

# Introduction to Transportation Systems

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**PART I:**

**CONTEXT,  
CONCEPTS AND  
CHARACTERIZATION**

# **Chapter 1:**

## **Introduction:**

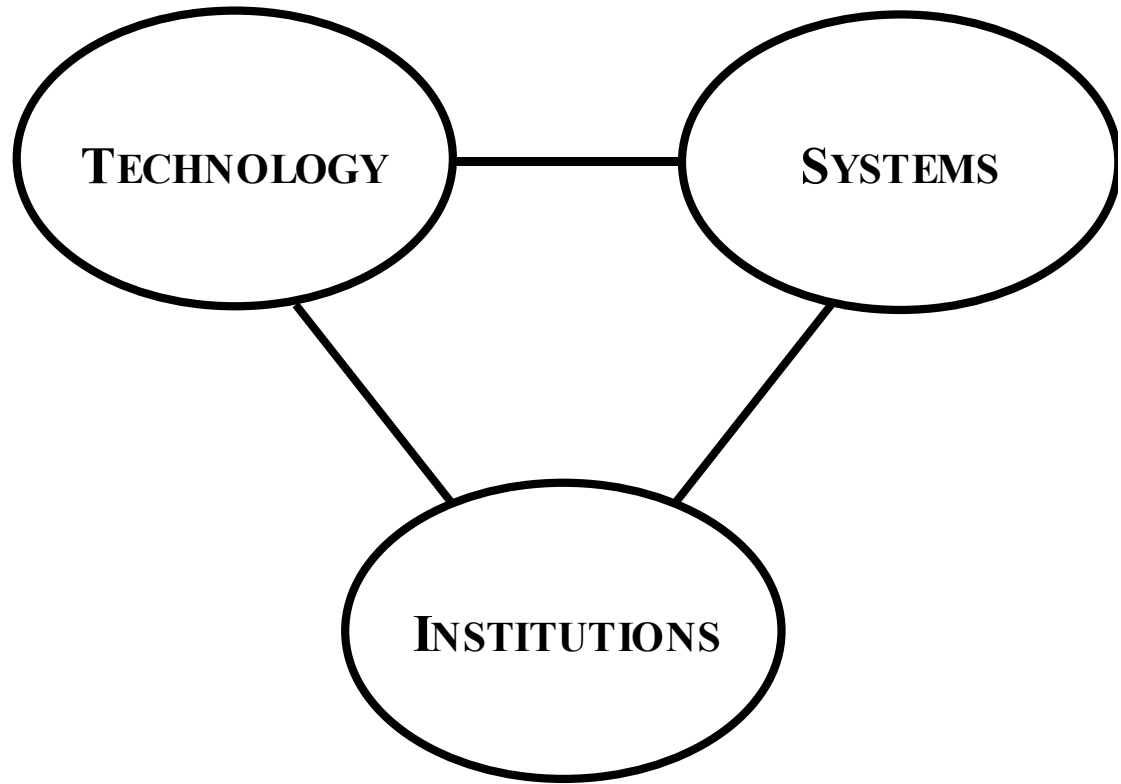
### **Context, Concepts and Characterization**

# Focus on Basic Principles

- The approach here is general and is relevant to all transportation modes and geographic contexts. We present a basic framework for thinking about transportation problem-solving.

# Transportation and the Social-Political-Economic Context

- ◆ Public-Policy Lever
- ◆ Private-Sector Investment
- ◆ Industrial Base  
(e.g., auto and shipbuilding industries)
- ◆ Employer
- ◆ Economic Development
- ◆ Large-Scale Infrastructure with Long-Term Impact
- ◆ Environmental Impact -- Sustainable Systems



“Transportation systems  
is not rocket science --  
it is a lot *harder*.”

# CLIOS

A system is *complex* when it is composed of a group of related units (subsystems), for which the degree and nature of the relationships is imperfectly known. Its overall behavior is difficult to predict, even when subsystem behavior is readily predictable. Further, the time-scales of various subsystems may be very different (as we can see in transportation -- land-use changes, for example, vs. operating decisions).

CLIOS have impacts that are *large* in magnitude, and often *long-lived* and of *large-scale* geographical extent.

Subsystems within CLIOS are *integrated*, closely coupled through feedback loops.

By “*open*” we mean that CLIOS explicitly include social, political and economic aspects.

Often CLIOS are counterintuitive in their behavior. At the least, developing models that will predict their performance can be very difficult to do. Often the performance measures for CLIOS are difficult to define and, perhaps, even difficult to agree about, depending upon your viewpoint. In CLIOS there is often human agency involved.



# Transportation Systems Concepts

- ◆ Transportation System Characterization
- ◆ Components of Transportation Systems
  - ☞ Internal
  - ☞ External
- ◆ Networks
- ◆ A “Simple” Example: An Elevator System
- ◆ Transportation “Key Points”
- ◆ Models and Frameworks

# Transportation Systems Characterization

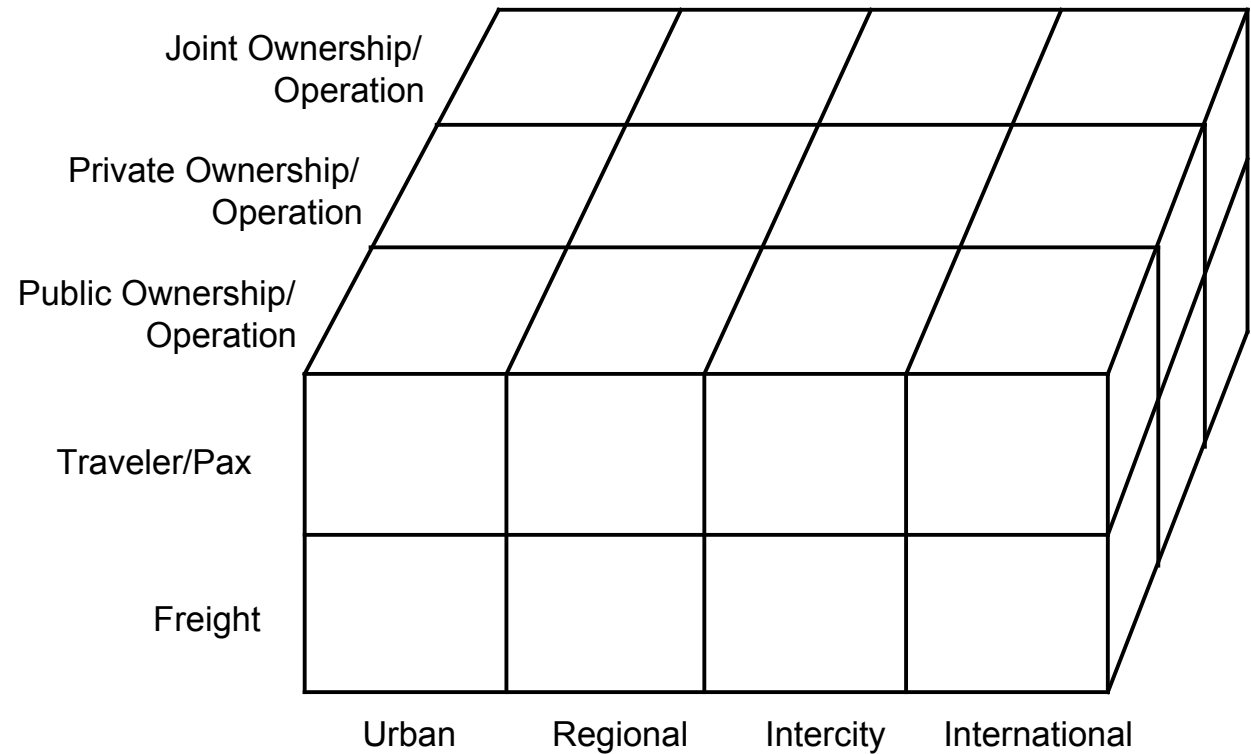


Figure 1.2