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# COMPLEXITY, AMBIGUITY AND VOLATILITY | LEADING IN THE NEW NORMAL



ENGINEERING & CONSTRUCTION CONTRACTING ASSOCIATION



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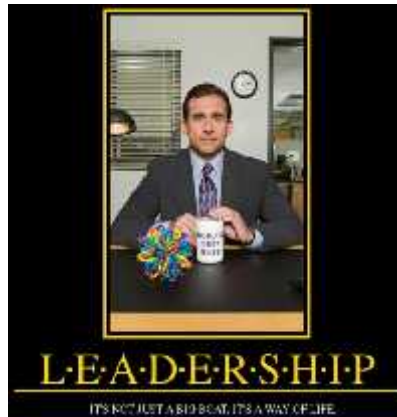
COMPLEXITY, AMBIGUITY AND VOLATILITY | LEADING IN THE  
NEW NORMAL

## Principles for Designing Effective Work



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School of Management Distinguished Professor  
MIT Sloan School of Management



## Why is work funny?



## The Main Argument

- Work, no matter how automated, is a fundamentally human activity
- But, most work is a very poor “fit” to the humans who actually do work
  - Many organizational problems emerge from this lack of fit
- **Dynamic Work Design** offers an alternate set of principles that can produce work that has better:
  - Quality, Throughput and Engagement

## Four Principles for Dynamic Work Design

- Reconcile Activity and Intent
  - Did my actions meet the goal?
- Connect the Human Chain
  - Who am I doing this for?
- Structured Problem Solving
  - If the activity didn't deliver the intent, why and what are we doing about it?
- Optimal Challenge
  - How much “gap” between activity and intent can we handle?

## Simple Metaphors for Good Work Design



## Why golf (and other hobbies) are Work that Works

- Constant Reconciliation of Intent and Activity
  - We know exactly why we are doing what we are doing
  - You know immediately whether you have hit a good or bad shot (lots of pattern matching)
- Connect the Human Chain
  - You know how your teammates depend on you

## Why golf (and other hobbies) are Work that Works

- Structured Problem Solving
  - Opportunities to get better in structured fashion (eg lessons)
- Optimal Challenge
  - Easy to set reasonable targets for improvement



## Principle #1

### Constant Reconciliation of Activity and Intent

In well-designed work people always know whether or not the work they are doing is meeting the goal

“If an employee doesn't know where he or she stands, then managers are not doing their jobs”

---Jack Welch

## Connect Activity and Intent

- In study after study, the single biggest factor relating to motivation and engagement is simply the feeling of making progress
  - In a recent study of 12,000 diary entries from managers and engineers, **76% percent** of the “good days at work” were associated with just *making progress*. (Amabile and Kramer, 2011:83)
  - Yet only **5% of managers** ranked progress as the most important source of motivation

## Principle #2

### Connect the Human Chain

In well-designed work people know and have regular with those who :

--supply the inputs to their work (“the suppliers”)

--receive the output of their work (“the customers”)

## Connect the Human Chain

- Adam Grant, a psychologist at Wharton, ran an experiment with call center fundraisers
- Three groups read different stories before work
  - Some stories were about the benefits of the job (e.g., income)
  - Some stories were about the students who had benefitted from the funds raised (eg scholarships)
  - Some stories were neutral
- Fundraisers who read about those they were helping raised over *twice* as much as the other two groups

## Connect the Human Chain

NUMB3R5 C4N B3 U53D 4S L3TT3R5 1N 4  
S3N73NC3, 4ND TH3 R35ULT1NG  
S3NT3NC3 C4N B3 R34D W1TH0UT GR34T  
3FF0RT.

ABC

1234

## Principle #3

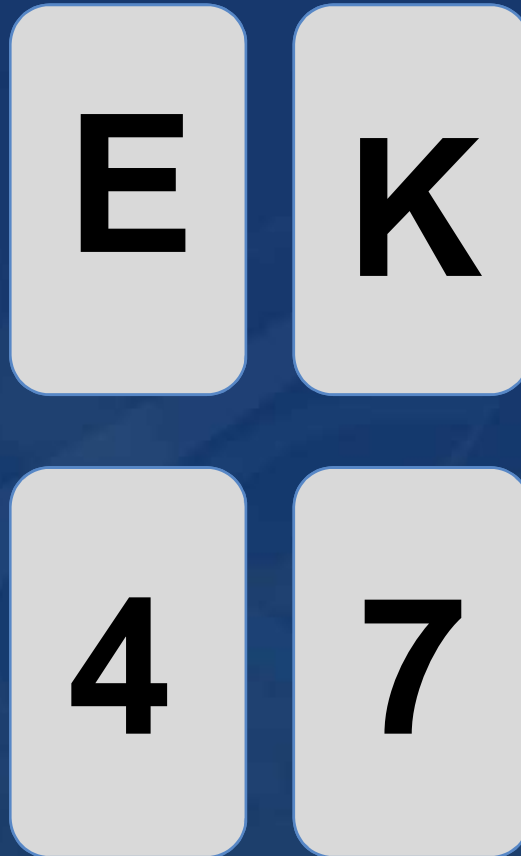
### Structured Problem Solving

In well-designed work people use a structured method and public method to resolve gaps between activity and intent

--Plan-Do-Check-Act

--DMAIC

## A Simple Experiment



Consider the following statement:

“If the card has a vowel on one side, it has an even number on the other side”

Which cards do you need to turn over to determine whether or not this statement is true?

### Results:

46% said “E and 4”  
32% said “E”

## What's the Correct Answer?

- The rule being tested is basically:
  - “If vowel, then even number” (ie if X, then Y)
- The only way to falsify an if-then statement is to find an instance of
  - “If vowel, then odd number” (ie if X, not Y)
- Thus correct answer is:

**Fewer than 4%  
of the students  
got this right!**

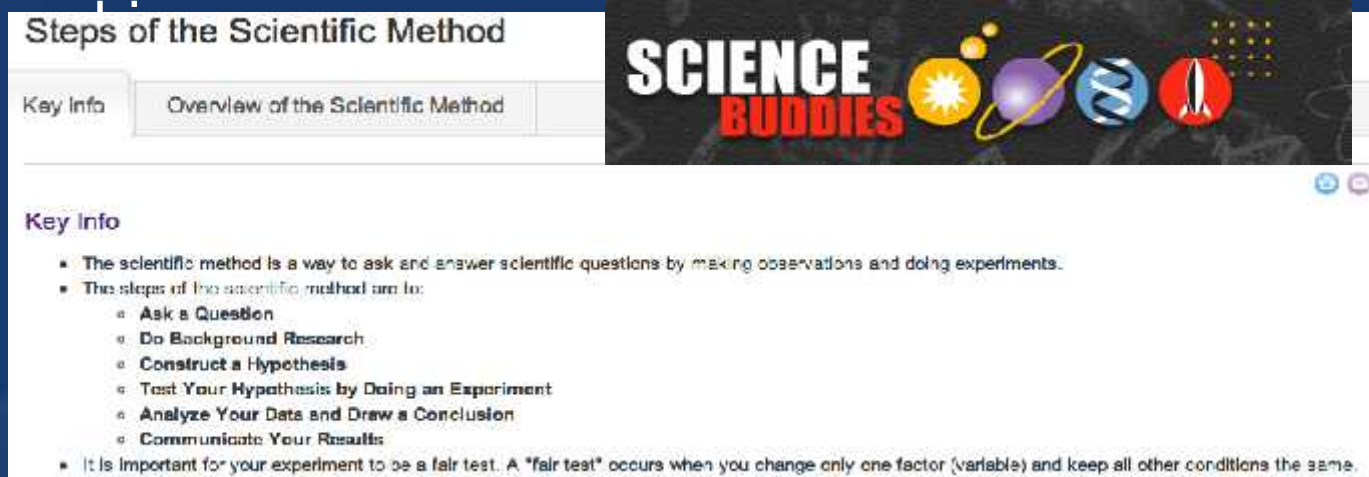
**E**

**7**



## Structured Problem Solving

- The scientific method is the best approach we know to offsetting our inherent cognitive



The screenshot shows a webpage with the title "Steps of the Scientific Method". Below the title is a navigation bar with "Key Info" and "Overview of the Scientific Method". To the right is a banner for "SCIENCE BUDDIES" featuring icons of a sun, a planet, a DNA helix, and a rocket. Below the banner is a "Key Info" section with a bulleted list of information about the scientific method.

**Steps of the Scientific Method**

Key Info Overview of the Scientific Method

**SCIENCE BUDDIES**

**Key Info**

- The scientific method is a way to ask and answer scientific questions by making observations and doing experiments.
- The steps of the scientific method are to:
  - Ask a Question
  - Do Background Research
  - Construct a Hypothesis
  - Test Your Hypothesis by Doing an Experiment
  - Analyze Your Data and Draw a Conclusion
  - Communicate Your Results
- It is important for your experiment to be a fair test. A "fair test" occurs when you change only one factor (variable) and keep all other conditions the same.

- There are many versions available for managers
  - PDCA, DMAIC, Kepner-Tregoe, etc

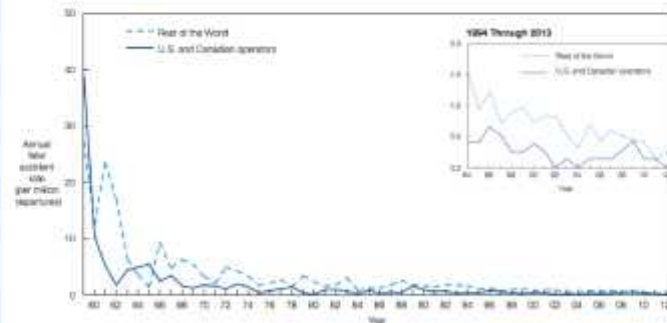
## Principle #4

### Optimal Challenge

In well-designed work, people fall short of their targets, thus creating learning opportunities, but also have time to tackle those gaps

## U.S. and Canadian Operators Accident Rates by Year

Fatal Accidents | Worldwide Commercial Jet Fleet | 1959 through 2013



# US aircraft near misses more than double

By Mike M. Ahlers, CNN

Updated 7:56 PM ET, Thu September 12, 2013



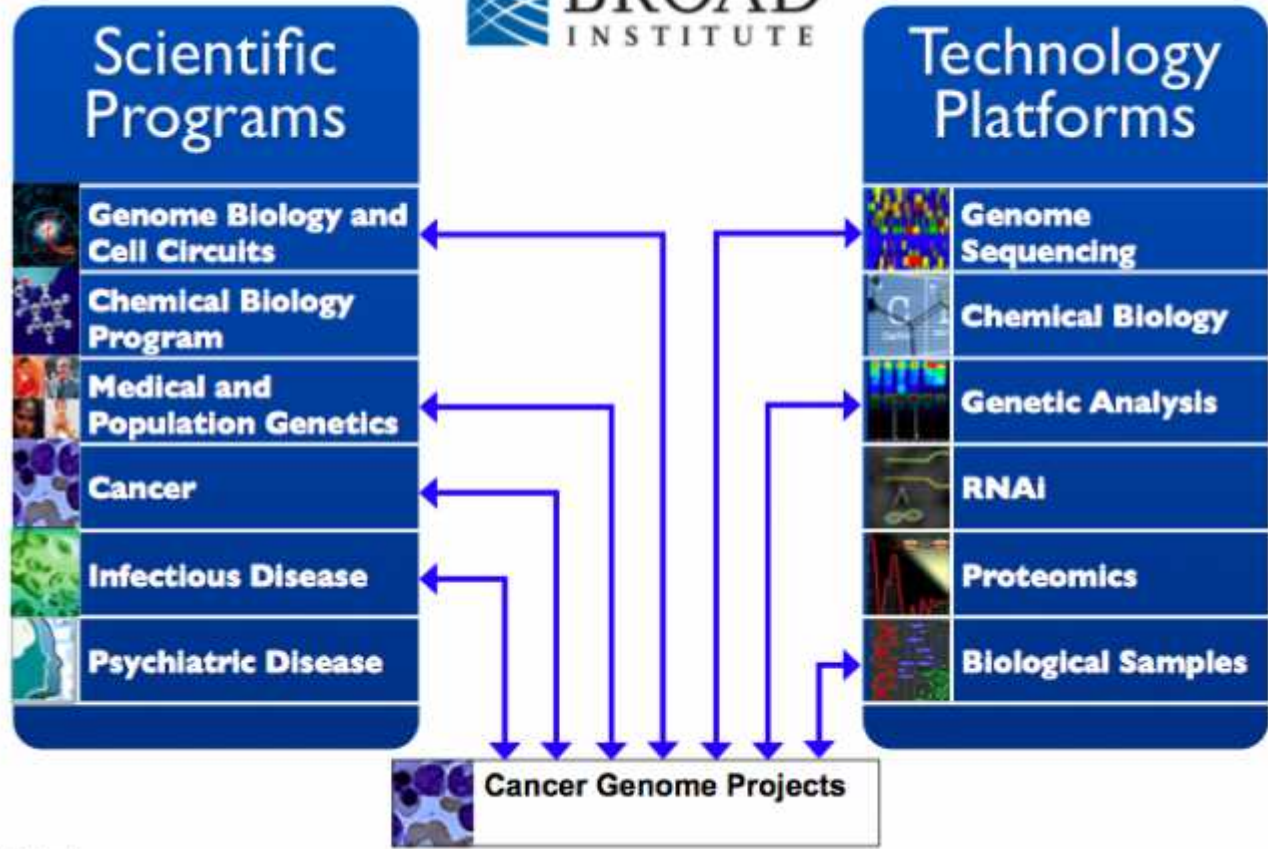
The agency says it is a victim of its own success. With commercial aircraft accidents rare -- or non-existent in some recent years -- it is difficult to use accident data to identify trends.

So the FAA has placed a greater emphasis on looking at "precursors" to accidents, such as "loss of separation" events in which aircraft come closer together than intended.

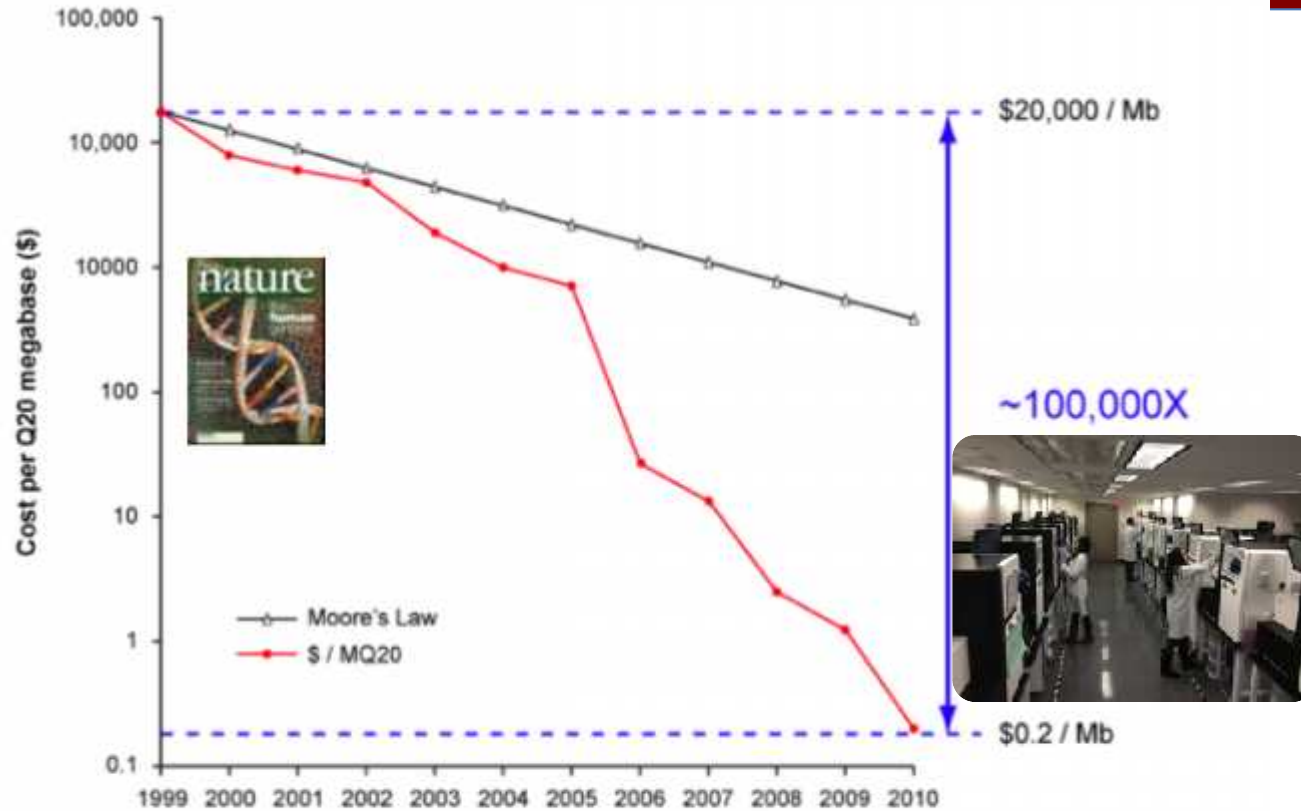
"We are covering electronically and identifying things that we never did before," said one FAA official, speaking on condition of anonymity.

## Why Work Doesn't Work (and hobbies are fun)

- We often don't know whether or not we have done a good job
  - Our “red box” thrives on matching patterns and learning to get better
- We don't know who we are working with and for
  - People are “pro social” and like to be connected to something large than themselves
- We don't feel like we are in control and we are victims of our own pattern matching
  - And we are forced to respond to problems with quick fixes and ad hoc “work arounds”



## Genomics is changing VERY rapidly



**2004: Genome \$800 M**  
**Exome \$100 M**

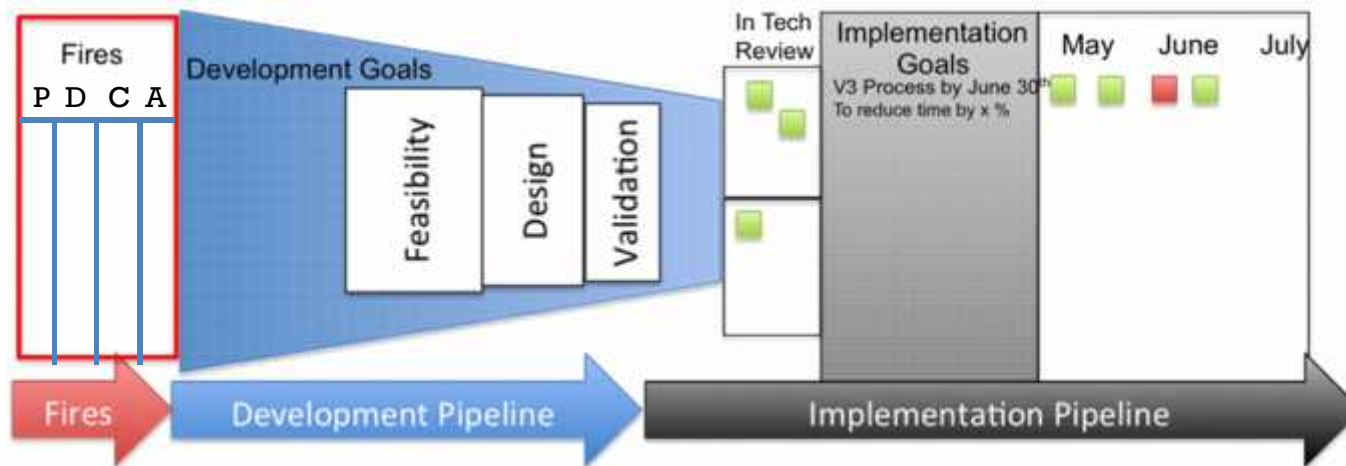
**Today: Genome \$2500**  
**Exome \$800**

# Tying It All Together Using Visual Management

Visual Activity Management System



## Tying it all together with visual management



The board:

- connects activity to intent by representing each activity as a post-it
- gives clear signals when activities are not progressing
- enforces structured problem solving
- facilitates optimal challenge by allowing the amount of work in the system to be clearly visualized and controlled





### DEVELOPMENT GOAL

3	KIT WORKFLOW REDESIGN	REDUCE TAT from 75min to < 5min
4	PLATING SCALEUP	SEQ 1440 samples/day FP 1056 samples/day ANALY 1440 samples/day
5	NEXTERA EXDNES	50 plates/wk 80x MTC with 8 PF 6b
6	ICE COST REDUCTION!	- Reduce by 25%
9	WGS SCALEUP	6 plates/wk 500ng input pooling, 30x with MSPF 6b
12	HiSeq X10	- Run genomes + exomes at scale scale: 10 FCs/day AWA Fail rate = 10% - Automated STP
10	CLUSTER DENSITY	- 90% samples w/in 10% target - implement new liquid handling





### Turnaround Time Reduced by >50%

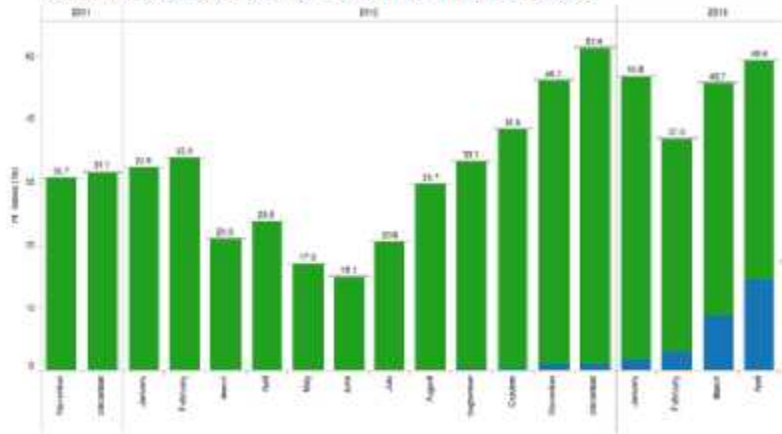


Sequencing Prices to Broad Researchers Reduced by

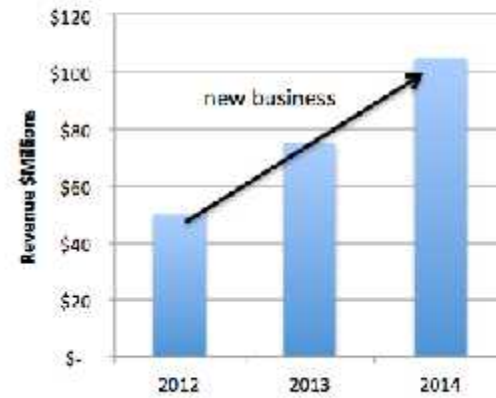
30%

### Greater than doubled annual budget

### Increased Demand & Utilization >50%



### Expected Budget



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