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# Transportation Systems to Transport What?

Examining the Why of Systems Engineering

- **Biography - Malcolm Currie**

UCLA: Control Systems Engineering Ph.D.

Engineering Consultant - Aerospace and Commercial:

Lear Seigler, Rockwell, Hughes, Boeing,  
Rocketdyne, Schindler Elevator, ...

Missile/Aircraft guidance, navigation, and control  
systems; Military Systems requirements; Elevator and  
Security Systems control software, ...

Member of IEEE, GNSS, INCOSE ...

- **Over 20 years experience in Systems/Software Engineering**



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# Why build a mass transit system?

- Over 50 years ago
  - At my grandmothers house, I could walk a block or so and get on the streetcar that took me to downtown.
  - At home I could use the bus to take me many miles from my home to downtown or across town to my cousins' house.
  - To send a package to someone, I could use the post office or UPS. (Now we have FedEx and other companies also.)



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# What will mass transit system transport?

- When the Los Angeles Metrorail system was planned, did any Systems Engineers look at what it could be used for?
  - Would people want to take bicycles/ send packages?
  - Would package companies want to send packages or even carloads of packages?
  - What else could be transported on or in conjunction with a Metrorail “System”?
  - Can the architecture of such a system be evolve to allow for such inevitabilities as technology enhancement ?
  - The impacts of a defect in a new control system could be enormous – how is this risk managed?
  - Is there a place to test such changes on a scale model of the rail system?
- In the language of UML, what are the Use Cases for a new urban transportation system?
  - Have you noticed the several implied Use Case names in the above questions?



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# How could a mass transit system be used?

- Let's explore how a Mass Transit System could be used
  - an interactive session
  - could lead to new thinking in the transportation systems that are in current planning stages.



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## How would you use it – with and without your car?

- Look at the new Metrorail in Los Angeles
  - compare it with the old Redline – how are they different?
  - Is it convenient to transport a person with a bicycle or with luggage/packages?
  - Does it take people where they want to go – like to LAX airport or to Orange County?
  - Can an express train be used to more rapidly transport people between only main/ hub stations?
  - How does the rail system integrate with other means of transportation besides automobiles or walking?
- More generally, what do people do at both ends of a rail journey as well as while on the journey?



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# What else could be transported?

- How is the current system different than what was in Los Angeles almost 100 years ago?
- How else could the current system do something differently than what was in Los Angeles almost 100 years ago?
  - Could it be used to send packages alone?
  - Could it be better used to carry luggage? Bicycles?
- How else could a new planned system be do something differently than what was in Los Angeles almost 100 years ago?



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# What about engineering aspects?

- **What about engineering aspects such as technology injection?**
  - How will new software be checked out for cutover to the transit system?
  - How will a new computer system be checked out for cutover to the transit system?
  - How will new rail-cars (passenger and locomotion) be introduced to the transit system?
  - How will operations and safety issues be addressed when a new line (rail or otherwise) is integrated with the existing system?
  - What if there was a small-scaled replica of the transit system, with some parts having full scale rolling-stock? Could this be used as a revenue generator, e.g., transportation for a community or a theme park?



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## What other uses are there?

- **What other uses are there for a mass transit system in LA?**

- Could a rail-car be rented for a rolling dinner or party space?
- Could a blood bank own a own rail-car that would be moved around the city on a schedule?
- What else?

[See notes that are with this presentation.]



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# Questions?

- Malcolm Currie
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- Special Thanks to Track Chairs
  - Track 1 [Applying Systems Engineering to Infrastructure Systems and Enterprise Systems](#) (plus “how to” case studies)
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