



# 2009 Mini-Conference

## Classical Systems Engineering -- Four Types

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- Biography
  - Georgia Tech B.S.A.E. 1971, Caltech System Engineering, 1995
  - USAF 1963 – 1967; Boeing, orbital mechanics and Flight Test, 1971 – 1981; Northrop Flight Test and Systems Engineering, 1981 - 2007
  - Apollo, CH-46/47, strategic aircraft, developmental projects, rocketry team mentor
  - Member of INCOSE-LA BoD
- Major fields of interest
  - Systems engineering, surface transportation, **railroads**



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## **Four types of classical systems engineering:**

- 1. Textbook**
- 2. De jure**
- 3. Du jour**
- 4. *Native or intuitive***



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## Four types of classical systems engineering:

1. Textbook
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**MIMICRY!**



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## **TEXTBOOK SYSTEMS ENGINEERING:**

- **Borne of experience**
- **Distilled and disciplined in the crucible of academia's rigor**
- **Defined by INCOSE**
  - **Defined by DAU and other professional organizations**
  - **The jargon may vary but the fundamentals are the same**



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**De jure systems engineering:**

- **An organization created**
- and**
- **a set of activities performed**
- **in response to the direction of the customer, management or fiat**



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## **Du jour systems engineering:**

- **Uses terminology deemed popular**
- **Uses software tools that allegedly “do” systems engineering**
- **Often times combined with de jure systems engineering**



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**Native or intuitive systems engineering:**

- **The original systems engineering – without the benefits of academic rigor**
- **The type of systems engineering most often confused with textbook systems engineering**
- **Is the second half of the maxim:**  
**“All successful project follow the systems engineering process. Some follow deliberately, the others follow it eventually.”**



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**Native or intuitive systems engineering is adequate if a project has:**

- **Lots of money**
- **Glam**
- **Highly qualified personnel**



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**Du jour and de jure systems engineering can be adequate if they meet:**

- **Customer expectations**
- **Performance**
- **Cost**
- **Schedule**



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## **CONCLUSION AND RECOMMENDATION**

- Use “textbook” systems engineering
- Yeahbutt:
  - Systems of tomorrow
  - Challenges of yesterday



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## **CONCLUSION AND RECOMMENDATION**

- Use “textbook” systems engineering
- Yeahbutt:
  - Systems of tomorrow
  - Challenges of yesterday
- Use “textbook” systems engineering anyway



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## **CONCLUSION AND RECOMMENDATION (Long form)**

- Classical systems engineering is thought to be inadequate because projects follow one or more of the three mimics and then the project managers do not understand why they fail.
- The challenge facing us is two fold:
  - Understand and follow the real systems engineering process and,
  - Exploit the experiences of railroads as they incorporated electrical technology into their systems.

Thank you for your time and attention.

Are there any questions?