Sussman’s Key Points

People and organizations alter behavior based on transportation system expectations.

Transportation service is part of a broader system—economic, social, and political in nature.

Competition, or its absence, for customers by operators is a critical determinant of the availability of quality transportation service.

Analyzing the flow of vehicles on transportation networks, and defining and measuring their cycle is a basic element of transportation systems analysis.

Queueing for service and customers and storage for vehicles/freight/travelers are fundamental elements of transportation systems.
Intermodal and intramodal transfers are key determinants of service quality and cost.

Operating policy affects level of service.

Capacity is a complex system characteristic affected by: infrastructure, vehicles, technology, labor, institutional factors, operating policy, external factors (e.g. clean air, safety, regulation).

Level of service = \( f(\text{volume}) \); transportation supply. As volume approaches capacity, level of service deteriorates dramatically - the "hockey stick" phenomenon.

The availability of information (or the lack thereof) drives system operations and investment and customer choices.

The shape of transportation infrastructure impacts the fabric of geo-economic structures.
The cost of providing a specific service, the price charged for that service, and the level-of-service provided may not be consistent.

The computation of cost for providing specific services is complex, and often ambiguous.

Cost level of service tradeoffs are a fundamental tension for the transportation provider and the transportation customer, as well as between them.

Consolidation of like demands is often used as a cost minimizing strategy.

Investments in capacity are often lumpy (e.g. infrastructure).

The linkages between capacity, cost, and level of service—the lumpiness of investment juxtaposed with the hockey stick level of service function as volume approaches capacity—is the central challenge of transportation systems design.
Temporal peaking in demand: a fundamental issue is design capacity - how often do we not satisfy demand.

Volume = f(level of service); transportation demand.

Level of service is usually multidimensional. For analysis purposes, we often need to reduce it to a single dimension, which we call utility.

Different transportation system components and relevant external systems operate and change at different time scales (e.g. short run - operating policy; medium run - auto ownership; long run infrastructure, land use).

Equilibration of supply and demand for transportation service to predict volume is a fundamental network analysis methodology.

Pricing of transportation services to entice different behavior is a mechanism for lowering the negative externalities caused by transportation users on other transportation users and society-at-large.
Geographical and temporal imbalances of flow are characteristic in transportation systems.

Network behavior and network capacity, derived from link and node capacities and readjustment of flows on redundant paths, are important elements in transportation systems analysis.

Stochasticity in supply and demand is characteristics of transportation systems.

The relationship among transportation, economic development, and location of activities - the transportation/land use connection - is fundamental.

Performance measures shape transportation operations and investment.

Balancing centralized control with decisions made by managers of system components (e.g. terminals) is an important operating challenge.
The integrality of vehicle/infrastructure/control systems investment, design, and operating decisions is basic to transportation system design.