



W & S Solutions, LLC
Transportation Consulting Service



Emerging Land Use and Transportation Modeling with UPlan and Emme in China

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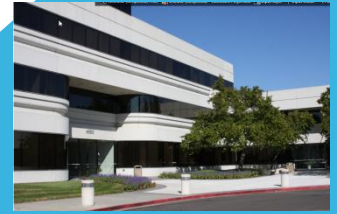
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7. INRO Consultants, Canada



W & S Solutions

An International Transportation Consulting Group



Transportation Consulting, Training and Modeling

1. W & S group has staffers and associates with advanced degrees and professional licenses and over 20 years of urban and transportation experience in the US, Canada, Europe and China
2. Group and partners offices in Pleasanton, Shanghai, Montreal and Barcelona
3. A business modeling partner of INRO (Emme, Dynameq), TSS (Aimsun), Transoft (Autoturn), Trafficware (Synchro) and GIRO (Hastus)



Laws In California And China

- California Laws: SB 375 is a California Climate Change law requiring Land Use and Transportation planning that will reduce GHG emissions mainly from passenger and light duty vehicles. This requires creating models for 2020 and 2035.
- In February, 2010, the China Ministry of Housing and Urban-Rural Development issued a legal document called “Urban Comprehensive Transportation System Planning Procedure,” which requires that both transportation system planning and urban general planning need to be done in a coordinated way and will serve as a legal requirement for development of urban and transportation planning procedures in China.



Active Tasks

- The Chinese Government's new "Twelve Five-Year Plan" has called for energy saving and environmental friendly societies. This plan will serve as a new regulation for urban general plans.
- The commitment from China is that Co₂ will be reduced by 40%-45% of the 2005 level in 2020.
- A National Research Forum was established in Shanghai, August, 2010. W & S and Fudan University are the founders of this national forum.
- Evaluation of criteria for the process need to be investigated.
- A modeling tool needs to be established for alternative evaluations.



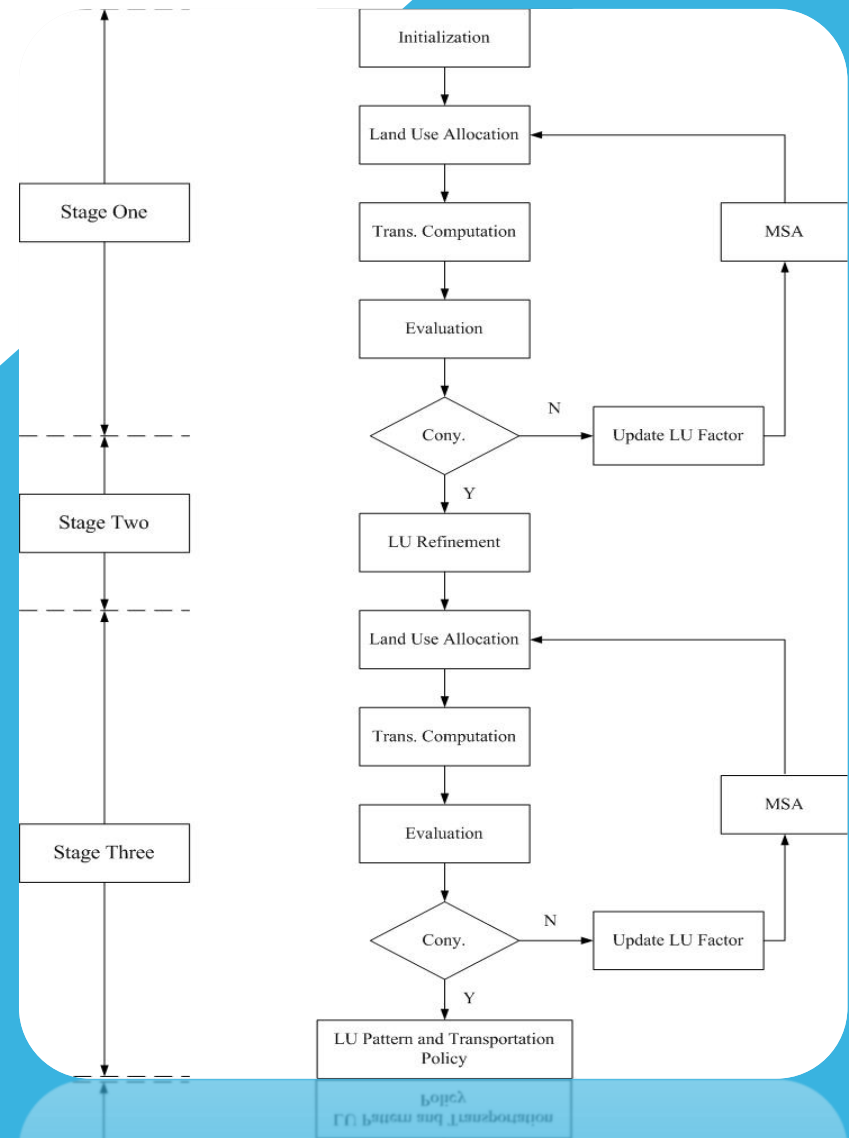
Evaluation Criteria

1. VMT
2. TAZ Based Accessibility
3. TAZ Based Congestion Measure
4. Average Distance
5. Average Travel Time
6. Population Covered by Bus Stops
7. Employment Covered by Bus Stops



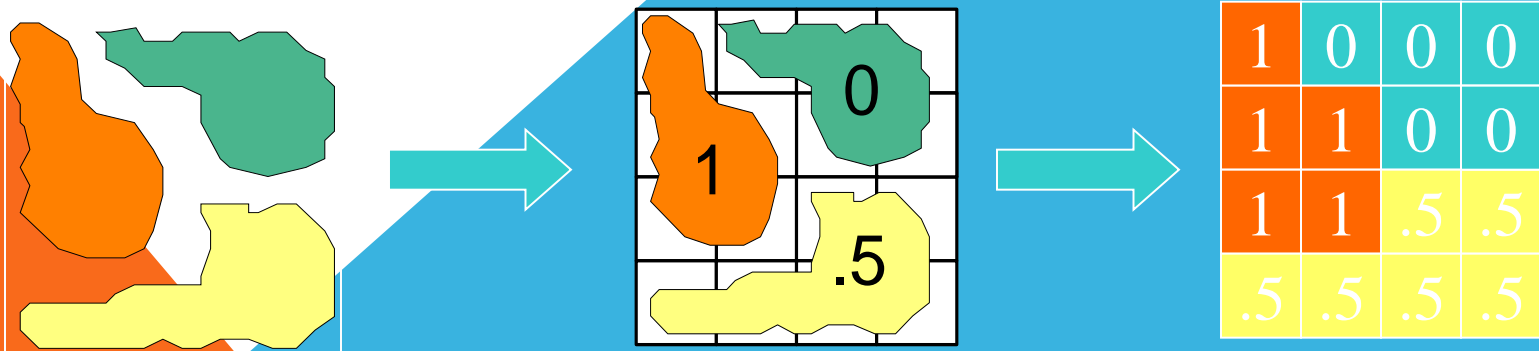
Land Use/Transportation Modeling

1. Stage 1: Land Use Sketch Planning;
2. Stage 2: Land Use Refinement;
3. Stage 3: Transportation Policy Planning;
4. Two special feedbacks at Stage 1 and Stage 3;
5. Uplan and Emme are used as part of the modeling process.



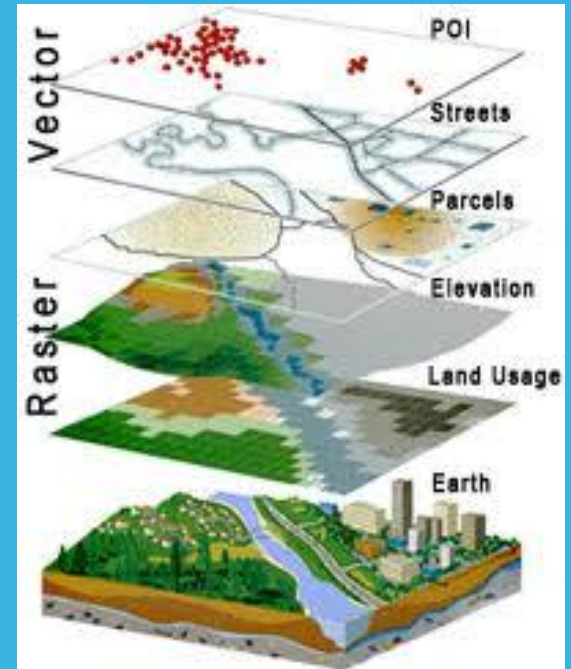
What Is UPlan?

- The land use allocation model is developed by UC Davis
- UPlan is a GIS based Land Use model that runs within ESRI's ArcGIS. Shape files representing General Plans, specific plans, existing urban areas, infrastructure, roads, environmental, and others are converted to grid based rasters.
- Uplan allocates the land use into grids and TAZs based on the total populations and total employments and a set of rules.



Attraction Factors In Layers

1. Existing road condition
2. On/off ramps of highway
3. Rapid high-speed rail
4. River environment
5. Existing urban condition
6. Existing construction condition
7. Flooding condition
8. Attribute of land
9. Earth quake condition
10. TAZ based transportation accessibility
11. TAZ based V/C measure
12. Policy preferences



Project Application for City of Luohe Region in China

1. Luohe is a prefecture-level city in central Henan province, People's Republic of China.
2. It is famous for its food production, the national garden city and is rich in tourism resources with the forest coverage up to 44.5%. The streets are lined with green trees and fresh flowers.



Study Area

1. Its urban proper area has a population of 800,000 with 61.99 square kilo-meters and 1.2 million in 2030.
2. It is a typical middle-sized city in China (a population between 0.5 and 1 million).
3. To develop a general plan of the city with the new regulation, we developed the project to determine the future land use patterns with transportation infrastructure by applying this modeling method.

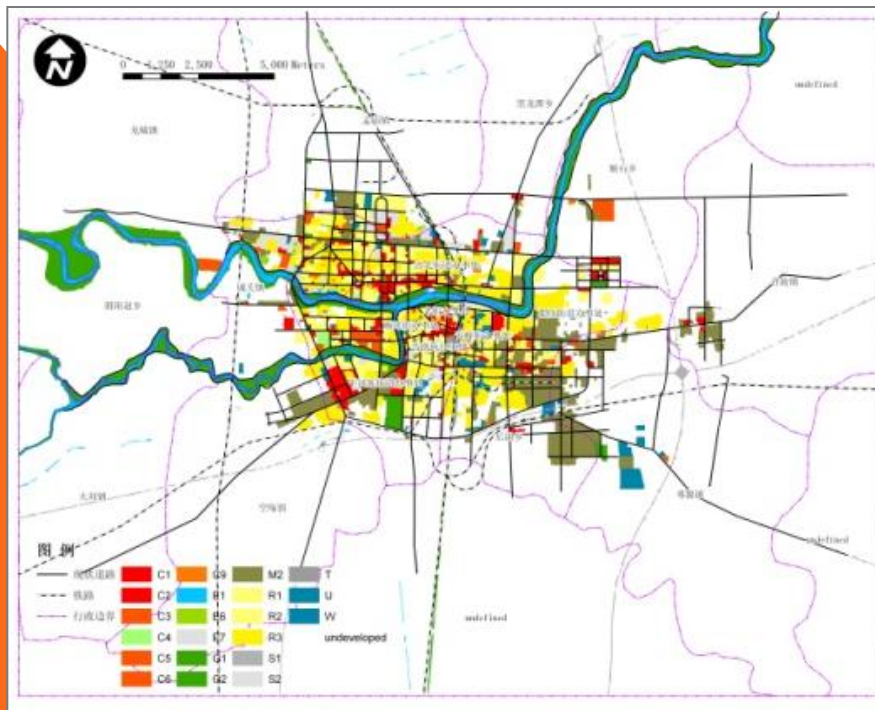
Land Use and Transportation Policies

LU Allocation Options		Transportation Policy Options		
		Transit	Auto	Non-Motorized
No-Intervention	LU1			
Aggregated	LU2			
Disaggregated with No Feedback	LU3	LU2.T1.A1	LU2.T2.A1	LU2.T3.A1
Disaggregated with Feedbacks	LU3	LU2.T1.A2	LU2.T2.A2	LU2.T3.A2



Land Use and Transportation Policies

LU Allocation (2009)



Draft LU Allocation (2030)

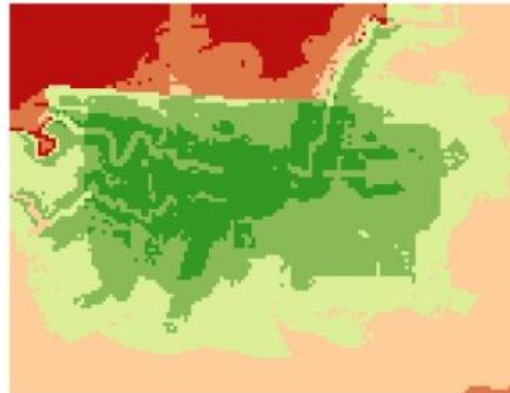
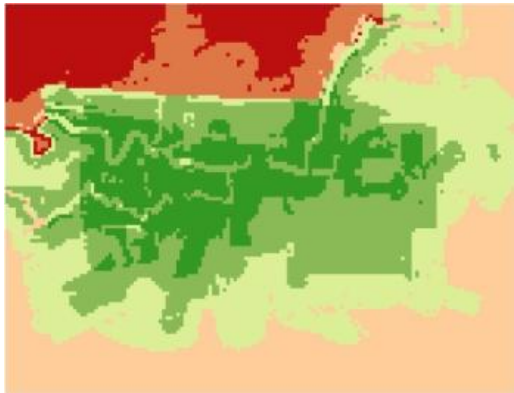


LU1:No-Intervention

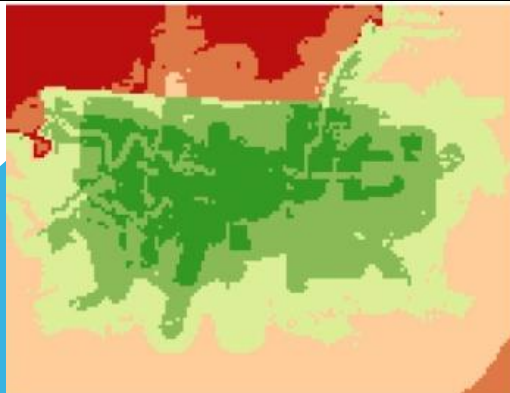
LU2:Aggregated

LU3: Disaggregated

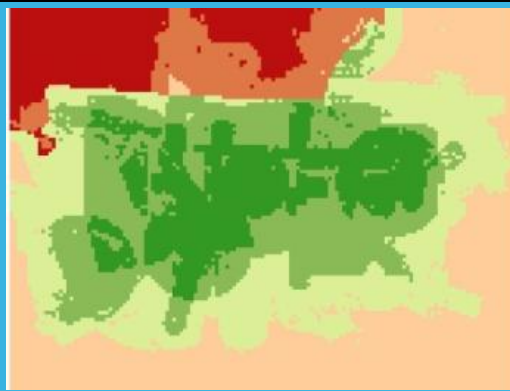
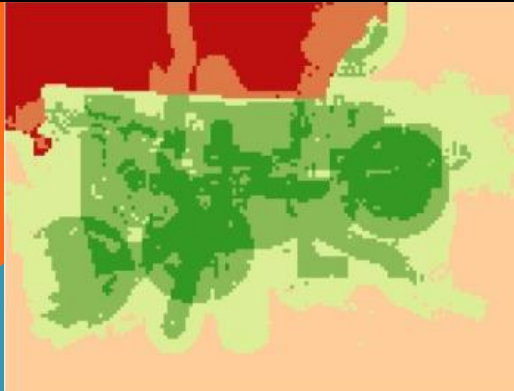
Residential Area



Commercial Area



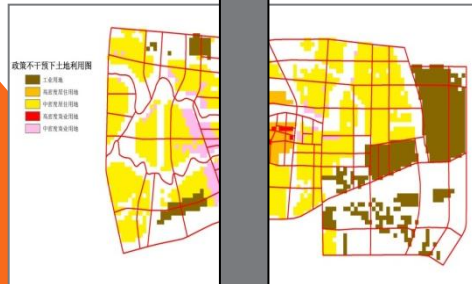
Industrial Area



Attractiveness from Low in Red to High in Green

Luohe City LU Allocations

表 4-16 三种土地使用政策下居住密度与就业密度对比分析表



情景	人口密度图	岗位密度图
政策 不干 预		
集聚 发展		
疏解 发展		

数据库=应用情景—
方案=传统发展政策

漯河城市土地使用与交通系统一体化规划决策支持系统模型——2030年传统发展政策机动车路段饱和度图



Volumes for Three Transportation Policies

Comparison Results at Stage Three

Table 14: Average VMT (in PCU-km) of Three Options for Two Applications

Transportation Policies	Time (min)			Distance (km)		
	Transit	Auto	Non-Motorized	Transit	Auto	Non-Motorized
With No Feedback	13.39	13.30	15.91	9.79	10.08	8.97
With Feedbacks	13.36	13.08	15.74	9.76	9.93	8.93
Difference	0.03	0.22	0.17	0.03	0.15	0.04

- The integration with feedbacks does produce a lower VMT
- Transit option is better than auto option

- 商业金融用地
- 居住用地
- 公共设施
- 工业用地
- 仓储用地
- 对外交通用地
- 道路广场用地
- 市政公用设施用地
- 公共绿地

河渠

吴未未加设计咨询(上海)有限公司
复旦大学城市规划与发展研究中心
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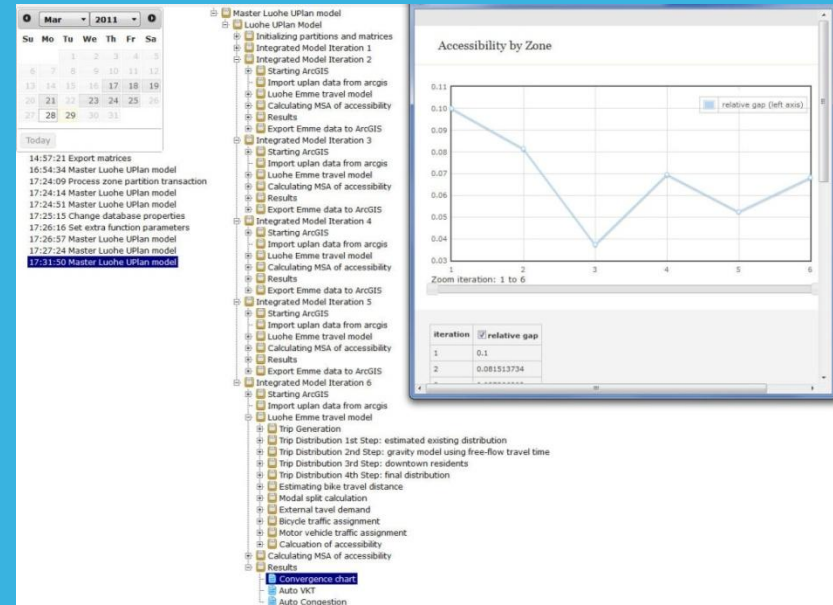
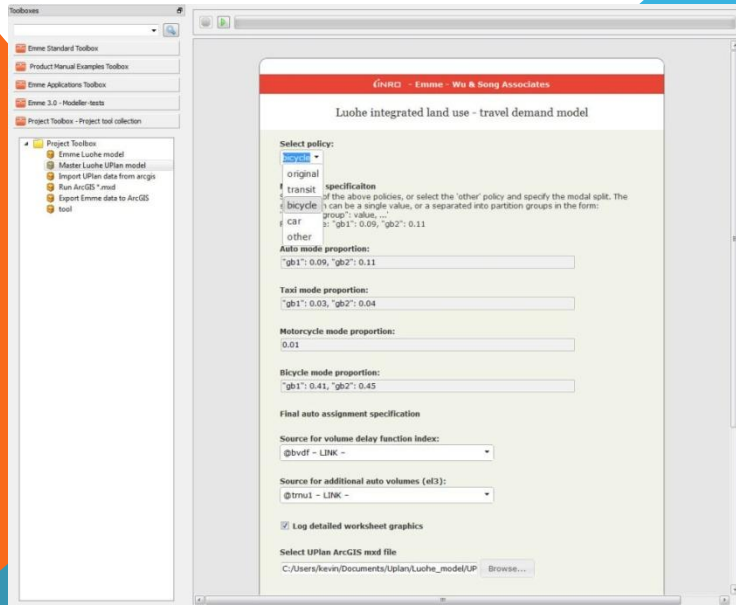
图 4-27 2030 年深化后规划用地方案图

Figure 9: 2030 Land Use Type Allocations for Transit Option with Application Two



Implementation: Uplan and Emme Modeller

1. New Emme Modeller can be used to call Uplan directly;
2. Iterations between Emme and Uplan can be streamlined automatically or manually;
3. A fixed point (or convergent solution) can be obtained and
4. Transportation results can be compared effectively.



Conclusions

1. Developed Sustainable Policies and Strategies
2. Implemented An Integration Modeling System
3. Performed Evaluation of These Policies and Strategies
4. Reduced VMT via Land Use and Transportation Feedbacks (Iterations)
5. Will apply this method to a larger area and regions
6. Will make comparison studies between the US and China

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