

The Integrator

INCOSE North Star Chapter



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North Star Newsletter

INCOSE North Star Newsletter Communication

Call for 2007 articles for *The Integrator*. North Star is seeking volunteers to provide 6 short (half to three quarters of a page) articles on Systems Engineering for 2007. In Particular, we are seeking a company to sponsor a year long theme associated with, for example, Medical Devices, Defense, or Environmental. Please contact Eileen.Arnold@incose.org if you wish to contribute articles every two months throughout the calendar year.

Eileen Arnold, Editor BAE Systems

"If email had been around before the telephone was invented, people would have said, "Hey, forget email! With this new telephone invention I can actually talk to people!""

- The Executive Speechwriter Newsletter

Systems Engineering at its Best!

This is the forth in a planned series of articles on the Systems Engineering behind the development of a much improved form of urban transportation. The process was started many years ago by a few engineers who did something about the oft-repeated conjecture: "There must be a better way to move around in cities!"

Meeting the Design Criteria for a New System of Urban Transportation, Step 1

It will not be possible to reduce congestion, decrease travel time, or reduce accidents by placing one more transport system on city streets – the new system must be either elevated or underground. Underground construction is extremely expensive, so the dominant emphasis must be on elevation. This was understood over 100 years ago in the construction of exclusive-guide way rail systems in Boston, New York, Philadelphia, Cleveland, and Chicago. A major problem, however, was the size and cost of the elevated structures, which markedly limited the

Chapter Presidents Corner

Bob Hunter ATK

Did you know that your membership information is available on the INCOSE.org website? To view your information, go to INCOSE.org and log into the Members' area. You can then do a search on your name to find your membership information. This information (and other information that is not displayed) can be updated by sending email to info@incose.org.

Remember that, when possible, INCOSE prefers to use your home address for the mailing address to avoid mail room problems in delivering your copies of INCOSE INSIGHT and the Systems Engineering Journal.

The information that can be updated includes the following:

- Name
- Member Number
- Organization Affiliation
- Position or Title
- Mailing Address
- Work Phone
- Fax Number
- Home Phone
- E-mail Address (Primary) and (Secondary)
- Chapter Affiliation
- Include Contact Information in the Members Directory [yes/no]
- Release Contact Information to Mailing Lists [yes/no]

INCOSE now depends on us to take the initiative to keep our information current, so check out the website and update your information today.

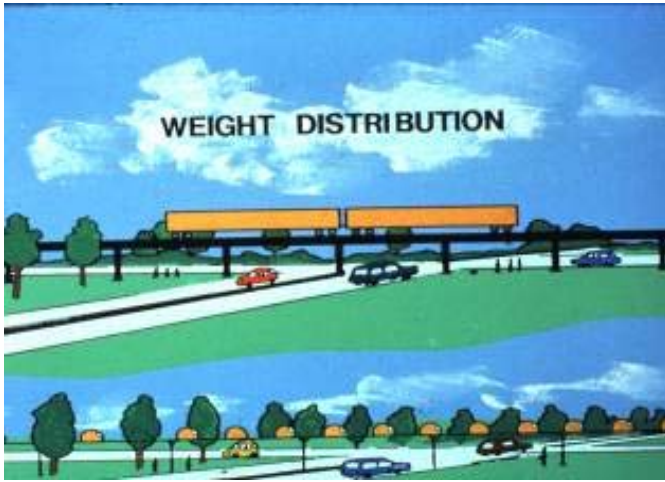
WELCOME NEW MEMBERS!

Name	Title	Company
Charmaine Sutton	President	The Tamarack Group
Roger Wichmann	Section Head	Mayo Foundation
Catherine Behun	Technical Supervisor	3M
Wes Nelson	Principle Engineer	Ecolab Inc.
Steven Untz	SE Manager	BAE Systems

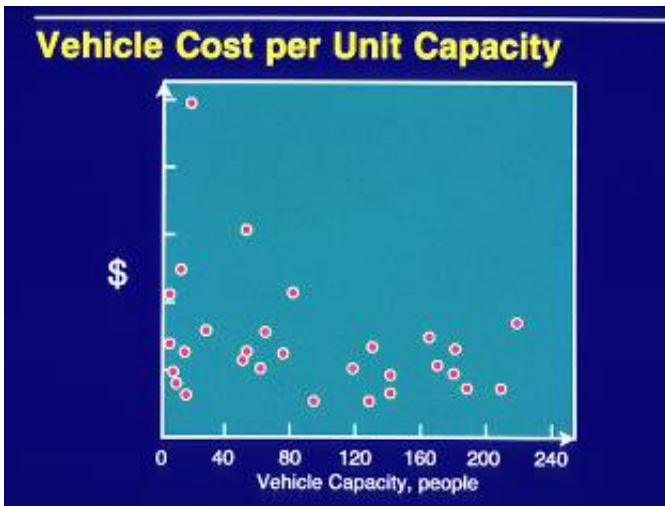
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expandability of those systems.

It has been found that if the units of capacity are distributed in many small units, practical now with automatic control, rather than a few large ones, and if we use techniques of light-weight construction practical today, we can reduce the weight per unit length of a guide way by a factor of at least 20:1! This difference in guide way weight has the potential to enormously reduce the cost and visual impact of an elevated structure. Moreover, for a given sum of money it permits the system to serve a much larger region, and thus per dollar will attract many more riders.



It is common to assume that there must be an economy of scale, i.e. the cost per unit of capacity of large vehicles must be lower than the cost per unit of capacity of small vehicles. Examination of data show, however, that, even with many more motors, controllers, and suspension systems, the cost per unit of capacity does not depend on capacity. Each point in the accompanying figure represents a transit system. The two upper points



correspond to systems developed by the U. S. federal government in the early 1970s at a time when cost minimization was not a design criterion. For the rest of the systems shown, it is clear that, if cost minimization is a criterion, a system of small vehicles can be designed to have as low a cost per unit of capacity as a system of large vehicles.

With this finding in mind consider the cost of a fleet of transit vehicles. The cost of the fleet is the cost per unit of capacity, a constant, multiplied by the capacity needed to move a given number of people per unit of time. The major factor that determines the capacity needed is the average speed. If the average speed could be doubled, the number of vehicles required to move a given number of people would be cut in half. The greatest increase in average speed without increasing other costs is obtained by arranging the system so that every trip is nonstop. The trips can be nonstop if all of the stations are on bypass guide ways off the main line.

The resulting system of small, automatically controlled vehicles operating between off-line stations in a network of guide ways is called Personal Rapid Transit or PRT. Detailed study¹ shows that, while there are many ways to design PRT poorly, by carefully following more detailed criteria PRT can result in the lowest possible cost per passenger-mile.

¹ J. E. Anderson, "Optimization of Transit-System Characteristics," *Journal of Advanced Transportation*, 18:1(1984):77-111.

J. Edward Anderson

2006 Meeting Calendar

17 August	Summer Social and Symposium Debrief	Anderson Renewal
14 September	Systems Integration	EcoLab
12 October	Safety	ATK
9 November	Human Engineering	Environ Labs
14 December	Member Holiday Party + Guest	

North Star Chapter Website

<http://www.incose.org/northstar>