Enchantment Chapter Monthly Meeting

11 Feb, 2015 – 4:45-6:00 pm:

When "Yes" is the Wrong Answer

Andy Pickard, Rolls-Royce Associate Fellow in Systems Engineering, Rolls-Royce

Abstract: Systems Engineering's value comes from doing effective pre-work to avoid later, expensive rework. There are many barriers to uptake of Systems Engineering, including the difficulty of abstract and holistic thinking and project time pressures. This paper focuses on the time pressures, and the usual desire to show positive progress in any form of review of a project. This leads to a behavior where there is a tendency to say "yes" in answer to a question because we know it is the desired answer. Inappropriate "yes" statements to questions like "Are the requirements complete?" result in a tendency to stop the pre-work, and start the solution stage pre-maturely or with false confidence. The paper proposes as a heuristic that the Systems Engineer recognizes that there are implicit dangers in answering "yes" to many review type questions.

Download slides from GlobalMeet file library or www.incose.org/enchantment/library.aspx

NOTE: This meeting will be recorded

A Few Words First

New INCOSE and Chapter web sites will go live in February, same addresses.

In February the Chapter Board will be planning the year.

A special focus this year on providing meetings, tutorials, and events that provide values you want – what would interest you?

If you haven't already, please respond to the survey that has been distributed, your input will guide the Chapter planning for the year.

- **Do you want to hear more about what working groups are doing … or not?**
- **Do you want a CSEP preparation event?**
- **What speakers or topics for meetings and tutorials?**
- **Tours or social events?**
- **Mud wrestling?**
- **Or what…?**

Considering INCOSE SEP accreditation? Look at last email announcement for:

> **Make 2015 your year. Gain international certification of your knowledge, experience and skills. Our CSEP Preparation 4-Day Course will place you in the best possible position to pass the CSEP exam. To learn how to successfully pass the exam and complete the application, join us at a course near you.**
>
> **Course details | Course brochure**
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> **2015 Course Schedule (close by, others available as well):**
>
> **April 27 - 30 | Albuquerque, NM | Find out more**
>
> **May 11 - 14 | Denver, CO | Find out more**

When “Yes” is the Wrong Answer
Things to Think About

When have you heard “yes” inappropriately?

To what ill effects?

How can this issue be rectified – by who?

Do you want to influence this behavior at your place?

Would you participate in a chapter project on this?

Send your interest to any board member (email in newsletter)

Speaker Bio

Andrew Pickard joined Rolls-Royce in 1977 after completing a Ph.D. at Cambridge University in Fatigue and Fracture of Metals and Alloys.

He is a Rolls-Royce Associate Fellow in System Engineering, a Fellow of the Institute of Materials, Minerals and Mining, a Chartered Engineer and a member of SAE International and of INCOSE.

He is Vice-Chair of the SAE Aerospace Council and represents Rolls-Royce on the INCOSE Corporate Advisory Board.

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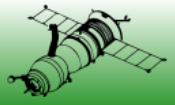
When “Yes” is the Wrong Answer

Richard Beasley, Andy J Nolan and Andrew C. Pickard

INCOSE 2014 International Symposium


The good, the bad and the ugly

Introduction

- System Engineering's value comes from doing effective pre-work to:
  - Get a full understanding of situation
  - Drive informed decisions, leading to effective outcomes
  - Avoid later, expensive rework
- There are many barriers – and one is the way we review and lead our projects
- Many questions asked regarding progress and status prevent proper use of Systems Engineering because the expected / desired answer is "yes"
  - Better answer would be "no" or "not yet"
- We give examples and illustrate the problems implicit often due to an expectation of linear progress

Example Questions

- Are your requirements complete?
- Do you understand all of the interfaces?
- It's only a small change – can I skip the analysis and test?
- Have you mitigated all the risks?
- Have you used stage gates/independent review?
- Can you improve the system by changing one part?
- Do you think the customer is an idiot?

Are your requirements complete?

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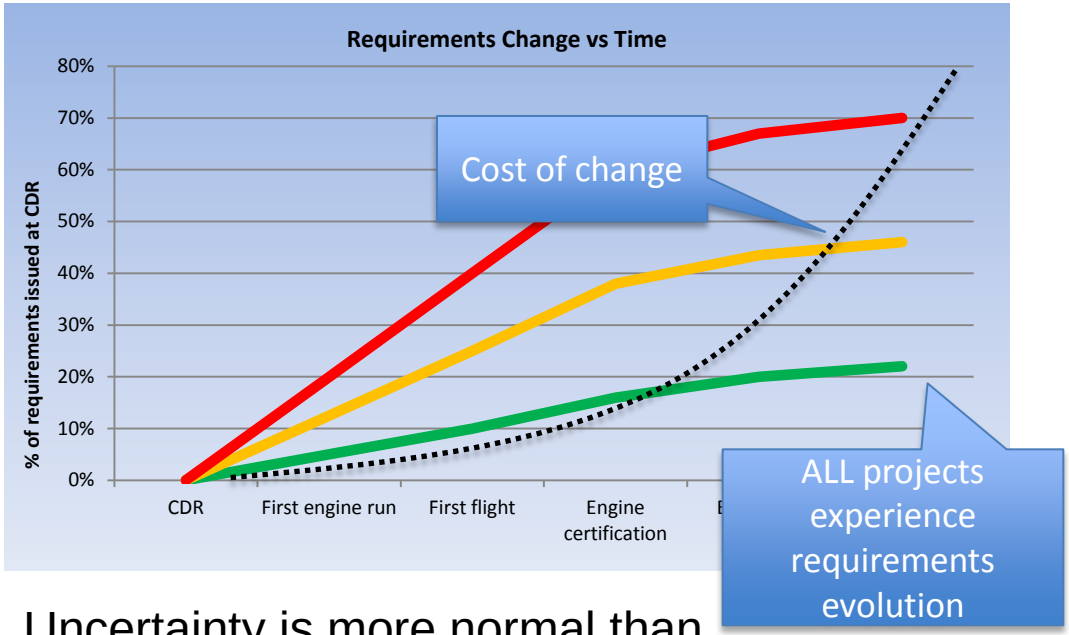
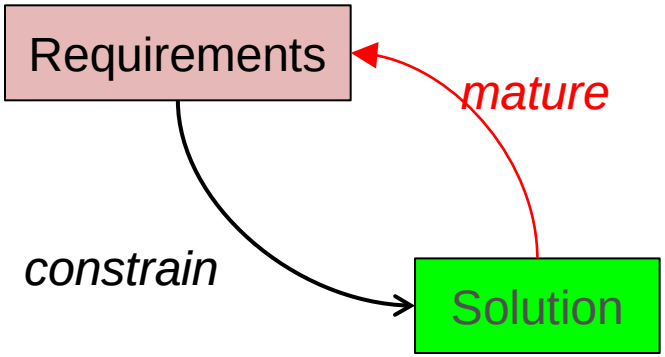
At first glance, an entirely sensible question. But…

Of 10 projects measured at RR, all had requirements change:

- Wicked problems
- Emergent requirements
- Customers never know all their needs





Uncertainty is more normal than certainty. Assuming you have complete requirements and ignoring the uncertainty will increase costs. Requirements uncertainty management has a 100:1 ROI

Bad

Do you understand all of the interfaces?

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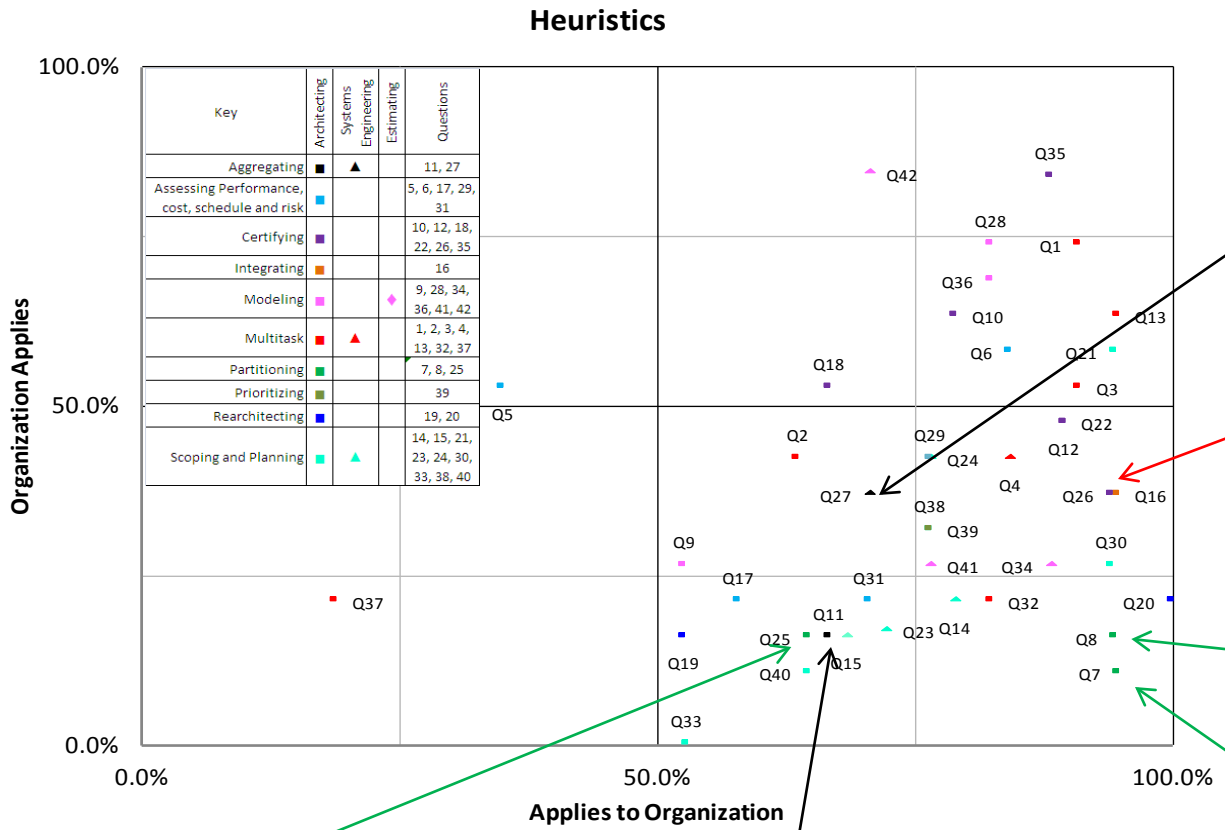


Q27 Modularity - To build a durable system, keep integration low between modules

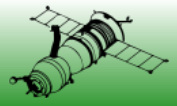
Q16 The greatest leverage in system architecting is at the interfaces; the greatest dangers are also at the interfaces

Q8 Be prepared for reality to add a few interfaces of its own

Q25 Organize personnel tasks to minimize the time individuals spend interfacing

Q11 Choose a configuration with minimal communications between the subsystems

Q7 It is inadequate to architect up to the boundaries or interfaces of a system; one must architect across them


Ugly

It's only a small change – can I skip the analysis and test?

- Small changes need risk assessment and mitigation -
  - It is too easy to make invalid assumptions
- Sweeping assumptions can be removed by clear thinking and a realistic assessment of risk
  - showing "simple" changes are not always simple
- If it is simple, then SE analysis will quickly show it to be so
- Question often driven by an implicit need for the change to be simple
- Better question – "is it a simple change, and how do you know?"

Ass u me Assume

Good

Have you mitigated all the risks?

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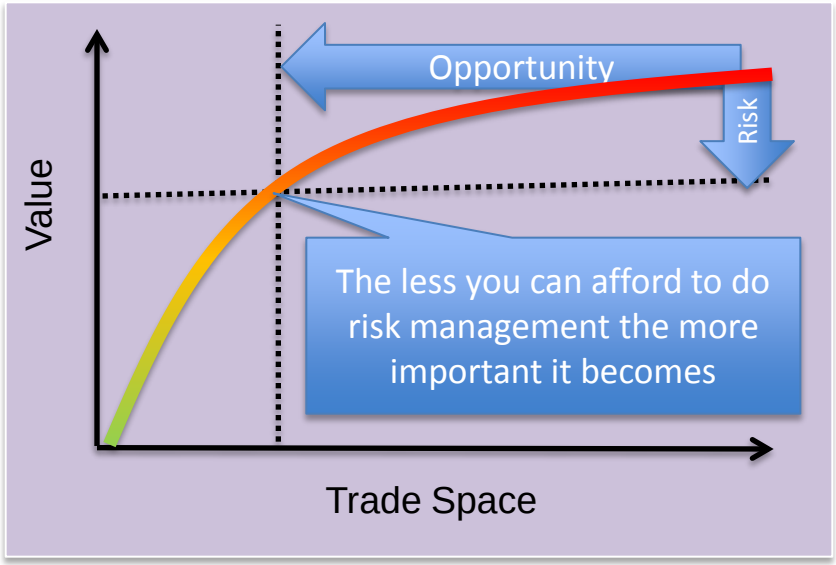
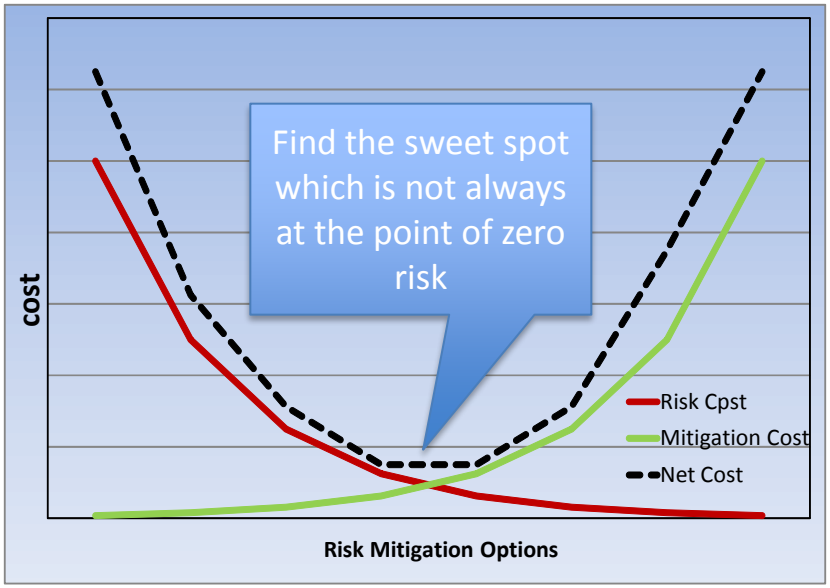
At first glance, an entirely sensible question. But…

- Zero risk is not the most cost effective position to be in
- Taking risks for greater opportunity is a normal part of systems engineering.

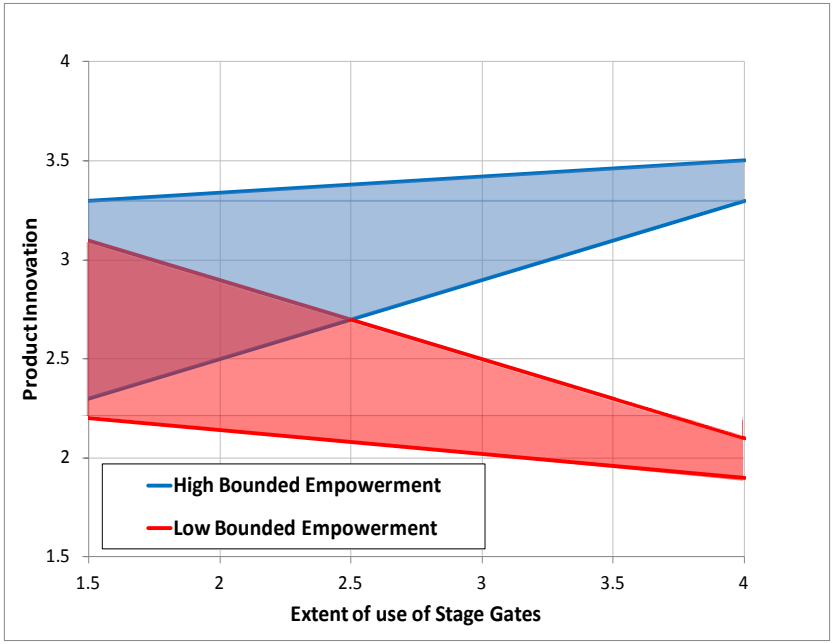




Risk management is not there to remove all risk but to help you take informed risks.

Have you used stage gates/ independent review?

- **Effectiveness of reviews is driven by culture and attitude**
- **Right attitude** – an opportunity to help avoid problems later
- **Wrong attitude** - an inspection - if problems are hidden / not found by the team then we passed
- **Do you trust team and review, or try to inspect quality in?**



From Hull, Frank, 2013 - Society of Concurrent Product Development - see http://www.scpdnet.org/

The impact of independent review depends on the level of high bounded empowerment in the team

Good

Are you going to get it right first time?

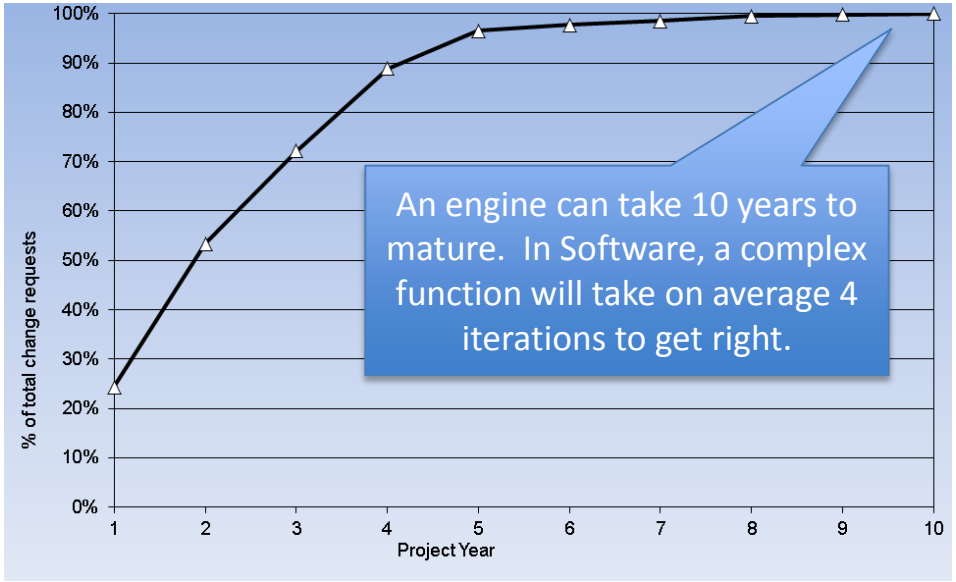
At first glance, an entirely sensible goal. But…

This will drive the behaviour of

- Planning for “failure” becomes politically incorrect.
- Product evolution and certification are combined into a single pass “heavy weight” process
- Contingency, mitigation and backup plans are removed

This then causes:

- late changes to become a surprise and more expensive



Complex projects need time to mature. Rework is only bad if you had not planned for it! When you plan for rework, plan to rework it as soon as possible in the most effective way.

Bad

Can you improve the system by changing one part?

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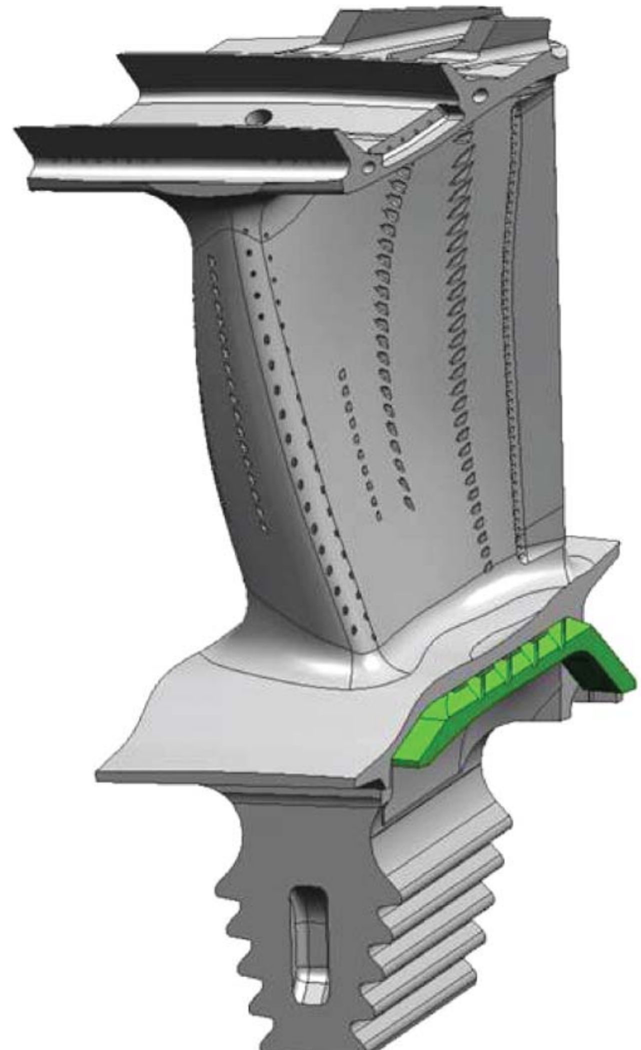

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Ugly

Do you think the customer is an idiot?

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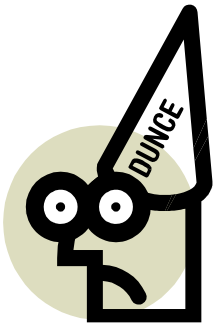
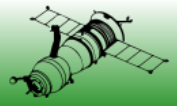
- It is easy to be “frustrated” with our customers
- We have to manage our expectations
  - Customer’s situation change as much as our situation
  - Expecting complete information leads to an abdication of our design team responsibilities
  - Complete information would be “over-constraining” – we’d be given solutions to draw, not problems to solve



Even thinking this can block the ability the understand the customer and the situation

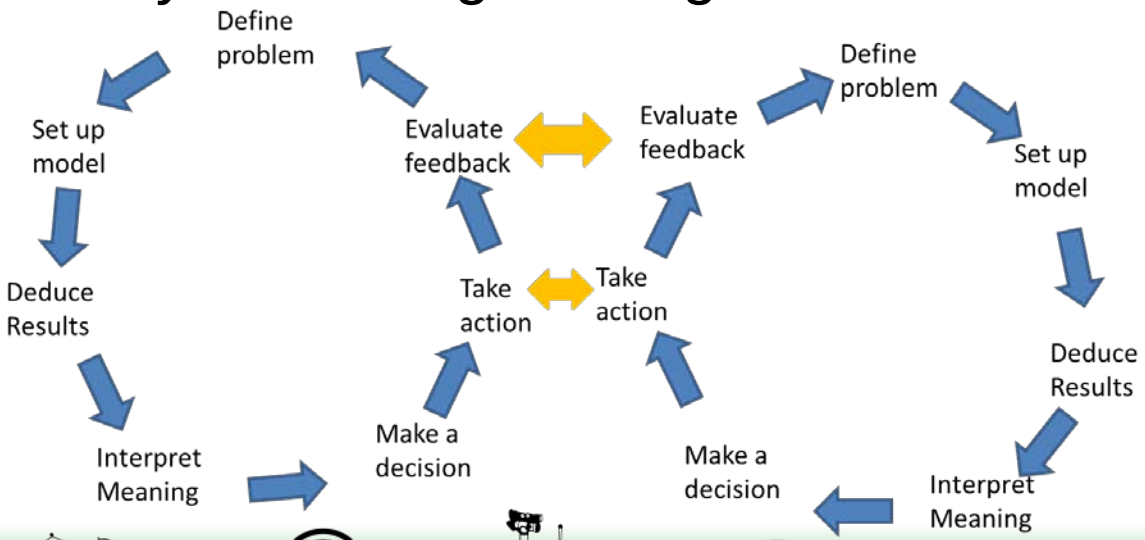
  - Soft Systems (Checkland) emphasizes understanding world view of all different stakeholders
  - Basic Emotional intelligence shows that “red” emotions (negativity leads to critical) creates inability to be aware of their situation


Good

Pre-Work, not Rework

- Pre-work is NOT starting early - it focuses on removing uncertainty/ increasing understanding
- Program plans need
  - Iteration to exploit the understanding achieved
  - Get timely understand to support decisions
- Without planned in iteration in the plan then the potential value of Systems Engineering cannot be realised.



Adapted from Blockley, D and Godfrey, P, Doing it Differently – 2000

Good

Who's your hero?

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- "Every day some new fact comes to light – some new obstacle which threatens the gravest obstruction. I suppose this is the reason which makes the game so well worth playing"

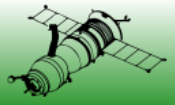
  Robert Falcon Scott, Polar explorer 1868-1912

  Second expedition leader to reach the South Pole

- "Adventure is just bad planning"

  Roald Amundsen, Polar explorer 1872-1928

  First expedition leader to reach the South Pole


Good

Heuristics

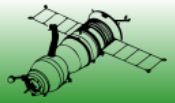
Showing progress on a linear path is not necessarily [illegible] might be in the

Recognizing uncertainty is the first step to certainty and to success. [illegible]ainty means failure [illegible]re likely

The customer may well not be right, but their position is valid from their (current) point of view and should be respected

It's not enoug[illegible] Systems Engineering; you must plan to do something with what you find doing Systems Engineering

[illegible] a project cheaper by doing less; you make it cheaper by doing more of the right things.


Bad

Conclusions

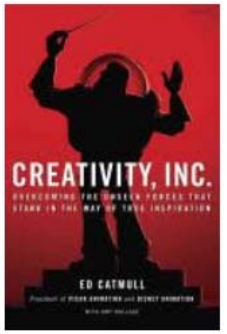
- **Many typical "management" questions**
  - Reinforce linear planning / tendency to jump to component solutions
  - Avoid valuing the identification and management of uncertainty.
- **The purpose of Systems Engineering is to improve the probability of a successful outcome to a complex/messy problem.**
  - It does this by looking for understanding of the problem, and
  - Uses that understanding to inform work to define the solution.
- **Discovering uncertainty is the first step towards certainty. "Yes" expectation hides that uncertainty**
- **Plan to look to identify, and then reduce uncertainties; adapting to what is found**
- **This must be a key common understanding between Systems Engineers and Program Managers.**

Finally…. “Have you made it simple?”

“When you distil a complex idea to a T-shirt slogan

- You risk giving the illusion of understanding
- In the process you sap the idea of its power

You end up with something that is easier to say, but not connected to behaviour”

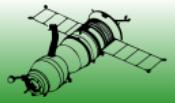


Ed Catmulll
Creativity, Inc.
Overcoming the Unseen forces that Stand in the Way of True Inspiration
2014

A better question –

“Is it well enough understood to give clear communication?”

Hopefully we have – but any questions anyway?


Good

Homework

- Do you know of any other typical questions to which the answer “Yes” is the wrong answer?

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Please

The link for the online survey for today's meeting is
https://www.surveymonkey.com/s/2_11_15_GM

https://www.surveymonkey.com/s/2_11_15_GM

Slide presentation can now be downloaded from GlobalMeet file library, and also from:

www.incose.org/enchantment/library.aspx

Recording will be in library within two days