, connectors, TAZs, and the presence of counts
4. Establish a growth per year per movement to review the viability of the raw model output. Make adjustments of these if need be. Be weary of negative or over 2.0%/year for ADT
5. Apply the growth rates to movements
6. Determine whether the adjustment process should be included, if so, then determining the legs to be updated or even individual legs
7. Review the model rates again after any application of adjustment process proportions
8. Double check the figures against historical growth to ensure a logical result is had
9. Check figures for balancing between intersections/interchanges when needed, as well as opposing flows, or peak flow patterns
10. Review Truck specific information if applicable. Be mindful that a AON assignment is do done in most models and that a model may have limitations on giving reasonable truck information
11. Peak Period calculations may require similar work as before, but a proxy might be required if the model is not capable
12. Record the work and assumptions that were used in this forecast, especially changes to the model inputs or outputs beyond simple balancing or minor growth changes.

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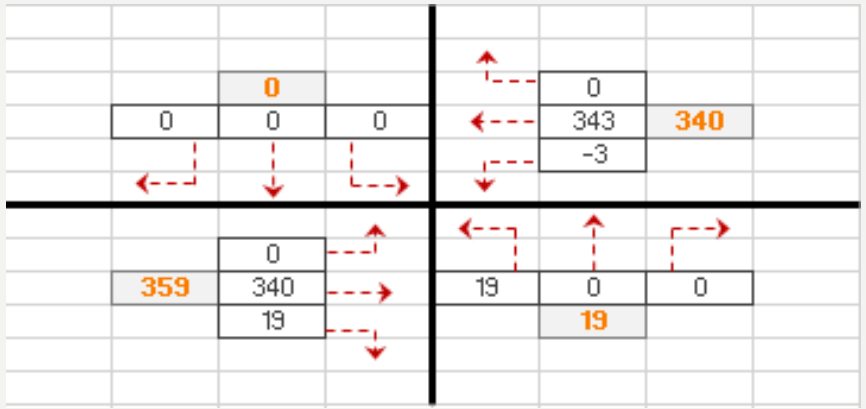
Example 1 – Turning Movement Diagrams [TMDs] Continued

Compare the Model 2040 flow to a Final 2040 Figure

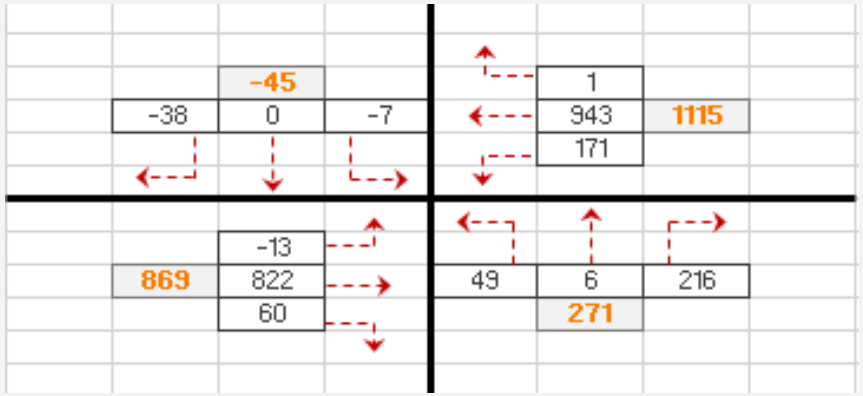
A review of the growth seen between the model and the polished forecasts;

- Shows differences on all legs
- Growth is derived on more than just the model alone

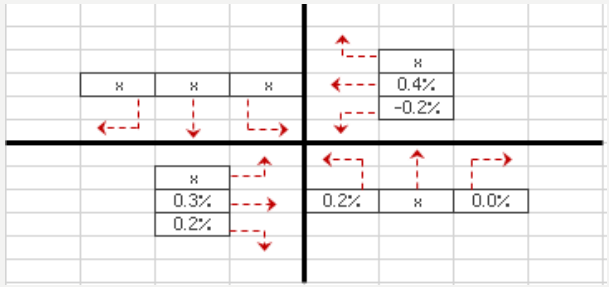
Model Differences



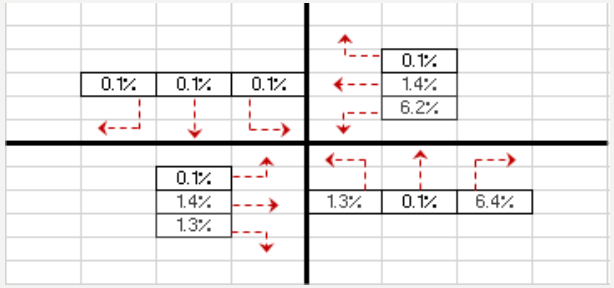
Polished Differences



Model Growth



Polished Growth



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Example 2 – The Adjustment Process and Adjusted Flow versus Flow

- The adjustment process takes the error inherent in the model in replicating a base count at the leg level and applies that amount as a ratio, difference or combination in a future year run
- To work properly, counts should be on all links and from the same year
- No gaps can be had, or else your model will have a blank value, or use a non-adjusted flow
  - EXAMPLE;

Legend
Forecast Flow
Adjustment Method
Adjusted Flow

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Example 2 – The Adjustment Process and Adjusted Flow versus Flow Continued

- When or if you decide to rely on the Adjustment Process;
  - Not having constant application of counts when about to use the Adjustment Process results in some numbers being corrected for base error, next to regular flow numbers, whether there is a modeled or actual intervening road or not
  - If the same count year was not used, the differences in the count between different years may lead to values irreconcilable with each other, as in they could not have happened at the same time
  - A count in a model is still a generalized but likely figure, hence a true balanced forecast with those numbers as leg controls is unlikely. Can use the adjustment in terms of
    - Determine a portion of the adjustment to be applied to movements based on the count proportions
    - Determine if the adjustment is worth using in the first place, some adjustments might result in reductions to the model growth that you and/or history do not agree with.

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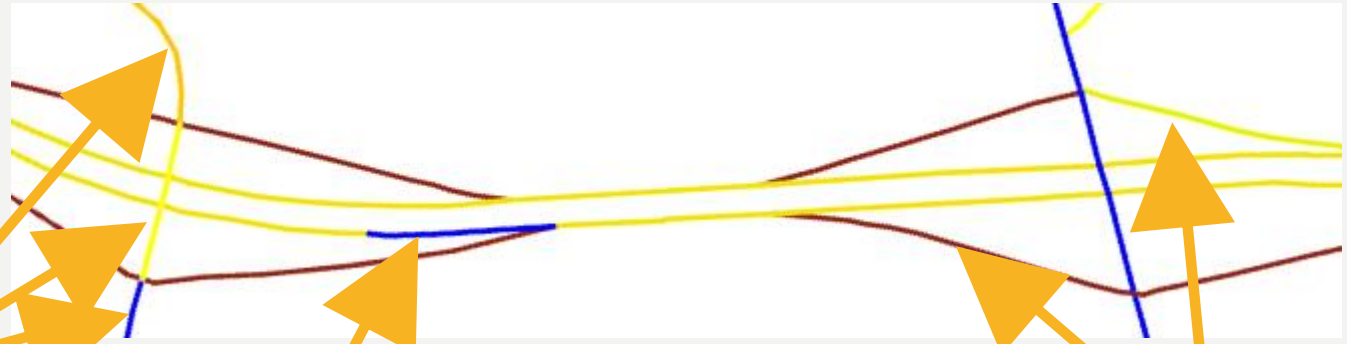
Example 3 – Study the structure and inputs of your model

- No matter how well a model has been calibrated/validated, at a specific location you may find errors that will lead to potentially doubtful data
- Model stewardship is on-going, there is always room for improvement
- Example, speed limits not consistent in logically or by visual validation



Crossroad has three speeds, when should only have 2

Inner leg a different posted-speed

Exit ramp not the same speed as opposite or other exit ramps

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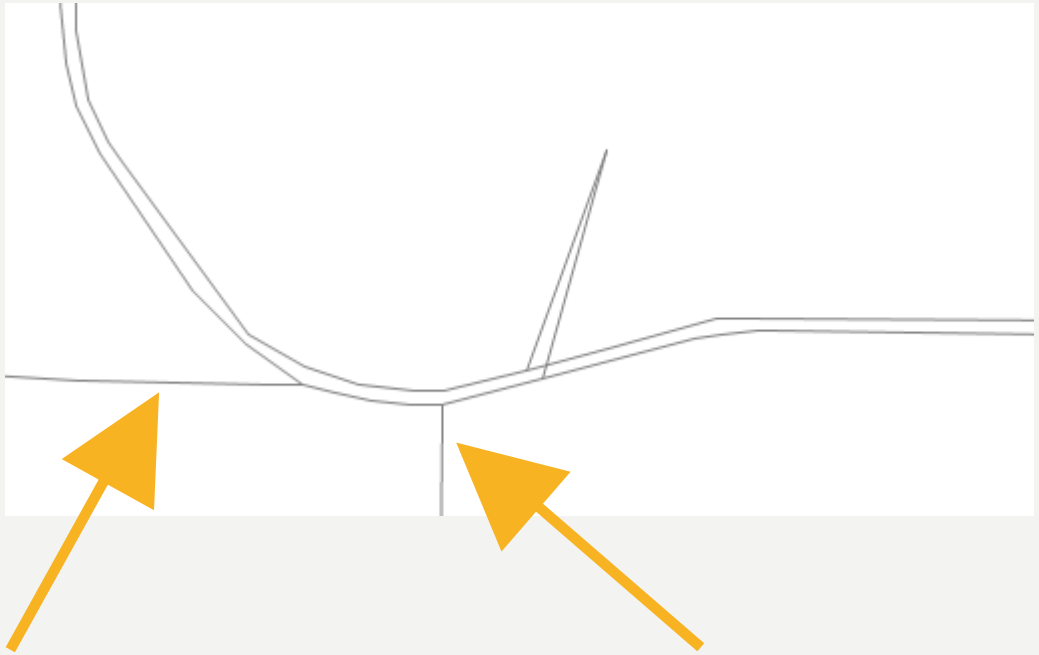
Example 3 – Study the structure and inputs of your model

- Example, connectors do not allow half of a dualized road access



Minor Arterial only
links to one direction

Significant Connector only
links to one direction

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Example 3 – Study the structure and inputs of your model

- What harm can these little things do?
  - If you don't investigate and discover, someone else may, model credibility may then suffer
  - The "need" that must be proved for a project to be built may not be deemed satisfied = no project
  - A project is
    - Under-Built – does not operate at a satisfactory LOS, people WILL notice
    - Over-Built – is too large for the need, may be viewed as a source of wasted resources, people MAY notice
  - Money or expectations for something, when it does not go as planned, will push for investigation. You then will be looking into the model and may find what could have been fixed to begin with.

Good faith efforts are all that can be asked for, but remember, the model is a source for continual improvement

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Example Scenarios with potential pitfalls

- A road diet of 4 to 3 lanes
  - Is the model setup to model the impact of having designated turn lanes?
  - Is the model able to give meaningful results for a fraction of a road?
- A bypass is built, how will the LOS of other roads be impacted
  - The new route does not have an adjusted flow, existing routes do have adjusted flows, but should they be used?
- A new mall is being built, will changes to the network be needed?
  - Do the trips to/from the mall seem reasonable when compared to ITE calculations
  - Are the network/zones setup to realistically represent in/out flows, microsimulation?
- A rural interchange will be constructed
  - Do the connectors truly load in a representative way?
  - Is this rural area in the periphery of the model, will internal and external traffic interact logically?

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Jeff's Key Takeaways

- **Models perform by math, not our expectations**
- **A model can always be improved, even the inputs you created**
- **A model has a set of outputs that you can mold for a deliverable**
- **A model is NOT capable of replacing you the Transportation Expert**

If you ever have questions, please let me know. I enjoy this… cause I'm weird.

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