Model Standardization: Propagation Case Study

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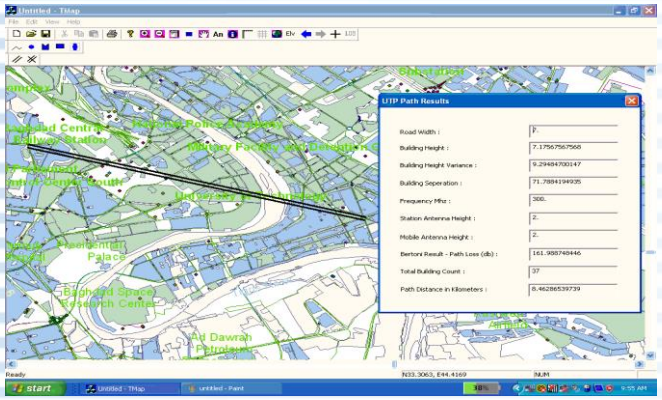
Note: The views expressed in this presentation are those of the author and may not necessarily represent the views of the Federal Communications Commission.

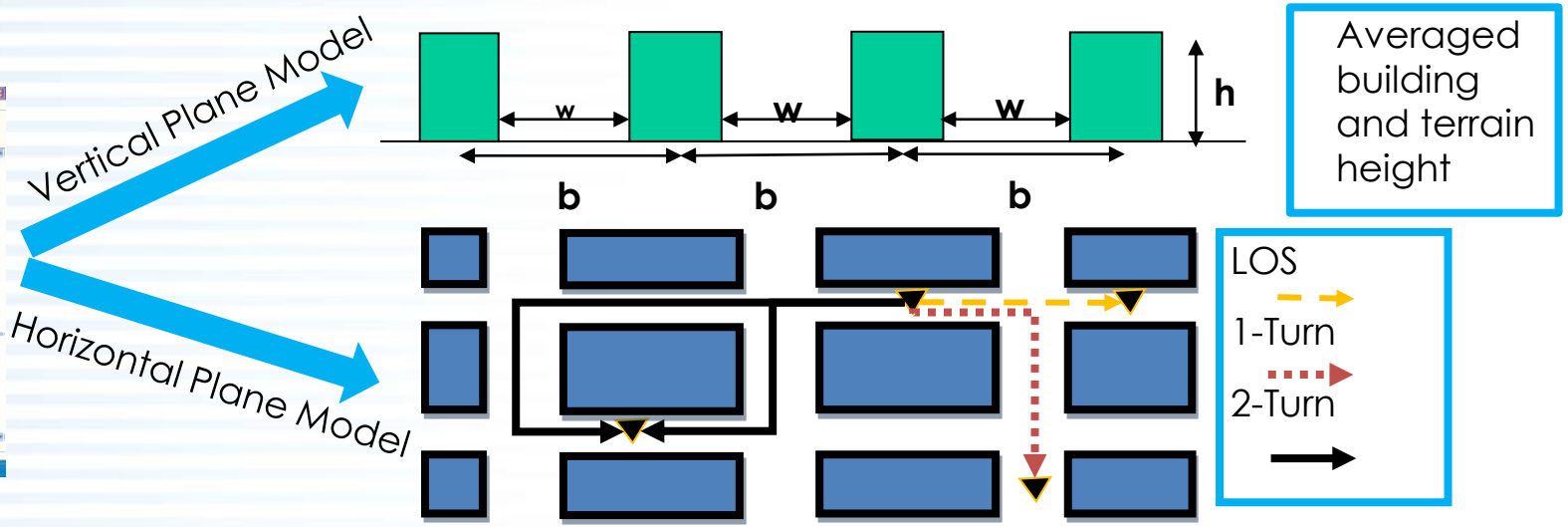
RF Propagation Roadmap: Many Obstacles

- Engaged with RF Urban Propagation from mid '80s at NYC Polytechnic University with Dr. Bertoni
  - Dominant multiple diffraction path over rooftops for cellular deployments with antennas well above the rooftop
  - Later other analytical models were built to consider "canyon" effects in cities for deployments with antennas below rooftop level
- A challenge to build a standardized software tool with minimal computational time and complexity due to lack of
  - Clutter data, 2D and 3D vector data for urban environment including building and street features
  - Measurements that represent different environments and topologies
  - Organizational expertise and collective efforts
- Still use mostly for propagation analysis and spectrum sharing:
  - Terrain elevation-based models with simplified diffractions, Empirical models, or combination of both

Propagation Evolution: Better Days Ahead

- Since then, many obstacles have started being overcome and opportunities are available to explore and develop complex standardized models
  - Geodata is becoming available to help but it is still not easily accessible
  - Availability of measurement datasets for different use cases still "a must"
- Tools are products that should have a standardized process for acceptance
  - Independent testing with common geodata and measurements
- In-house efforts to build an Urban Propagation Model using ArcGIS Engine v10.4 Geospatial engine to retrieve urban data
  - Convert complex urban environments to simplified topologies

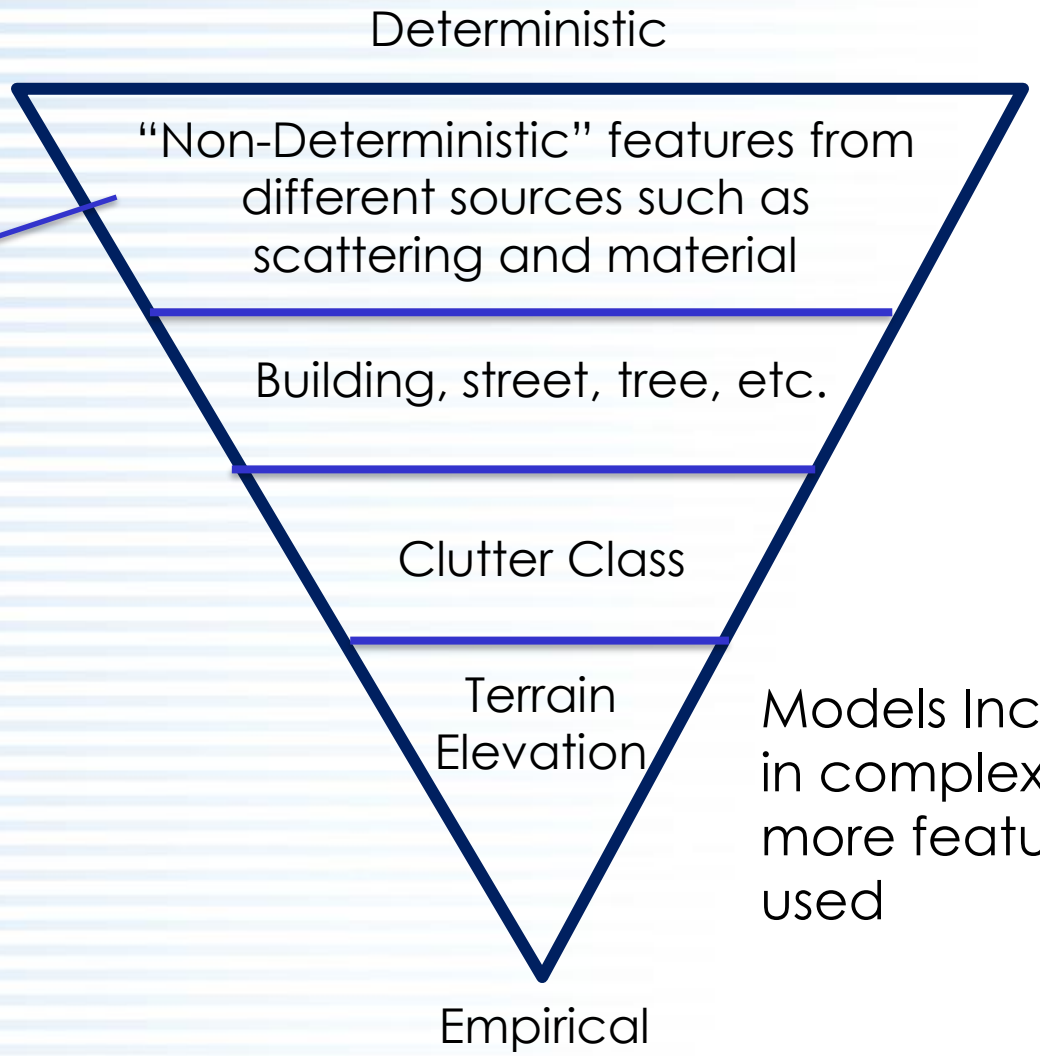




Building a Propagation Model

Difficult to estimate:

- Use of empirical formulas based on collected data
- Use AI/ML or other techniques to identify sources and build models
- Specific to the transmitter location as related to EM environment



Models Increase in complexity as more features are used

Dense Urban

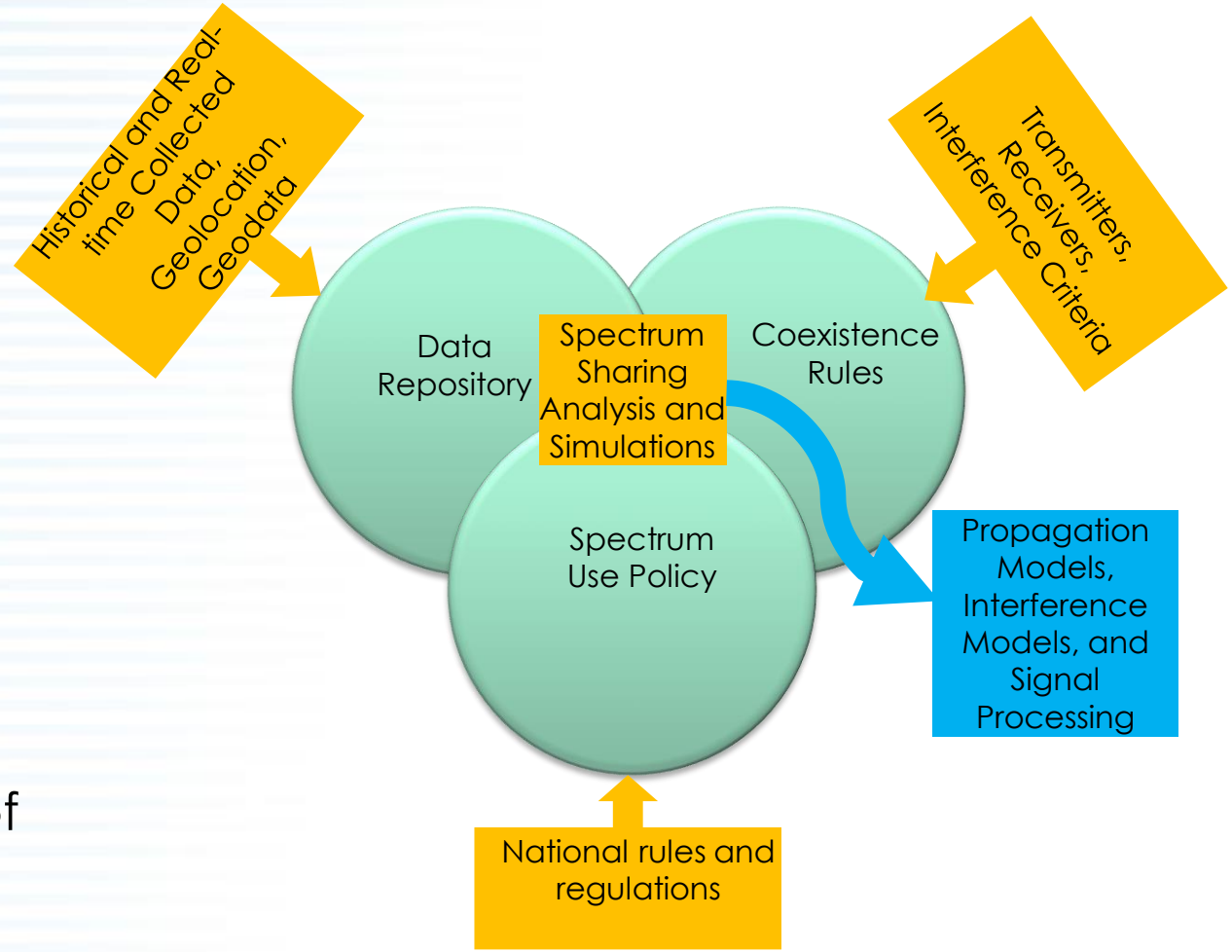
Urban

Suburban

rural

Things to consider

- As old obstacles go away, new needs arise for:
  - A better standardized process to validate and accept new models
  - An independent testing of new models
- Can't do it alone, requires
  - A lot of resources with different expertises
  - Government-industry partnership
- Spectrum sharing requires a lot of other capabilities
  - Do we have a common operational view?



Questions ?

Thank you!