

# ***Delivering Economic and Efficient System Engineering***



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***INCOSE Railway Systems Engineering in a  
Tough Economic Climate – London, June 2010***



**Tube Lines**

# Introduction

- System engineers need to be more resourceful than ever
- We need to **Reflect on Our Practices**  
*Where might opportunities lie to improve system engineering delivery in this climate?*
- We need to think about how we **put the Case for SE in the current climate**  
*What arguments might convince the sceptical stakeholder?*



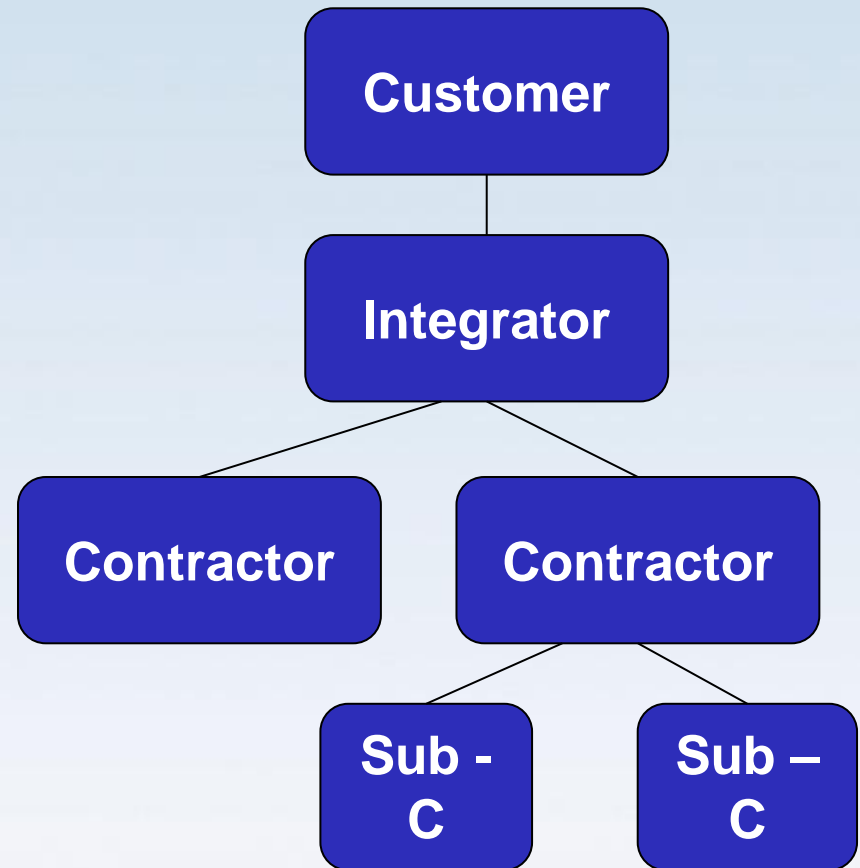
# Reflecting on our Practices



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# Duplication of Effort in the Supply Chain

- SE effort is probably duplicated through a complex supply chain
- Reducing duplication needs a level of trust and interaction between the parties
- ... but the prize is worth considering.



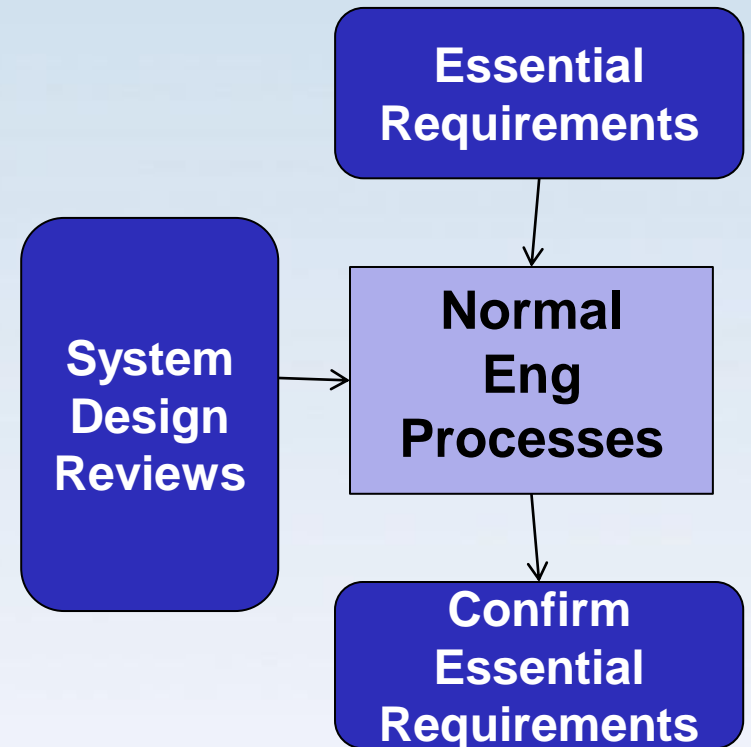
# Optimising the Scope of System Engineering on a Project

- Tempting to try to apply SE to the whole project scope.
- **But not all system components are equal**
- Can simply employ standard engineering practices in some areas.
- Reduces SE costs and the tension that can arise when trying to impose SE in a low risk area where SE concepts are alien



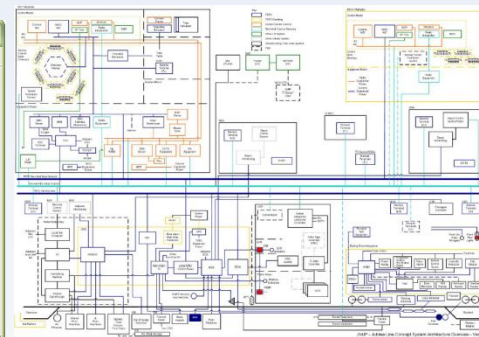
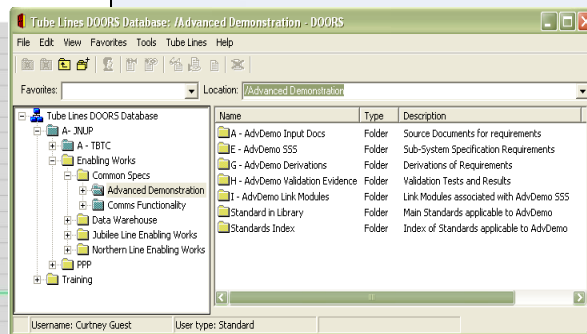
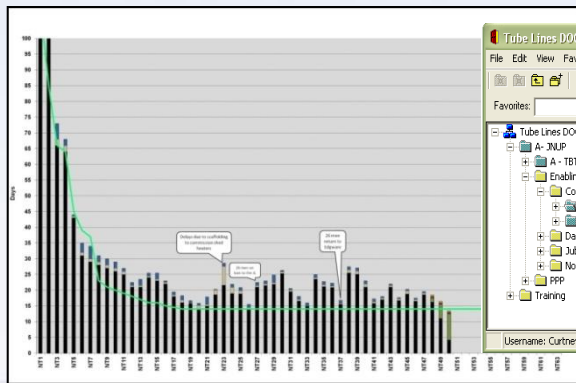
# Case Study: New Service Control Centre

1. Input key requirements into scope
2. Allow normal civil engineering/ E&M processes to operate
3. Periodic System Design Reviews
4. Check key requirements met



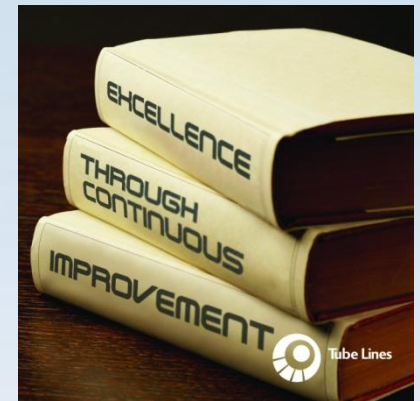
# Critically Examining SE Processes

- As with all management systems, SE processes tend to grow over time.
- Can add to process complexity without a corresponding increase in value.
- A critical review of processes, using tools such as **Six Sigma** can identify process improvements
- **GOAL: Eliminate or reduce low value process elements.**



# Institutionalising Lessons Learned on Projects

- Mistakes, inefficiency and ineffectiveness cost money, quality and time.
- Also affect less tangible capital such as morale and reputation.
- “Lessons Learned” can seem like a soft skill, but actually has hard consequences.
- Lessons Learned reports are easily forgotten
- **Lessons can only really be learned when they are reflected in day to day processes.**



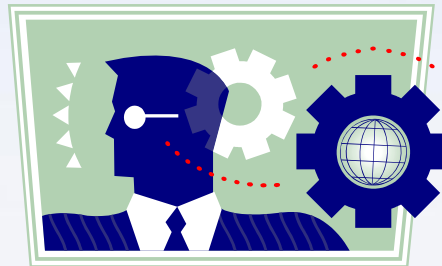
# Critically Examining Customer Requirements

- Not visible to end user and customer organisations what the true cost of specific requirements is
- Nor is it visible to suppliers what the true cost of not delivering a requirement is to the customer.
- Hence, **collaboration** is needed to review this.



# Building Resilient Teams of Competent System Engineers

- Matters more than ever to recruit, retain and develop in-house SE resource and a tailored SE tools.
- Requires patience, energy and time from senior practitioners.
- Opportunity to further integrate SE into other areas
- Strong system thinkers can be found in many places.



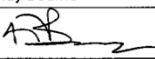
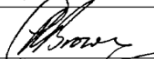

# Case Study: TL Engineering Competence Management System

- Specialist SE Competences
- But also **general competences** for SEs
- **System Thinking** in ALL competences

Job Technical Competencies TLF-315

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**PRINCIPLE SYSTEMS ENGINEER**

Issue No 1	Job holder	Functional Manager	Manager of Engineering
08/02/05	Andy Bourne	Chris Brown	Mike Hann
Signature			

These technical competencies are based upon the Signals and Controls group standard job descriptions. Please sign to agree.

Issue	Date	Details of Revision
1	31/01/05	

**TECHNICAL COMPETENCY SUMMARY**

Competency	Level	Application Field*	Competency	Level	Application Field*	Competency	Level	Application Field*
Assurance	4	General	Feasibility	5		Projects	4	General
Auditing	1		Fire			Qualifications	4	Systems
CAD			Inspection			Risk Assessment	5	General
Codes, Regs & Stds	5	Systems	Installation			Safety	5	General
Contracting	3	General	Investigation	4		Surveying		
Design	5	Systems	LUL Awareness	4	Systems	Systems Engineering	5	General
Drawing			Maintenance			Testing	3	Systems
Estimating	4		Metallurgy			Value Engineering	4	General

These competencies are based on TLL-SUP-S1007-A1 Technical Competency Standards, levels 0-5 (5 Highest).

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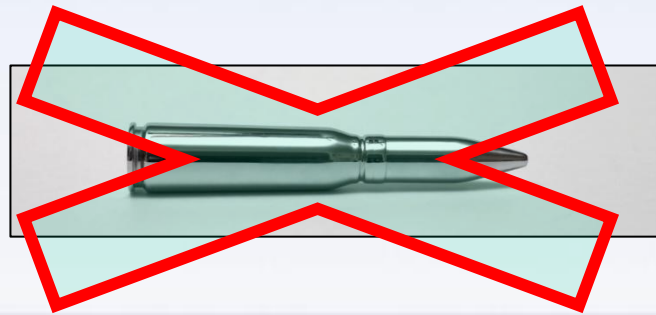
# Putting the Case for SE in the current climate



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# Putting the Case

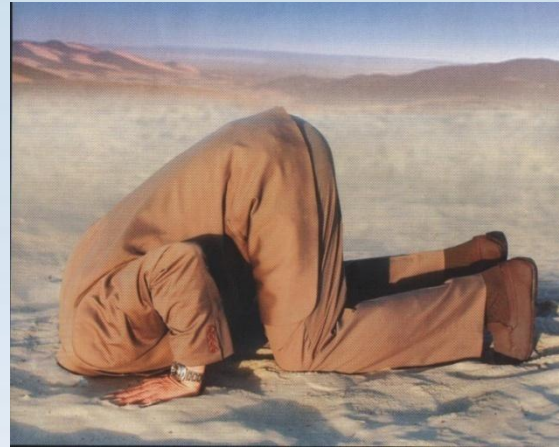
- SE in the rail industry is increasingly recognised as a critical element.
- But SE is not a silver bullet and can still be patchily practised
- Need to show that we understand and have control of cost drivers and that we can quantify business benefits of SE
- This also means putting our house in order rather than wait for the axe to fall arbitrarily!



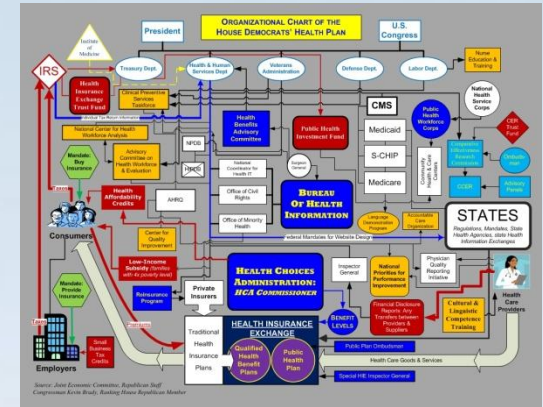
# Things to avoid ...



**Overselling  
SE**



**Hoping there won't be  
any budget cuts**



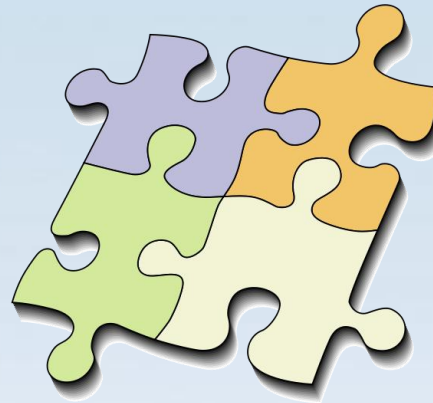
**Making things  
over-complicated**

# Things to do...

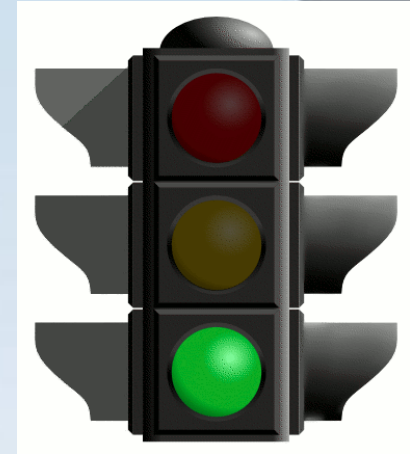


**Show how SE  
relates to the  
bottom line**

- cost drivers as well as
- risk avoidance
- business benefit



**Keep it simple  
And relevant**



**Be proactive**

# Conclusion

- Current climate demands ***resourcefulness***
- We need to critique our own processes and look for opportunities to focus on what delivers value – to “***System Engineer our SE***”
- We need to act ourselves rather than wait for others to act for us!

