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A System Dynamics Model for Improving Railroad Performance

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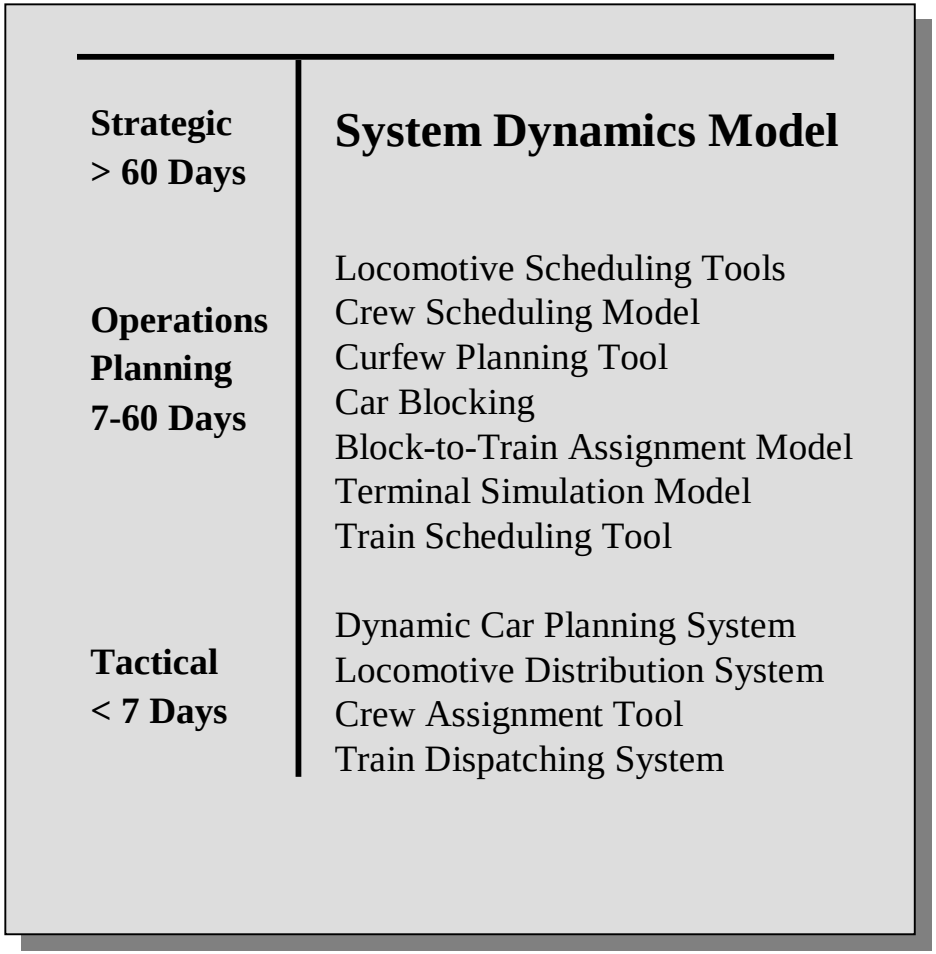
Why this model? (Phase 1: 1998, Phase 2: 1999)

- Chronic problems with on-time service performance
  - Solve one problem, another pops up
  - Poor performance generates costs and ties up capacity
  - Shifting business (intermodal up, coal down) creates challenge
  - Competitive environment requires good service and financial performance -- only 5 major freight railroads left in U.S.

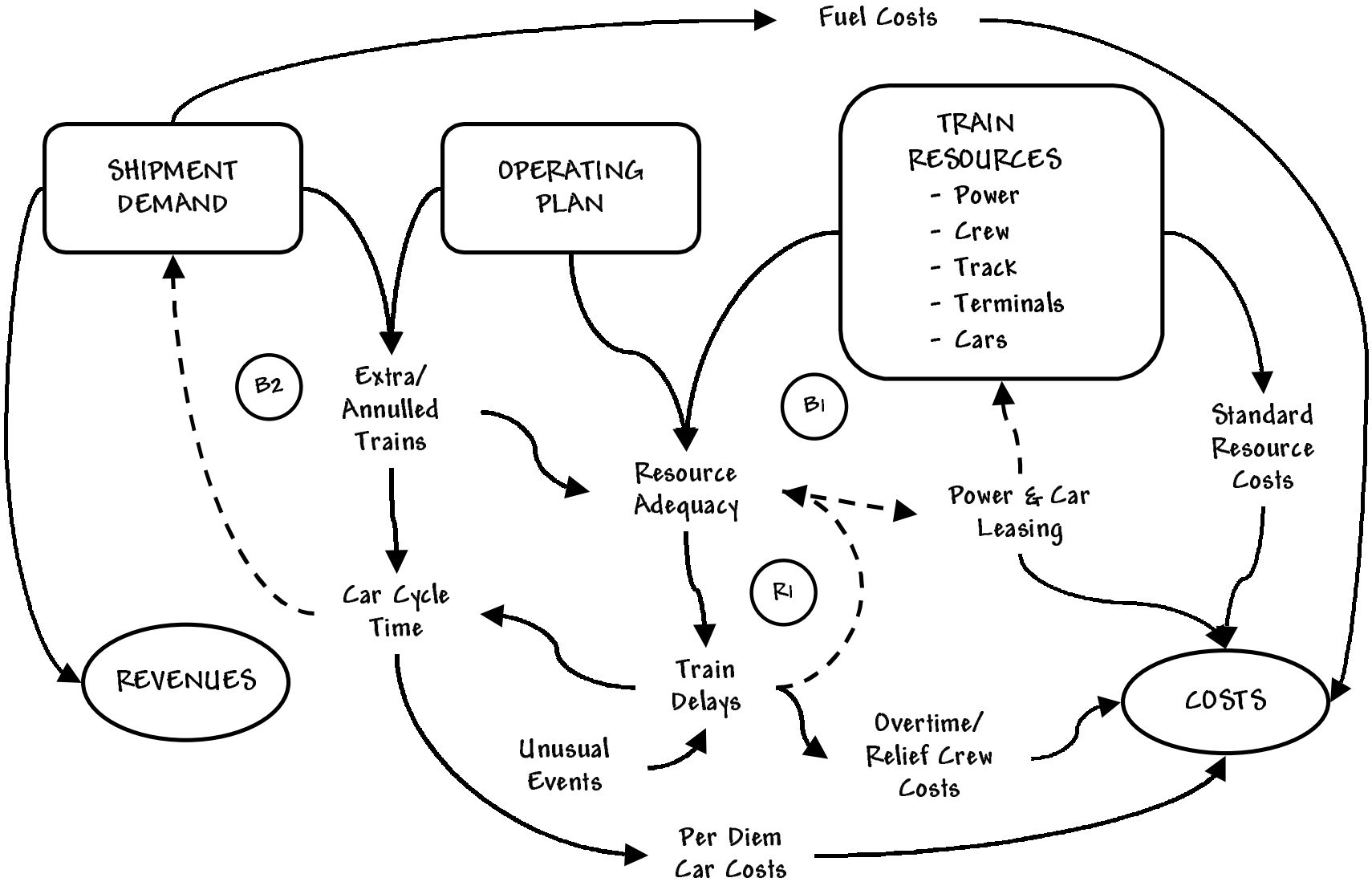
- Conrail acquisition and integration (June 1999)
  - Need to cut costs further to maintain cash flow
  - Anticipated new "single line" volume: Can CSXT handle it?
  - Concern about possible prolonged "gridlock" when two networks merge -- Union Pacific/Southern Pacific debacle 1997
    - Cars missing, RR crossings blocked, major terminals congested, factories closed….Customer lawsuits

Level of analysis: The view from the client organization (OR Dept.)

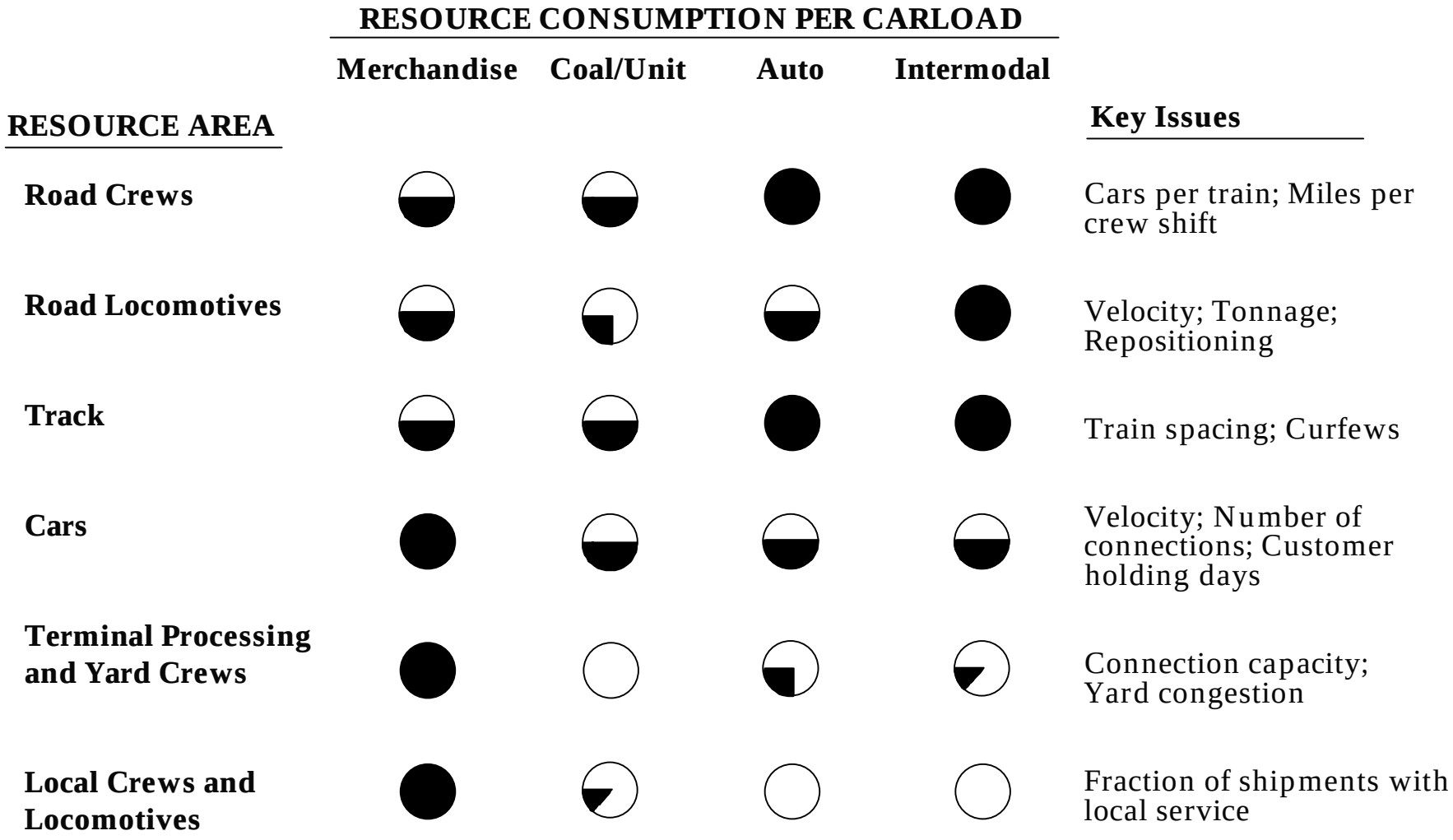
- Complements existing ops planning models
- 6-36 month time frame
- Network aggregates: No specific geography
- Four business units (Merchandise, Coal/Unit, Auto, Intermodal)
- Focus on cycle times and variable costs



Performance comes from the interplay of resources, demand, and operating policies



The different business segments consume network resources differently (all resources shared except cars)

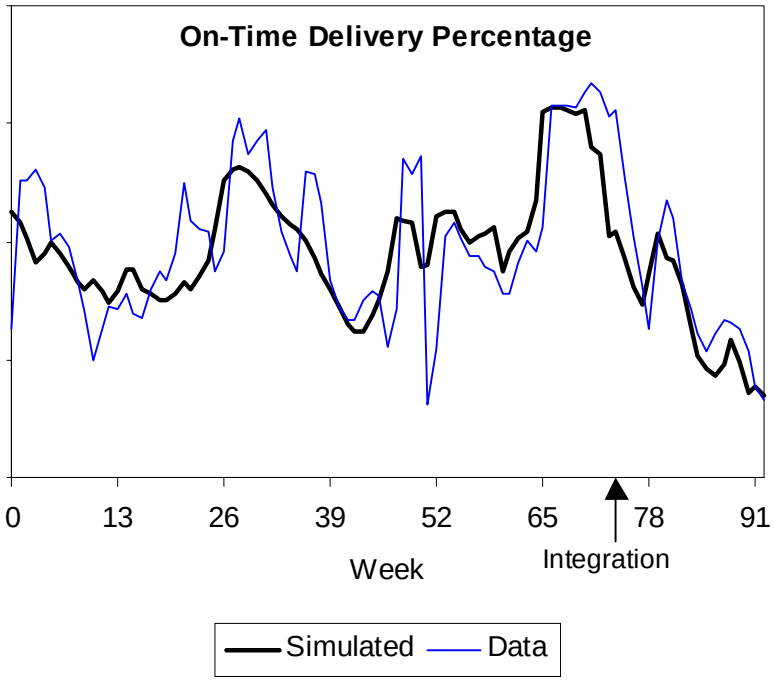


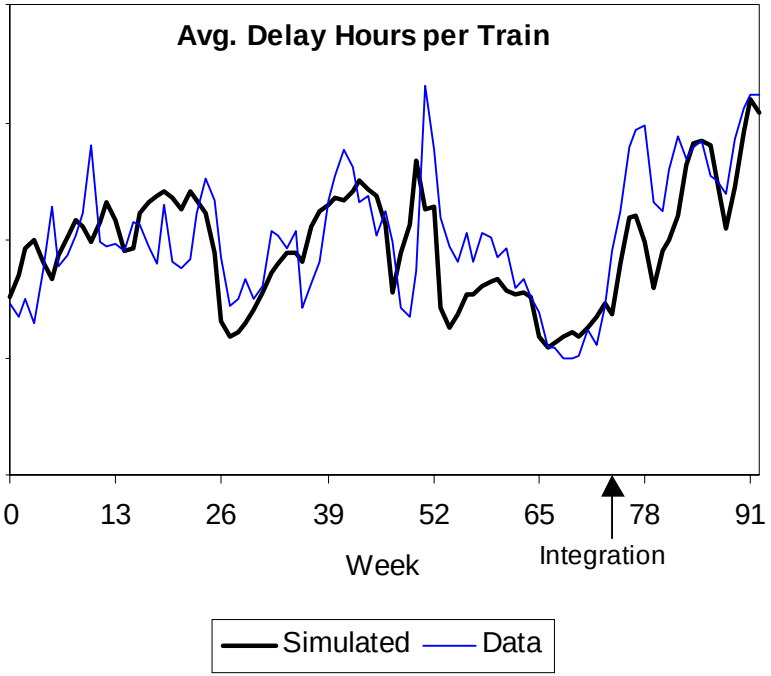
The model reproduces history (Jan. 1998 - Oct. 1999) for about 30 model variables, half of them broken out by business segment

Weeks 0-51: 1998…

Weeks 52-72: 1999 pre-integration...

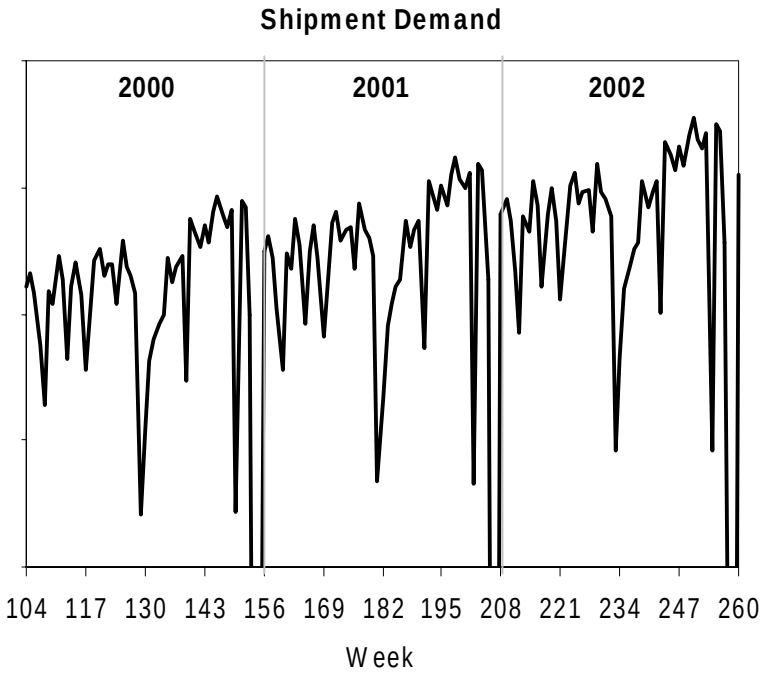
Weeks 73-92: 1999 post-integration

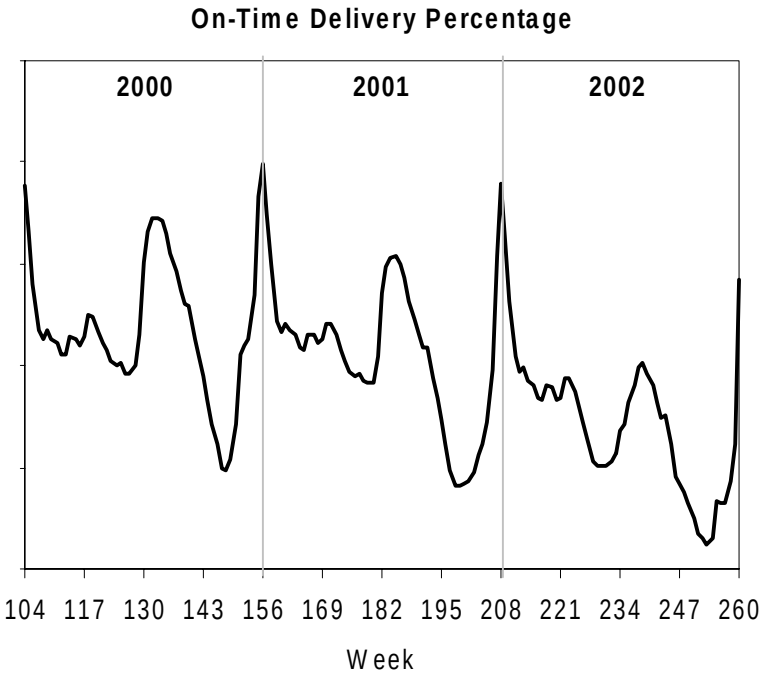




Base case projection: Expected volume gains cause service degradation in the absence of corrective action

Model Simulation Results for 2000-2002





What can the model tell us about managing the expected increase in demand over the next three years?

- Potential solutions are of three general types. A combination of these is necessary to achieve satisfactory performance.