

# Planguage & Innovation

How Metrics Drive Ideas

Tom Gilb

at GilbFest Last Week June 2015 London  
20 minutes, followed by 30 minutes discussion

# Innovation

Useful, Practical, Purposeful

PL Concept \*679 Dec. 2 2014

Order of magnitude, or better,  
improvement in performance/cost  
efficiency,  
in stakeholder-valued system  
attributes.

# Innovation

## How big?

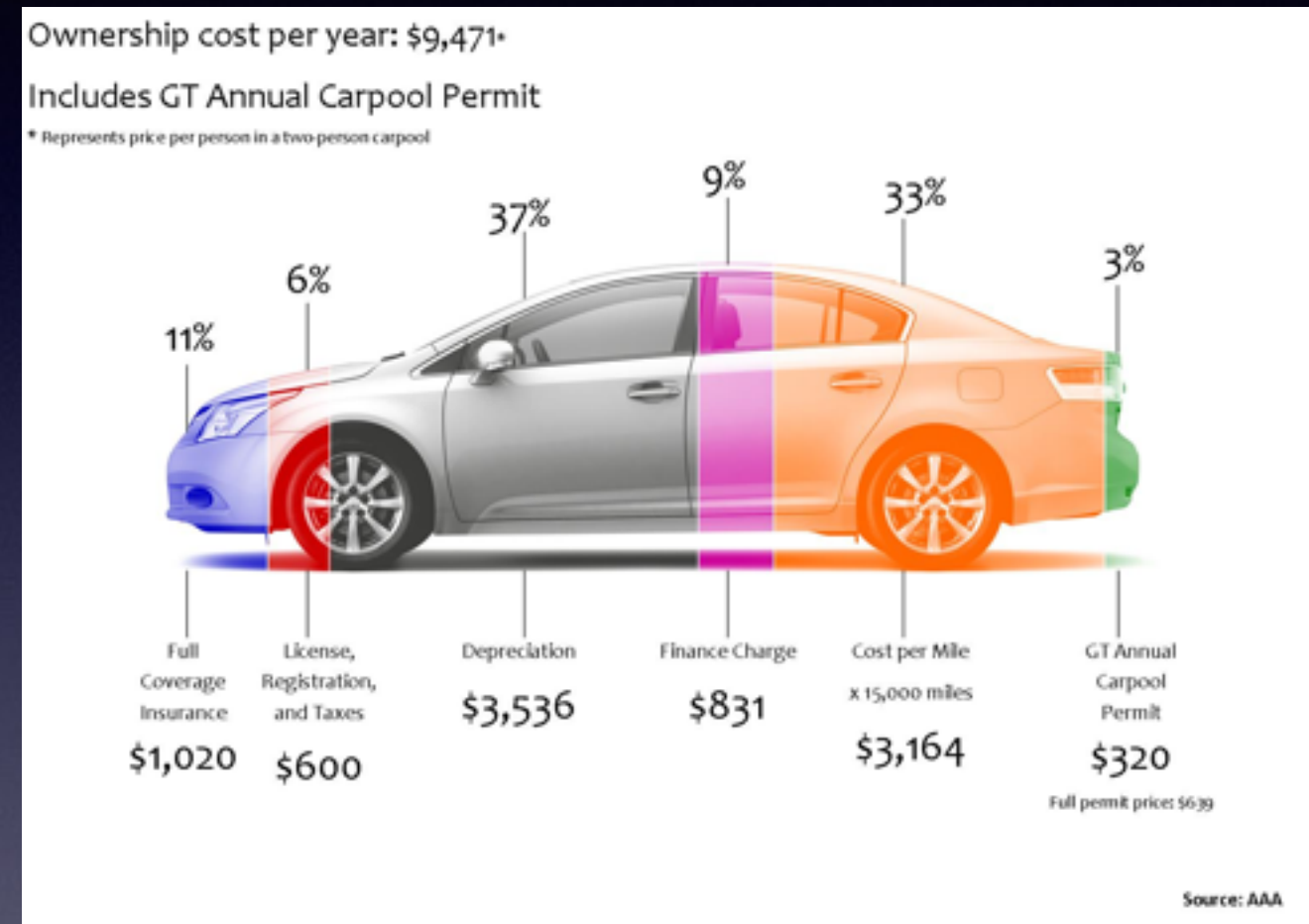
- The 'order of magnitude (10:1)' concept is an arbitrary, but useful, concept in the definition.
- It is our way of being somewhat more precise about the concept of 'significant' (improvement).
- In given situations we can certainly argue that far less ( 25%, 250% improvement) would be considered 'innovation'.
- So the degree of improvement needs to be argued in defined contexts.
- However, any '10 to 1' improvement in the ratio of performance and costs, will almost invariably be considered true innovation.
- The less than this it is , the less 'innovation' degree.
- 



# Innovation

## The COSTS aspect

1. Notice that we consciously avoided the trap of **only** considering the performance increases (and it can be several **concurrent** performance dimensions) alone.
2. We believe that practical innovation will consider the **costs** (plural!) incurred, as an integral factor to be evaluated in considering the true degree of innovation.
3. I.e. big performance improvements are interesting innovation, but doing so at half the price, rather than infinitely costly is 'even more innovative' in the real world.

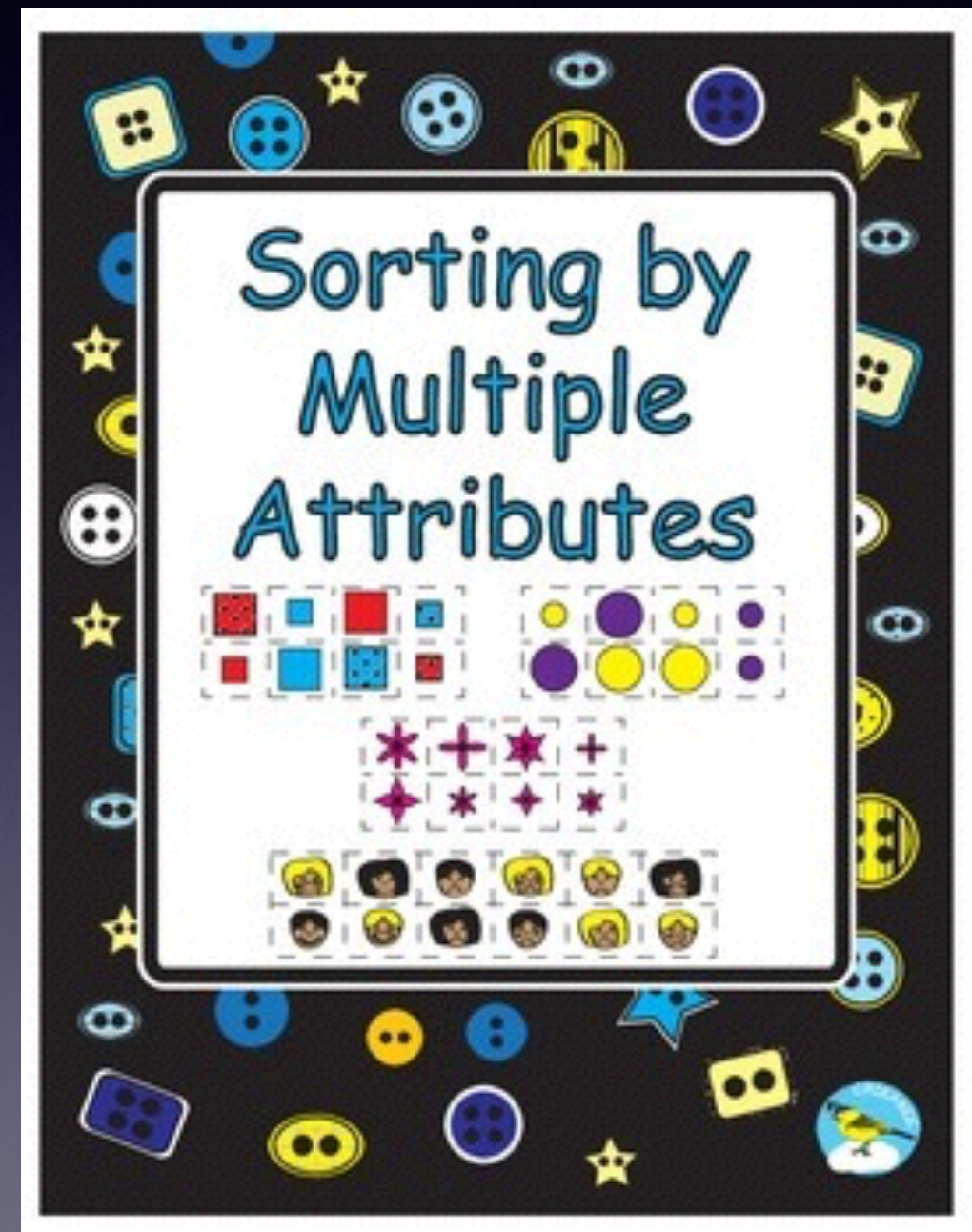




# Innovation

## Multiple Attributes Thinking

1. Note that we very consciously include the notion of simultaneous improvement in any **useful set** of performance characteristics (for example *Usability, and Security*),
2. together with any **useful set** of cost characteristics (for example *Capital Cost, and Installation time*).
3. The more attributes improved, the more 'innovation'.
5. All improvements deserve evaluation and credit.



# Innovation is 'Plural Efficiency Improvement'

So, our concept is 'plural efficiency' improvement,  
of significant dimension

The screenshot shows a web browser window with the address bar displaying 'app.needsandmeans.com'. The browser's menu bar includes 'Safari', 'File', 'Edit', 'View', 'History', 'Bookmarks', 'Window', and 'Help'. The page title is 'Tom Gilb & K...ents-Material'. The browser's address bar shows 'app.needsandmeans.com'. The page content is a table comparing various performance metrics across different categories. A green arrow points from the title 'Innovation is Plural Efficiency Improvement' to the 'Performance To Resource Ratio' row. A white arrow points from the 'Clinical Quality' row to the 'Defect Prevention...' column.

Requirements	Use Community Su...	Defect Preventio...	The BEST Design	Design	Sum
<b>Reduce Bed Days</b> Decrease from 4 to 3 days By end of November 2015 Average number of days per [Patient Type] per month [Patient Type = Adult, child]	<b>0.3 days</b> 30 %  30 %	<b>0.5 days</b> 50 %  80 %	<b>0 days</b> 0 %  80 %	<b>0 days</b> 0 %  80 %	<b>80 %</b>
<b>Clinical Quality</b> Decrease from 0.1 to 0.05 Infections By end of June 2015 Average number of [Infections] per [Patient Type] per month [Infections = Bloodstream, Patient Type = HIV]	<b>0.025 Infections</b> 50 %  50 %	<b>.003 Infections</b> 6 %  56 %	<b>0 Infections</b> 0 %  56 %	<b>0 Infections</b> 0 %  56 %	<b>56 %</b>
<b>Sum Of Performance:</b>	<b>80 %</b> 80 %	<b>56 %</b> 136 %	<b>0 %</b> 136 %	<b>0 %</b> 136 %	
<b>Skilled Effort in work Days</b> Increase from 0 to 100 work days o... By end of all No qualifiers	<b>10 work d...</b> 10 %  10 %	<b>50 work d...</b> 50 %  60 %	<b>0 work d...</b> 0 %  60 %	<b>0 work d...</b> 0 %  60 %	<b>60 %</b>
<b>Sum Of Resources:</b>	<b>10 %</b> 10 %	<b>50 %</b> 60 %	<b>0 %</b> 60 %	<b>0 %</b> 60 %	
<b>Performance To Resource Ratio:</b>	<b>8.00</b>	<b>1.12</b>	<b>0.00</b>	<b>0.00</b>	

# Main ideas or Principles

- Numeric Requirements
  - can stimulate creativity and innovation
  - can protect creative ideas from being dismissed



# Loo Watt Case

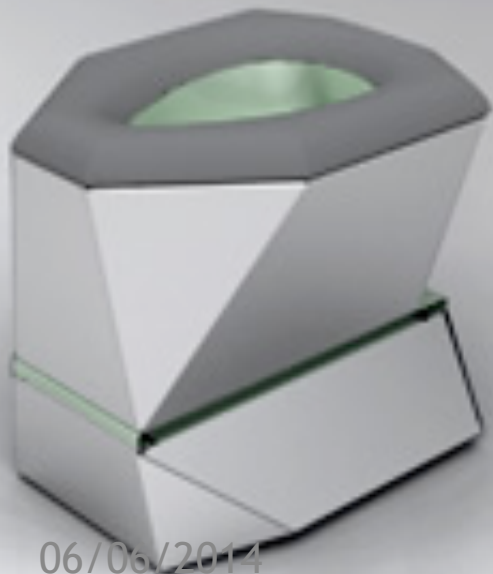
Successful Innovation Using  
Planguage







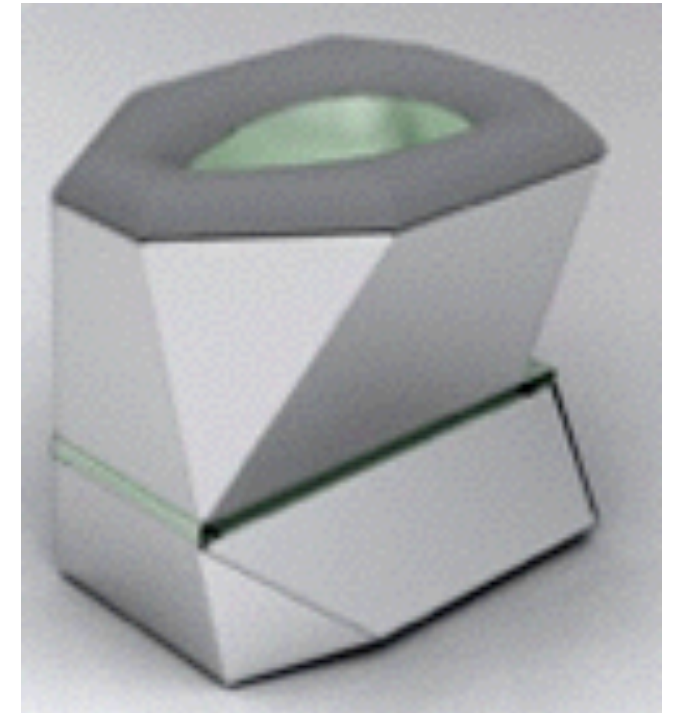
## LOOWATT: A NEW PARADIGM IN SANITATION



06/06/2014



# Key Values: Quantified





# Planning Language

Name of  
Value  
definition

Definition of  
value as a  
quantity

- **Improve Sanitation**

Target: 25% - 75%

ected / waste produced by user group

nd Longevity

Current or Past level  
(systems analysis)

ngle user per m

Target level, Required  
level, Objective

Target: 0.4 - 0.8

Unit: Average of factors rated

- **Managing Risk**

Target: 0.2 - 0.8

Unit: Average of factors rated 0.0 - 1.0

- **Methodology**

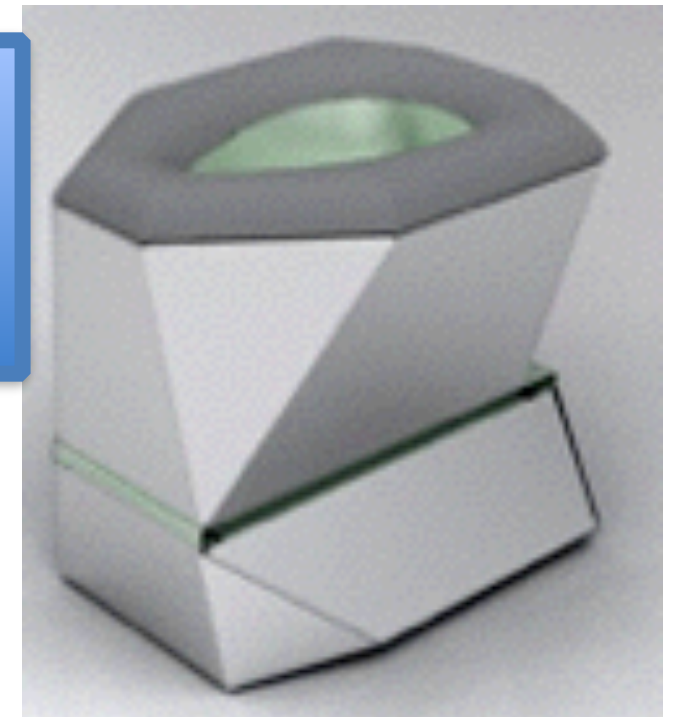
Target: 0.4 - 0.8

Unit: Average of factors rated 0.0 - 1.0

- **Diffusing Knowledge**

Target 0.15 - 0.8

Unit: Average of factors rated 0.0 - 1.0





# Nick Coutts Presenting

THE DESIGN LONDON STORY

## An Energy Producing Waterless Toilet System

### Impact Estimation Table for Gates GCE Project

Key Values	Designs / Actions							Total Impact	Safety Factor
	Unfitted risk assessment with associated impact estimation table for methods of mitigation (x3)	Research trip to Madagascar	Detailed design research	Building financial models at community level	Research into existing sanitation projects	Creation of knowledge 'database'	Codification of our acquired knowledge etc.		
<b>Improve Sanitation</b> Target: 25% - 75% Unit: Waste collected / waste produced by user group	10	20	40	18	15	0	0	103	1.00
<b>Sustainability and Longevity</b> Target: 05 - 05 Unit: Cost to single user per month	0	5	20	90	10	0	0	95	0.95
<b>Story and Data</b> Target: 0.4 - 0.8 Unit: Average of factors rated 0.0 - 1.0	5	35	20	15	3	15	0	103	1.03
<b>Managing Risk</b> Target: 0.2 - 0.8 Unit: Average of factors rated 0.0 - 1.0	50	20	20	15	15	0	10	25	0.25
<b>Methodology</b> Target: 0.4 - 0.8 Unit: Average of factors rated 0.0 - 1.0	15	0	0	0	0	0	15	30	0.30
<b>Diffusing Knowledge</b> Target: 0.15 - 0.8 Unit: Average of factors rated 0.0 - 1.0	0	8	0	0	10	10	15	43	0.43
<b>Total impact of design / action</b>	80	68	100	118	53	25	25	579	
<b>Total cost of design / action (person days)</b>	5	30	20	15	10	15	10	105	
<b>Benefit to cost ratio</b>	10	2.9	5.0	8.5	5.3	1.7	2.5	5.5	

Design London - Royal College of Art / Imperial College London

# FEEDBACK FROM LOOWATT

- They continued to use the planning method throughout the 14 month project
  - Because it helped keep them on track to the real critical objectives
- They highly recommended to their 20 parallel incubator projects, that they should use these methods for planning their startups





# Winners!



- The Bill & Melinda Gates Foundation has awarded Loowatt Ltd a \$1 million grant to expand its pioneering waterless toilet systems in Madagascar and Sub-Saharan Africa.
- 13.09.2013



# Creative Design Principles supported by Metrics

- **Estimating and measuring the effects of ideas, on your requirements**
  - **will stimulate people to find better ideas**
  - **will defend good enough ideas**
  - **will help teams to prioritise and agree on good or promising ideas**
  - **will make people responsible for the results of their ideas, and thus motivate them to**
    - **make sure they work**
    - **even if they need better definition to succeed**

# My basic 'paper' on 'Creativity'

Practical Purposeful Creativity paper

Journal: AI & SOCIETY · Volume  
7 ... Author, 1993

[http://www.gilb.com/tiki-  
download\\_file.php?fileId=22](http://www.gilb.com/tiki-download_file.php?fileId=22)

## Practical Purposeful Creativity Constructs

by Tom Gilb,  
Independent Consultant and Author,  
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Kolbotn, Norway  
Telephone: +47-66-801697, [Tom@Gilb.com](mailto:Tom@Gilb.com), +47 920 66 705  
URL [www.Gilb.com](http://www.Gilb.com)  
Version Updated May 4 2006, Nov 6 2008 (address, Imagination definition at end)

## Introduction

This paper is written as an invited contribution to a book "Creativity, Innovation and Cooperation" (Springer) and a special issue of "AI & Society: the Journal of Human-Centred Systems and machine Intelligence". The editor is Robert C. Muller (Fax +44-491-579750). Published around 1992.

## Definitions.

**Creativity:** accessing ideas to improve some values.

**Practical (INDUSTRIAL) Creativity:** *Systematic Identification of ideas which serve useful human purposes*

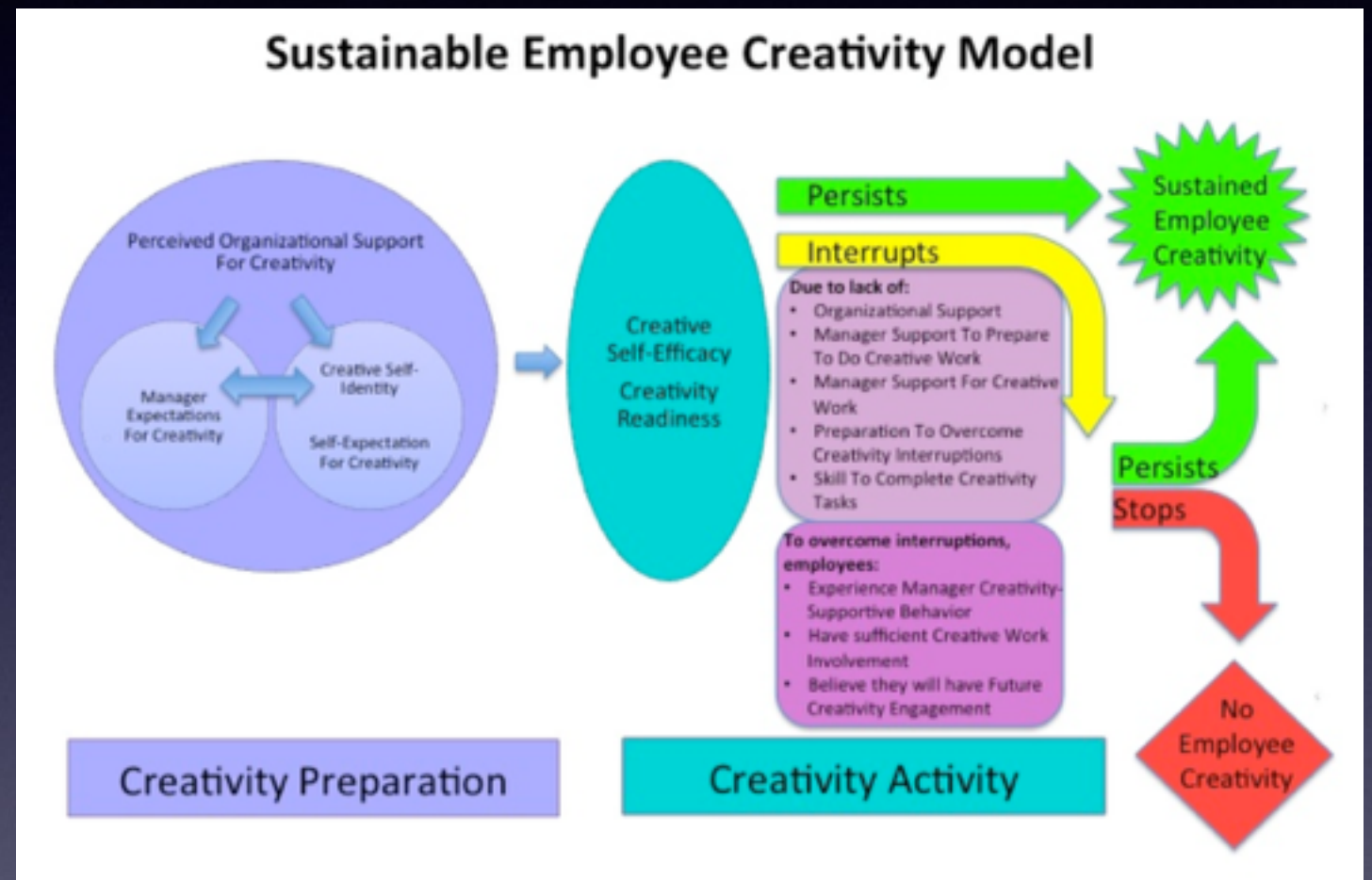
**Purposeful Creativity:** *Identification and validation of ideas which meet specified objectives.*

## Part One: A Theory of Practical Creativity.

Creativity is a result of the creativity process structure and its particular agent.

A creative process is more or less suitable (or “good”) for its purposes as a result of:

- its structure (how the creative process is defined and managed)
- who does it (the individual, the team, the organization).
- its resources (time, money, knowledge base)





# My Ten fundamental principles of Practical Creativity

(1993)

1. *Practical* creativity must have a defined purpose which is objectively measurable.
2. Practical creativity must operate in multiple purpose dimensions at the same time.
3. The result of practical creativity depends on the clarity of the stated objectives.
4. The result of practical creativity depends on the nature of the creativity process and the agents employed to do it.
5. Any creativity objectives initially defined, will tend to change as time goes on due to changed perceptions, changed external world and experience with delivering partial results.
6. The practical creative process follows the rules of any similar “design”, “planning” or “engineering process”: it is merely a higher level generalization of them.
7. The “net value” of an additional idea for solving a defined problem can be estimated in relation to remaining unsatisfied objectives. How far will the idea move us in the direction of our final objectives, from where we are at the moment?
8. The degree of yet unsatisfied objectives for a problem being solved, determines the priority needed for continued creative effort. This (degree of yet unsatisfied objectives) is a function of previously accepted or applied ideas and of any changed objectives since they were originally defined.
9. Seemingly “bureaucratic” idea management processes can stimulate, protect and justify creative effort. Total freedom of thought is not necessarily the best way to get useful creativity.
10. If a creative effort fails to satisfy even a single real, defined or not, critical success factor then it is, in practice, a total failure.

1. Measurable Purpose
2. Multiple Purposes
3. Goal clarity is critical
4. Process+ Agents = Result
5. Change happens
6. Creation = Engineering = Planning
7. Degrees of Innovation Evolve
8. Unsatisfied goals = Priority Signal

End of 20 minute talk

Now some exercises  
or if time

let's look at DPP as metrics driven innovation

If there is not time for this in 20 minutes,  
then put off, to another opportunity

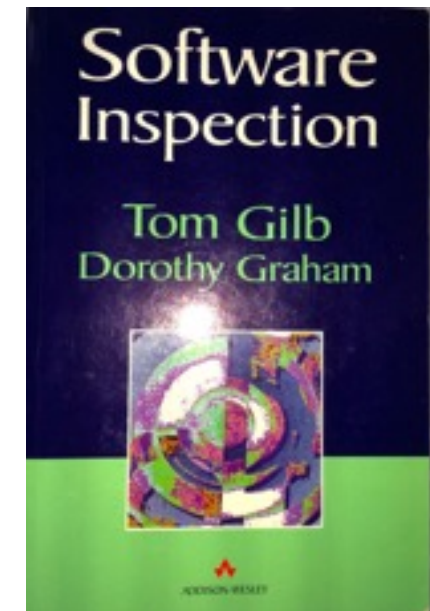
# **Defect Prevention Process**

Metrics Driven Innovation



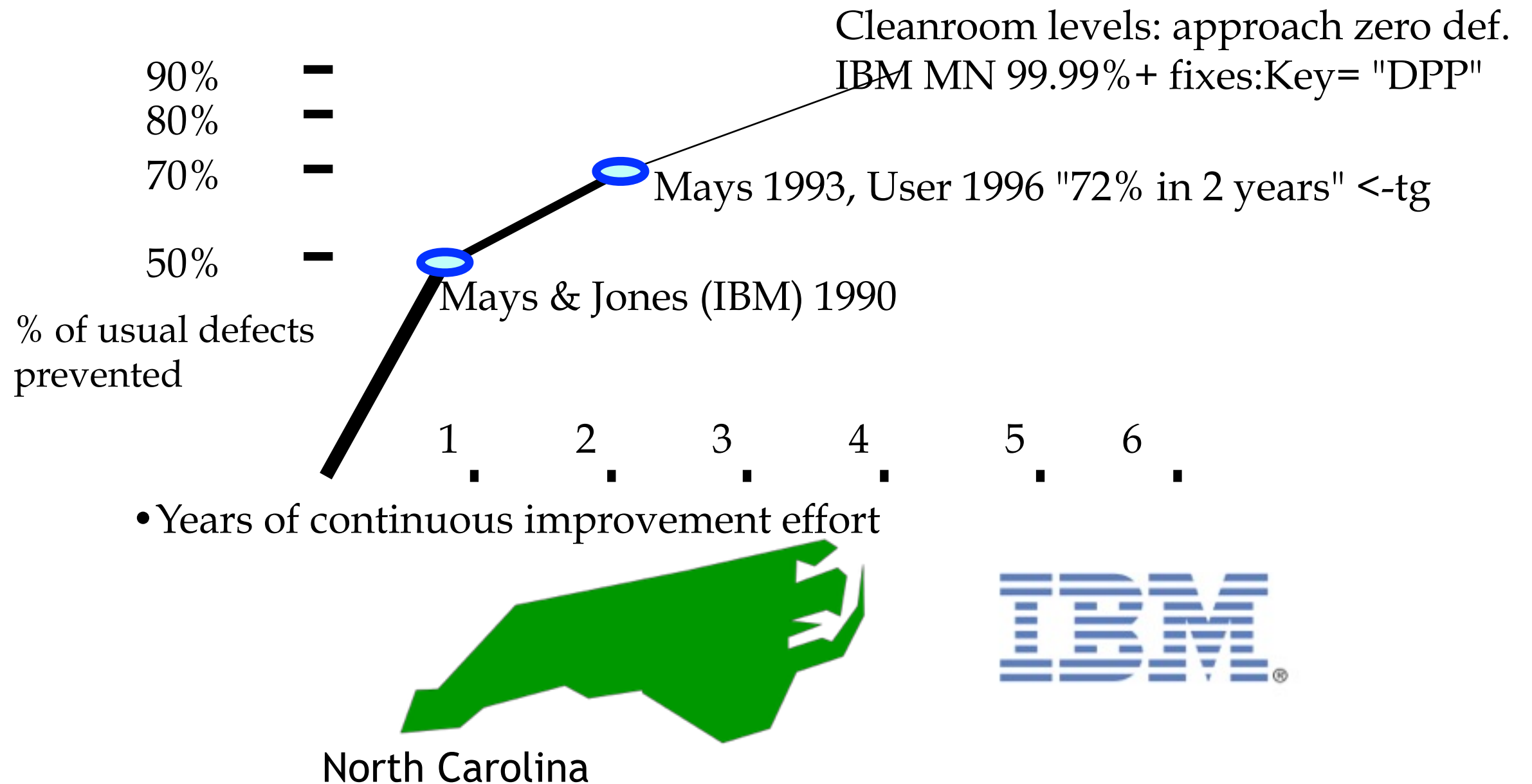
# DPP is described in the Software Inspection book 1993

- 2 Chapters on DPP
  - 7 By Tom (DPP with Inspection)
  - 17 by Robert Mays
- R Mays IBM SJ, Paper on
- ‘Defect Prevention Process’, DPP
  - [http://www.gilb.com/tiki-download\\_file.php?fileId=457](http://www.gilb.com/tiki-download_file.php?fileId=457)



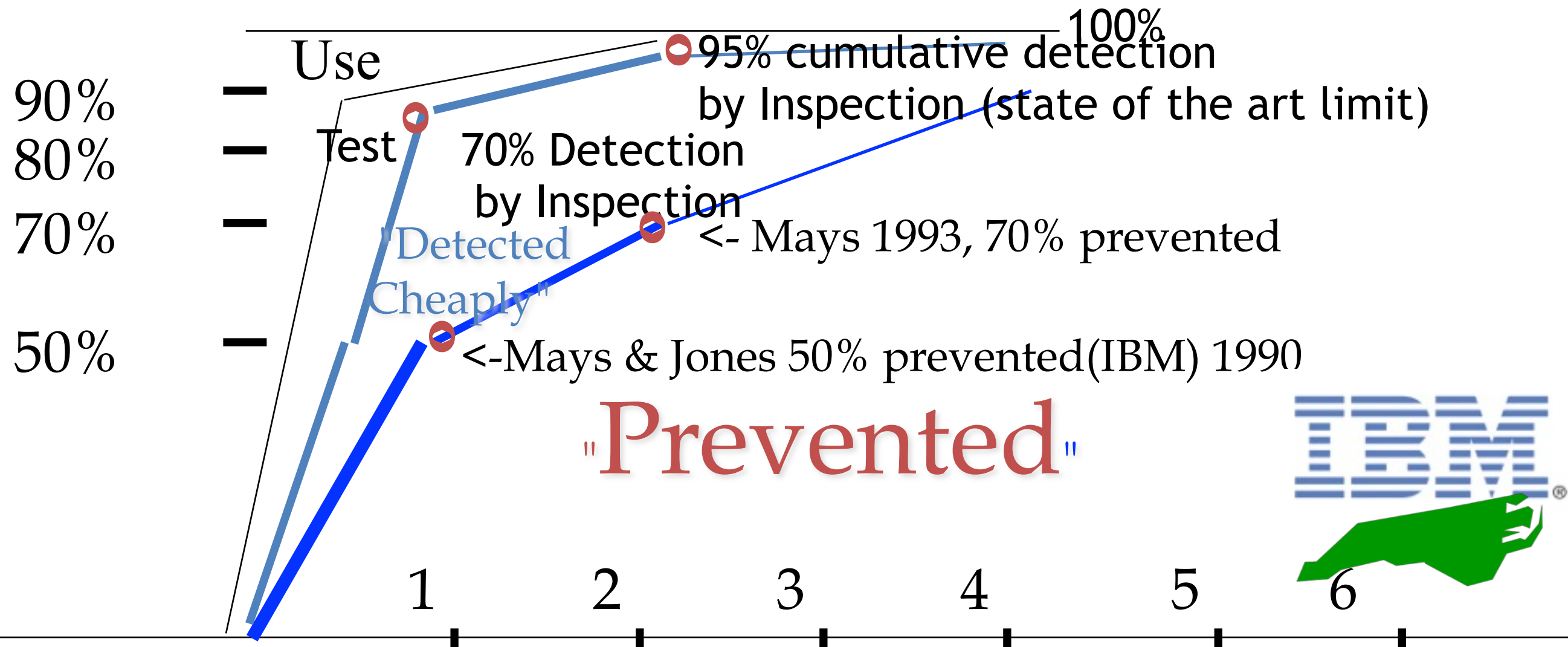
# Defect Prevention Experiences:

## Most defects can be prevented from getting in there *at all*



IBM Research Triangle Park Networking Laboratory

# Prevention + Pre-test Detection is the most effective and efficient



- Prevention data based on state of the art prevention experiences (IBM RTP), Others (Space Shuttle IBM SJ 1-95) 95%+ (99.99% in Fixes)
- Cumulative Inspection detection data based on state of the art Inspection (in an environment where prevention is also being used, IBM MN, Sema UK, IBM UK)



# IBM MN & NC DP Experience

- 2162 DPP Actions implemented
  - between Dec. 91 and May 1993 (30 months)<-Kan
- RTP about 182 per year for 200 people.<-Mays 1995
  - 1822 suggested ten years (85-94)
  - 175 test related
- RTP 227 person org<- Mays slides
  - 130 actions (@ 0.5 work-years
  - 34 causal analysis meetings @ 0.2 work-years
  - 19 action team meetings @ 0.1work-years
  - Kickoff meeting @ 0.1 work-years
  - TOTAL costs 1% of org. resources
- ROI DPP 10:1 to 13:1, internal 2:1 to 3:1
- Defect Rates at all stages 50% lower with DPP



Cost of Quality over Time: Raytheon 95  
Using DPP and Inspection as numeric drivers

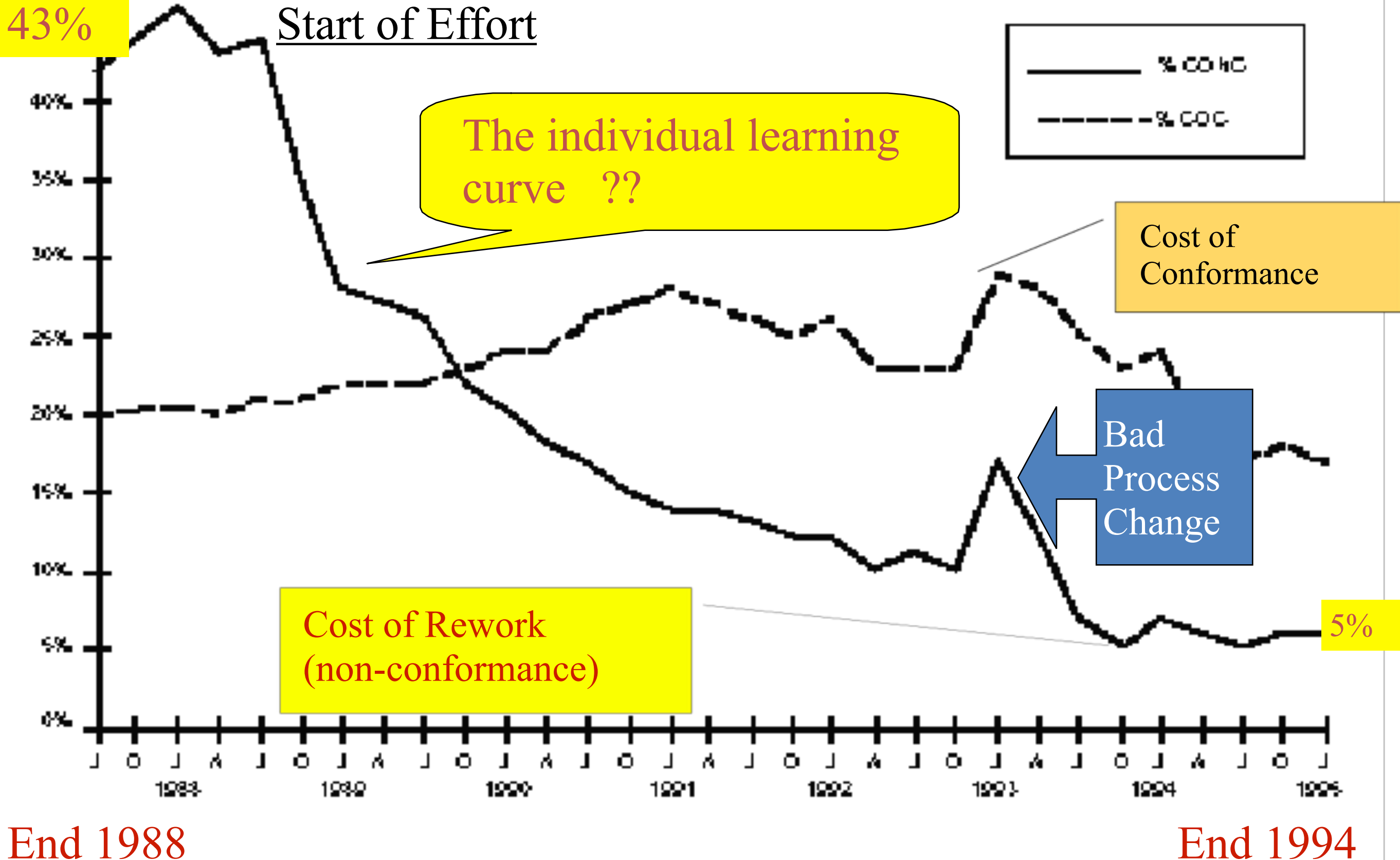


Figure 8: Cost of Quality Versus Time

# Exercises and Discussion

30 minutes



# Exercise 1

## Clear Requirements stimulate more-useful innovation

# Frank's Objective

[http://www.bing.com/  
videos/search?q=ad+free  
+clip+sinatra+fly+me+to  
+the+moon&qpv=ad+free  
+clip+sinatra+fly+me+to  
+the  
+moon&FORM=VDRE#view  
=detail&mid=57284755971  
7D8D9BF3B572847559717  
D8D9BF3B](http://www.bing.com/videos/search?q=ad+free+clip+sinatra+fly+me+to+the+moon&qpv=ad+free+clip+sinatra+fly+me+to+the+moon&FORM=VDRE#view=detail&mid=572847559717D8D9BF3B572847559717D8D9BF3B)



# Objective: Vague But 'Poetic'

Fly Me To The Moon  
Fly me to the moon  
Let me play among the stars  
Let me see what spring is like  
On a-Jupiter and Mars  
In other words, hold my hand  
In other words, baby, kiss me



Quincy Jones presents platinum copies of Frank Sinatra's album to Senator John Glenn and *Apollo 11* Commander Neil Armstrong



# Brainstorm and tell 2 best solutions 3 minutes

- Requirement 1
  - Window side of room
  - Amnition: **Cheapest way to 'fly me' to the moon**
- Requirement 2
  - Wall side of room
  - Ambition: **Safest way to allow 'me' to roam the moon, observe it, communicate on it**

# Exercise 2

## Evaluating solutions for Impact

**How good are solutions ?**  
**How well do they match requirements ?**

- Requirement 1
- Window side of room
- Cheapest way to 'fly me' to the moon
- **How much will that cost approximately?**

- Requirement 2
- Wall side of room
- Safest way to allow 'me' to roam the moon, observe it, communicate on it
- **How safe is your solution for my life and health?**



# Questions to discuss

- Did either requirement clarify what solutions could be used and which could not be used?
- Can *both* requirements be applied at the same time

R1: Cheapest way to 'fly me' to the moon

R2: Safest way to allow 'me' to roam the moon, observe it, communicate on it

- and if so does that change the solutions available?

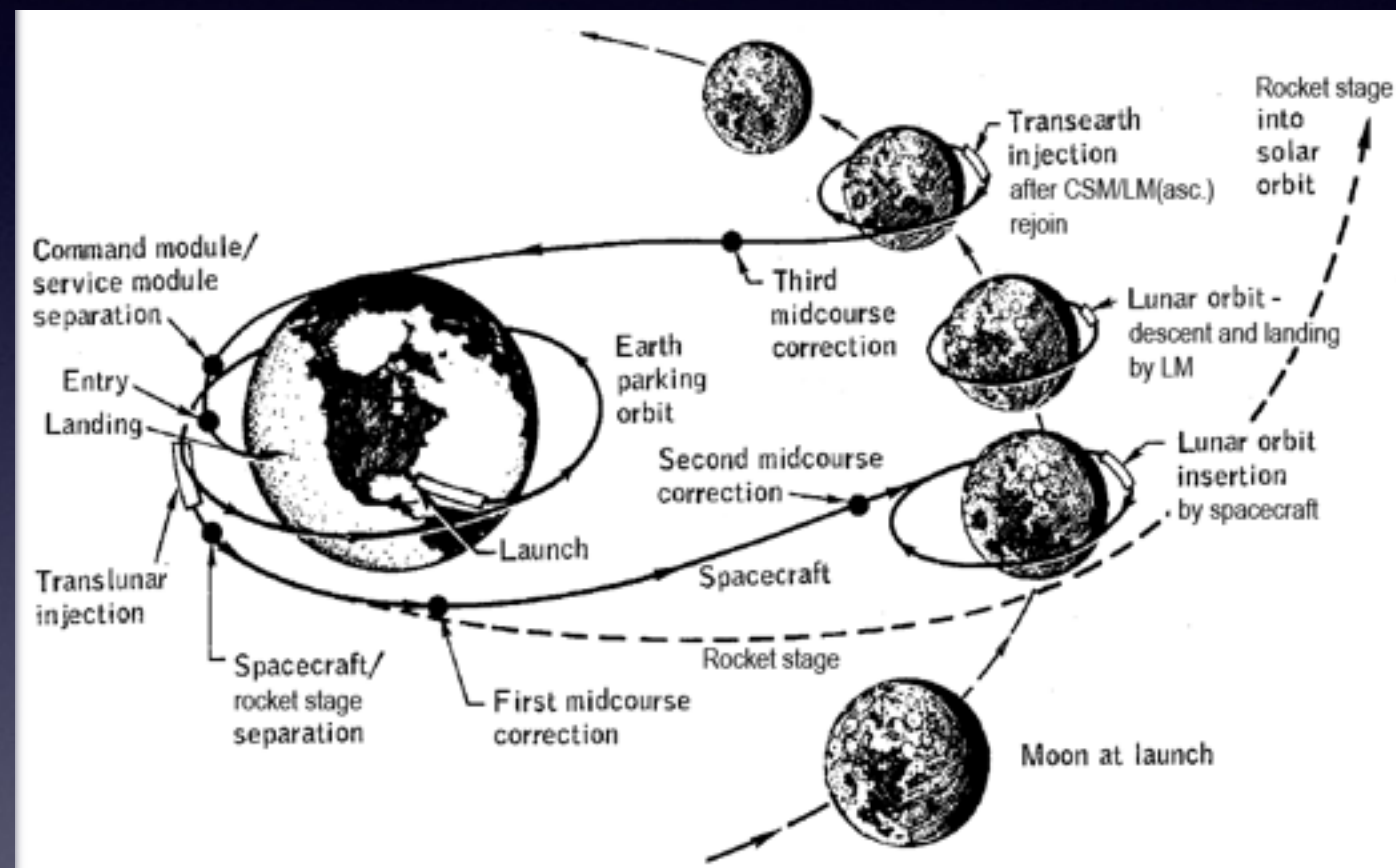
# Exercise 3

## Extreme, Beyond State of the Art, requirements

do they provoke creativity?

# Innovation Challenge

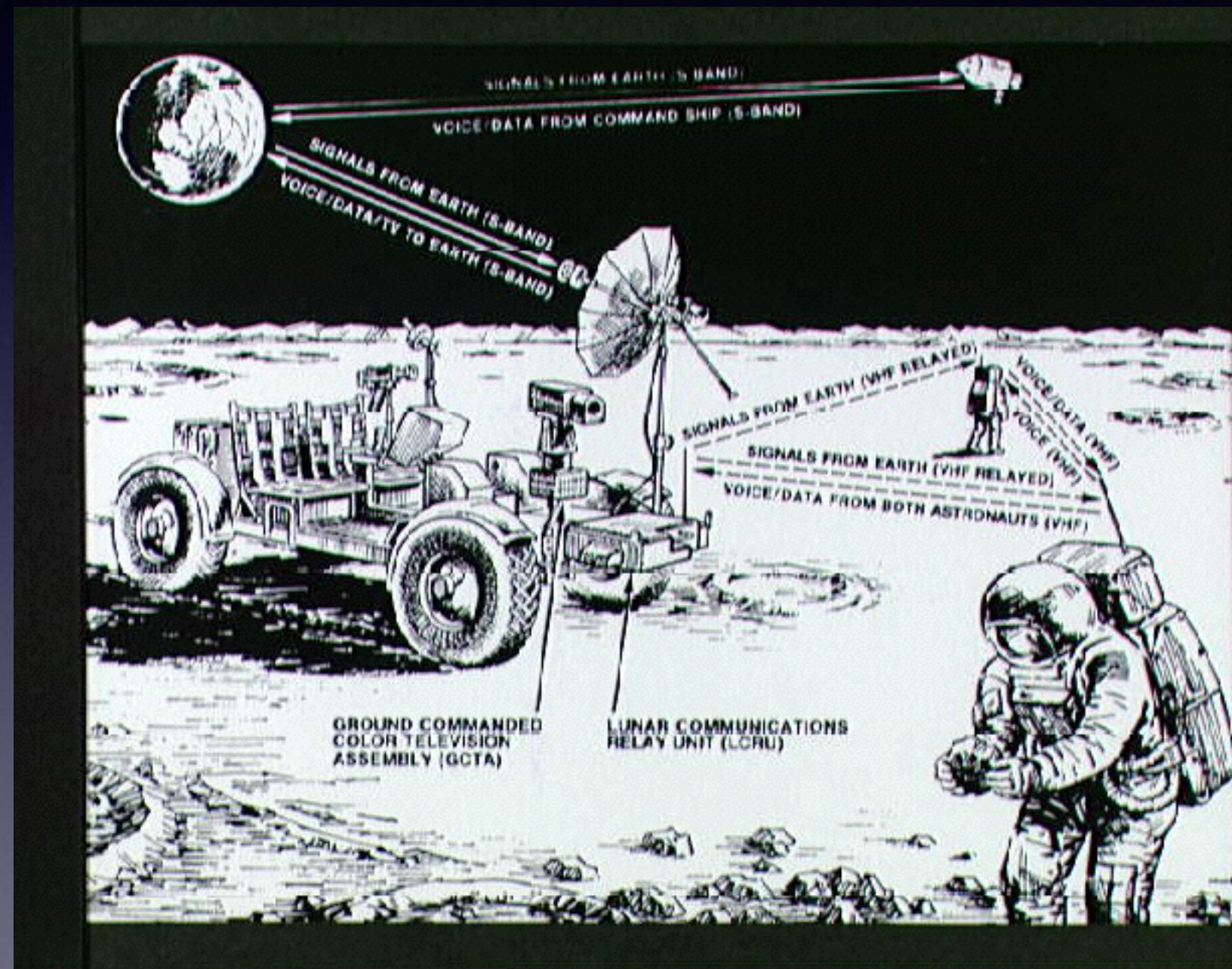
- I want to
- get to the moon and back
- in 10 seconds





# Changing problem formulation

- OR, REPHRASED
- “Get my Perception and Voice/Image
  - from Earth, and to the moon
  - within 10 seconds
  - within a decade”





# Solution?

Telepresence  
Robot sent to  
moon might be a  
solution



Best Regards,  
Ray

E. Ray Arell, Jr. | Director of Intel Emergent Systems and Coaching | w: 503-264-9120 m: 503-705-6982 web: [Agile and Lean CoP](#)







## Exercise 4

Put the 2 requirements and 2 solutions on  
an Impact Table  
using Richard Smiths tool or a flipchart  
and evaluate the designs

# IET

	D1:Telepresence Robot	D2 Ship on next unmanned moon mission	
R1 Cheapest			
R2 Safest			
Cost			
$(R1+R2)/Cost$			

End Last slide