

**What?**  
**So what?**  
**NOW WHAT?**

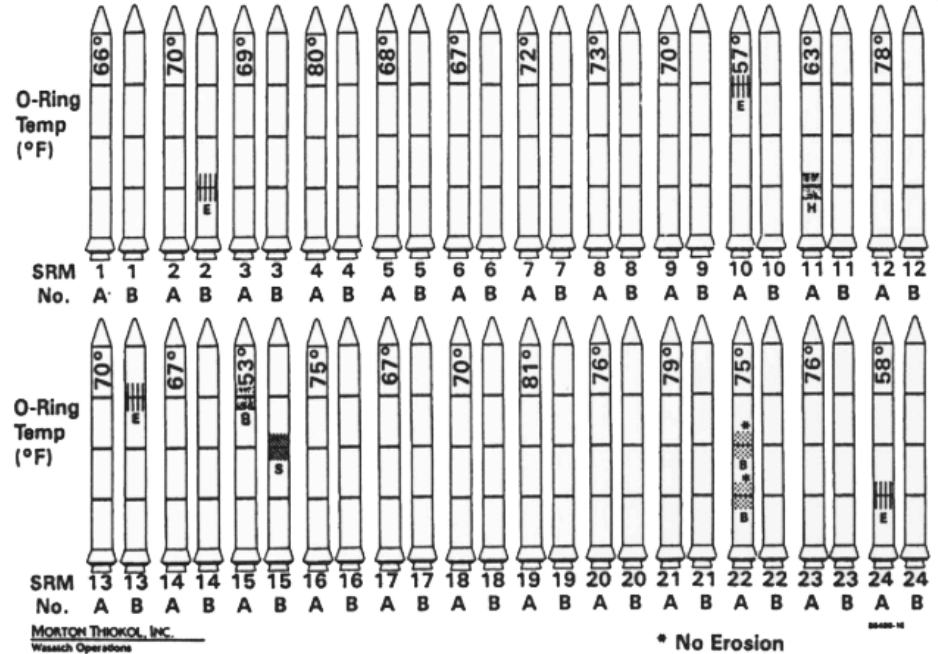
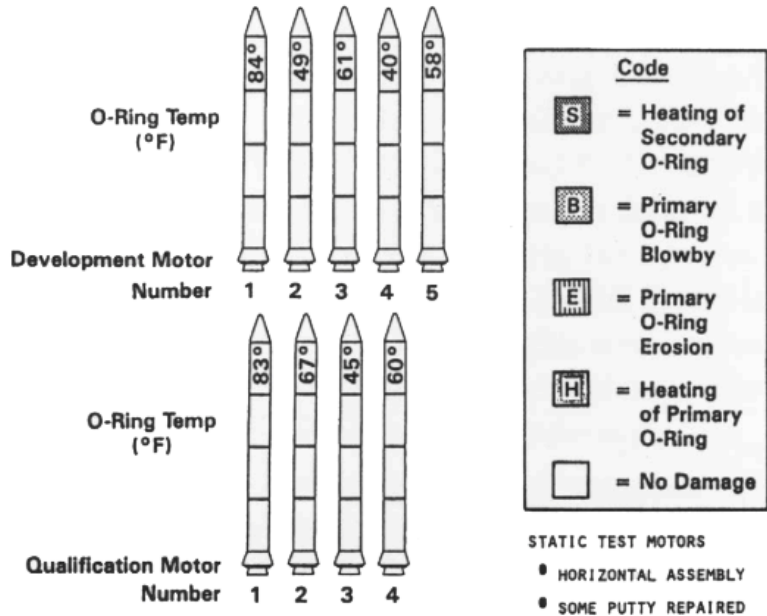
**What?**



# What? So what? NOW WHAT?

Presenting metrics to get results

## History of O-Ring Damage in Field Joints



MORTON THIKOL, INC.  
 Waukegan Operations

INFORMATION ON THIS PAGE WAS PREPARED TO SUPPORT AN ORAL PRESENTATION AND CANNOT BE CONSIDERED COMPLETE WITHOUT THE ORAL DISCUSSION



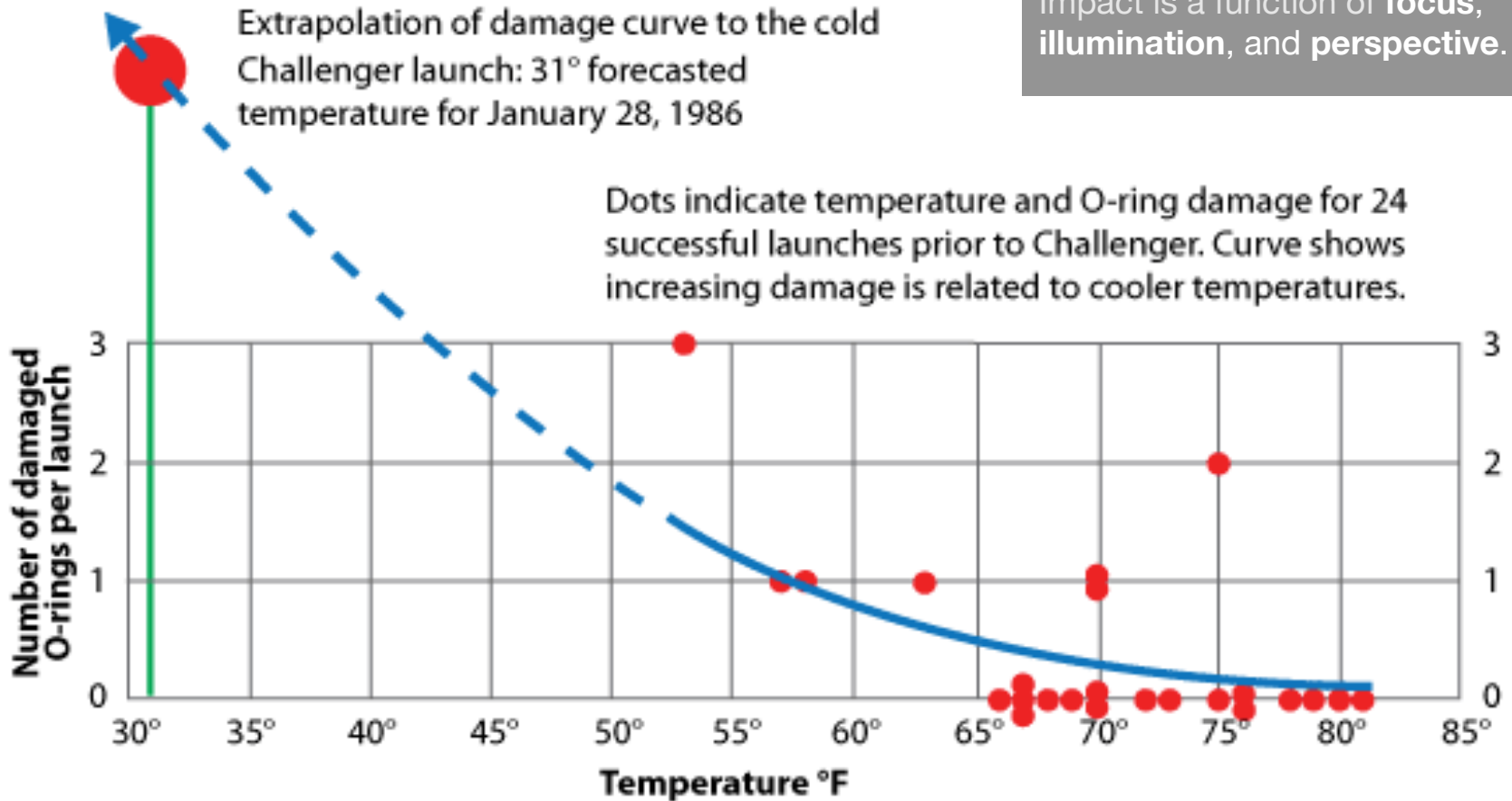
**So what?**



# What? So what? NOW WHAT?

Presenting metrics to get results

Visualization is like photography. Impact is a function of **focus**, **illumination**, and **perspective**.



**NOW WHAT?**

A photograph of the Space Shuttle Challenger on the launch pad. The orbiter is white with a black nose cone and is mounted on a white External Tank and two white Solid Rocket Boosters. The orbiter has "USA" and a small American flag on the left side, and "NASA Challenger" on the right side. The External Tank is orange. The shuttle is positioned vertically on the launch pad, with various support structures and equipment visible at the base. The background is a clear blue sky with some light clouds.

Don't  
Launch!

**Prevent your own  
disastrous decisions  
with better visualization  
and insight**

**Larry**  
**Maccherone**  
**@LMaccherone**



**What the \_\_\_\_\_ does this  
talk have to do with  
Agile?**

**Agile is about feedback.  
This talk is about how to  
get value out of  
quantitative feedback.**





# Getting acceptance of the Software Development Performance Index (SDPI) was (is) HARD!

THE IMPACT OF AGILE  
**QUANTIFIED**

SWAPPING INTUITION FOR INSIGHT®

REAL WORLD NUMBERS THAT MAKE THE ECONOMIC  
CASE FOR YOU TO GET THE RESOURCES YOU NEED AND  
GET YOUR PEOPLE TO COMMIT TO CHANGE.

SOFTWARE DEVELOPMENT  
PERFORMANCE INDEX

**SDPI**

# Forecasting

*how you should think about it*

**Every decision is a  
forecast!**

Next time someone gives you reasons for their decision, **ignore them!**

Rather,...

ask them about the

**alternatives considered**

and

the **models used to forecast**  
the outcome of those alternatives.



## Every decision is a forecast!

You are forecasting that the alternative that you chose is going to have better outcomes than the other alternatives.

So ...

**The quality of your decision depends upon two things:**

### **1. The QUANTITY (and thus quality) of alternatives considered**

- Brainstorm to gather lots of (even crazy) alternatives.
- Use back-of-napkin models to rapidly reject lots of bad alternatives.  $3 \times 3 = 10$ .
- But, be careful to not to remove whole branches of your decision tree prematurely. A single golden fruit may exist on a branch that is mostly rotten apples.

### **2. The models used to forecast each alternative's likely outcomes**

- Models should produce a probability distribution. NOT a single forecast.

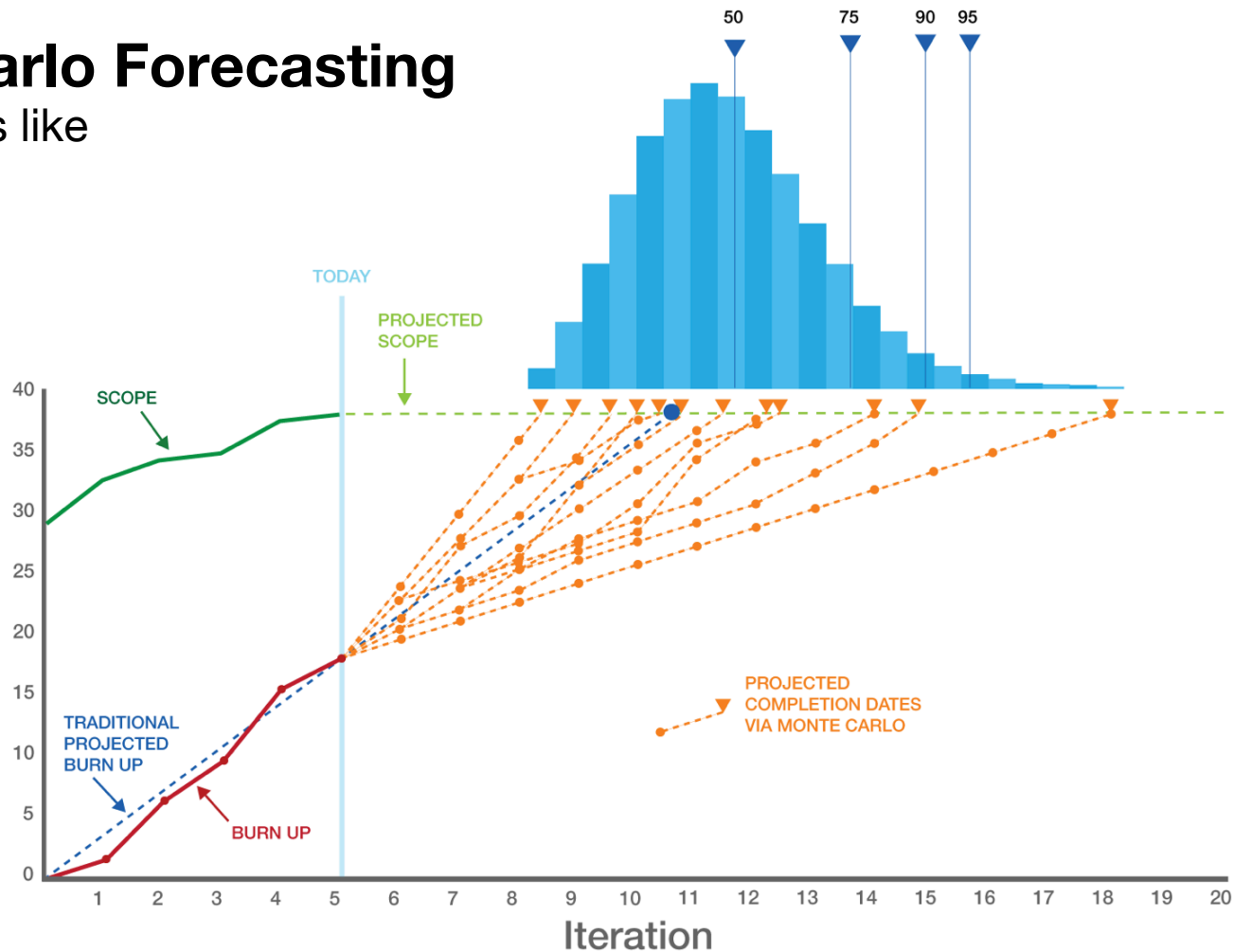
Forecasting is about  
**probability**





## Monte Carlo Forecasting

What it looks like





**Seek to  
change the nature of  
the conversation**

# Criteria for **great visualization?**

**Credits:**

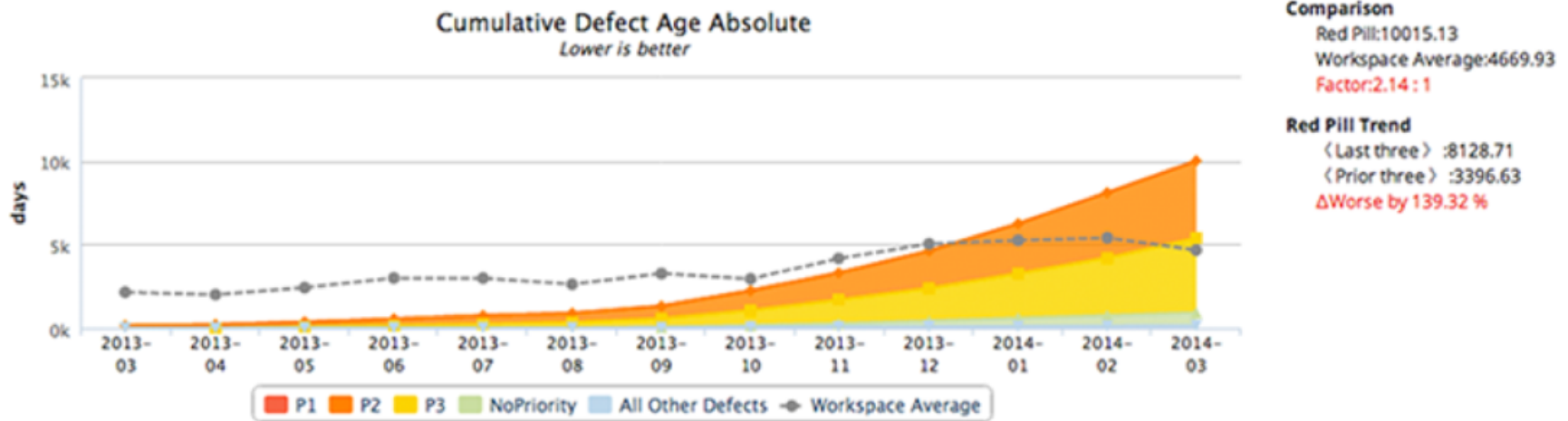
**Edward Tufte (mostly)**

**Stephen Few**

**Gestalt School of Psychology**



## 1. Answers the question, "Compared with what?" (So what?)



- Trends
- Benchmarks

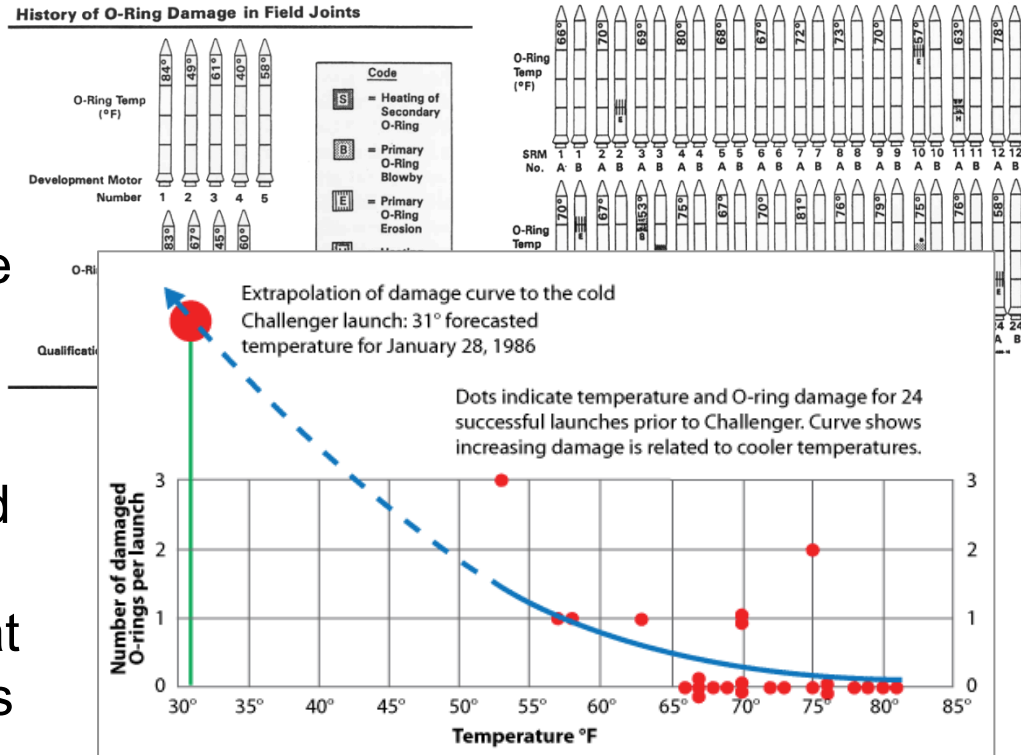


## 2. Shows causality, or is at least informed by it.

The primary chart used by the NASA scientists showed O-ring failure indicators by launch date.

Tufte's alternative shows the same data by the critical factor, temperature.

The fateful shuttle launch occurred at 36 degree. Tufte's visualization makes it obvious that there is great risk for any launch at temperatures below 66 degrees.





### 3. Tells a story with whatever it takes.

- Still
- Moving
- Numbers
- Graphics

And ...

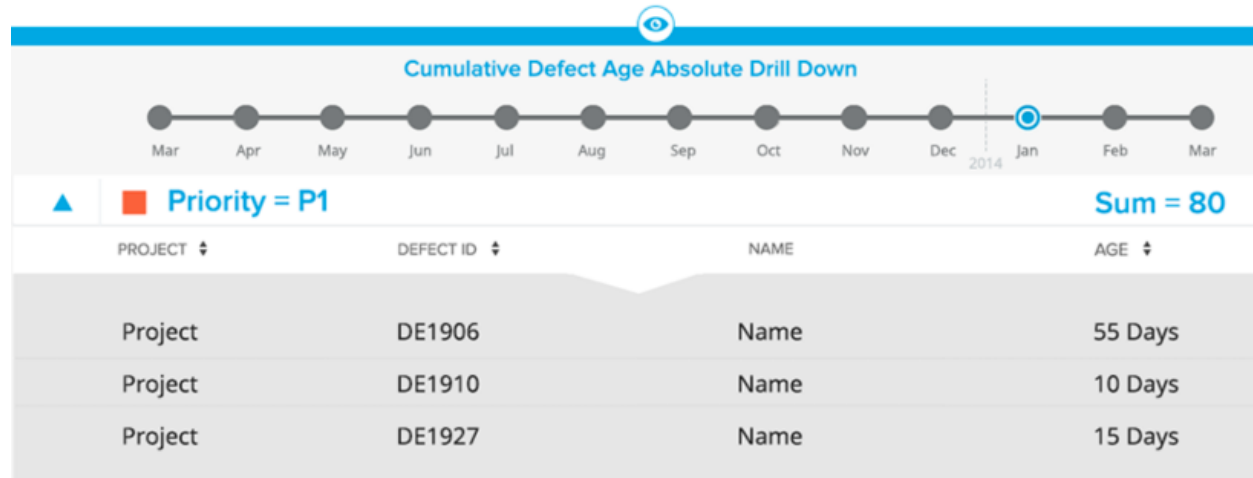
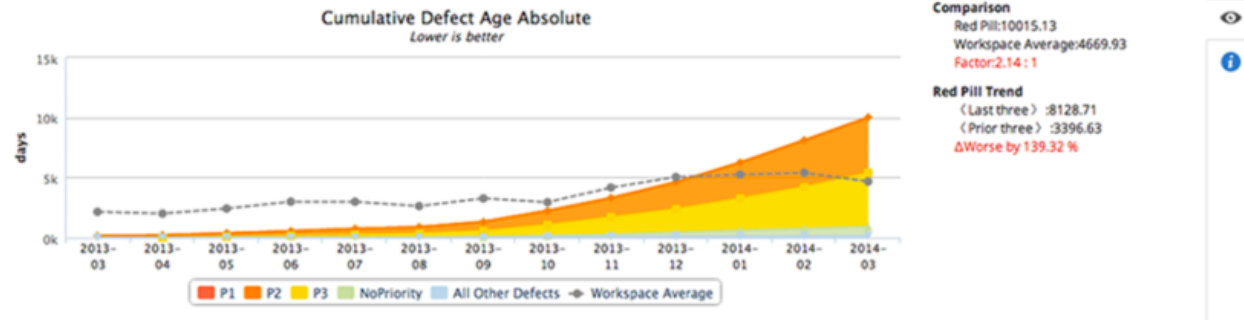
- A maybe some fun





## 4. Is credible.

- Calculations explained
- Sources
- Assumptions
- Who (name drop?)
- How
- Etc.



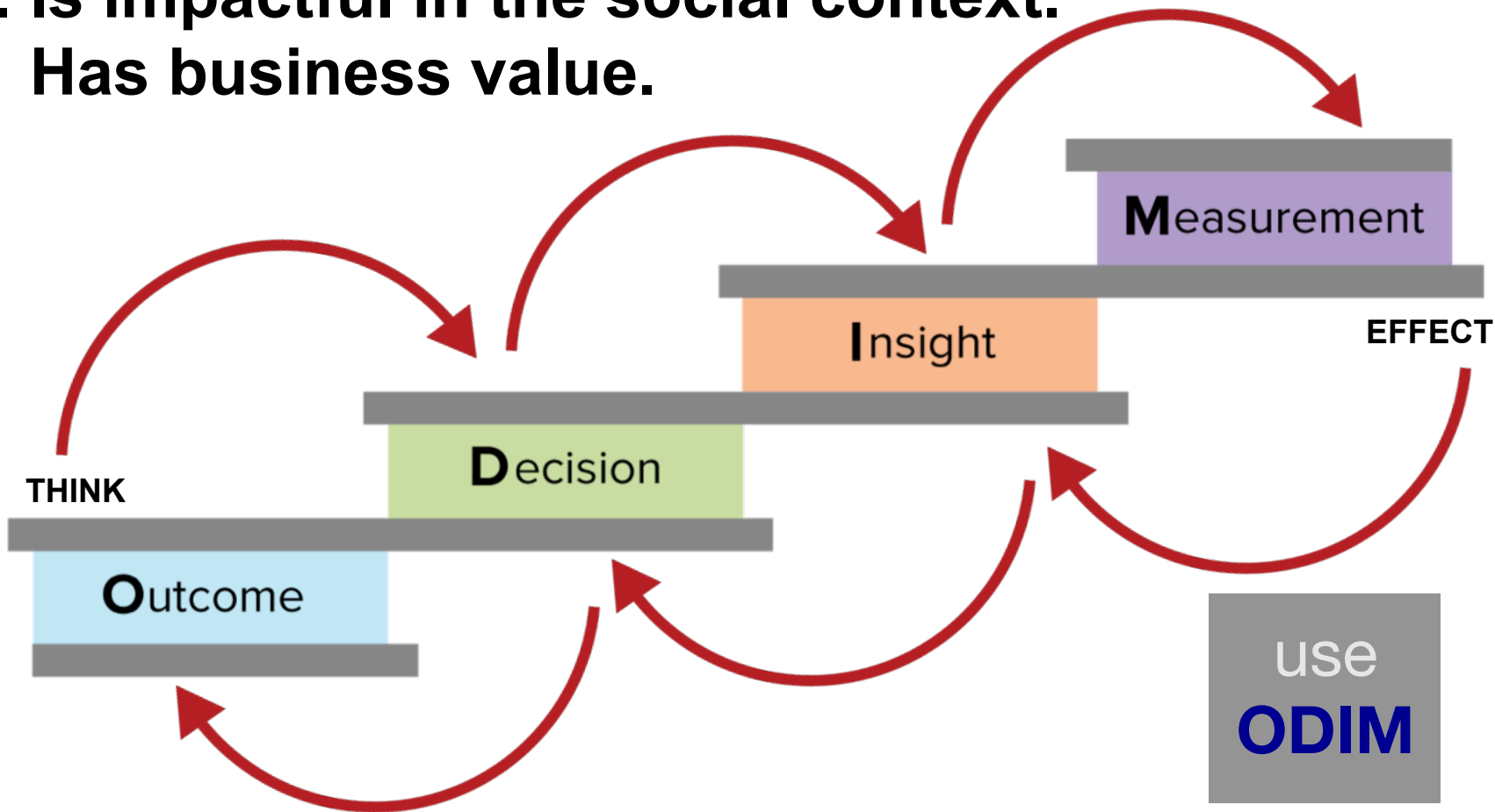
When presenting  
“Impact of Agile Quantified”,  
I spend 20 minutes explaining the  
research approach

Why?

A: It shows credibility.



# 5. Is impactful in the social context. Has business value.

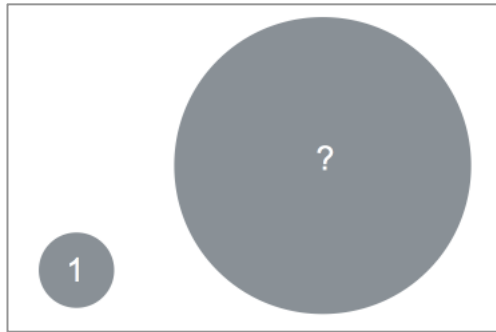
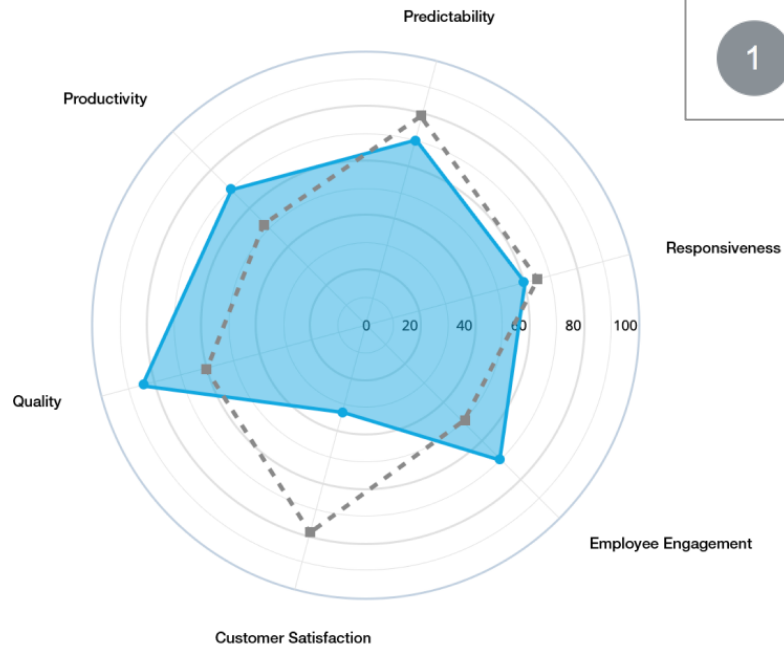






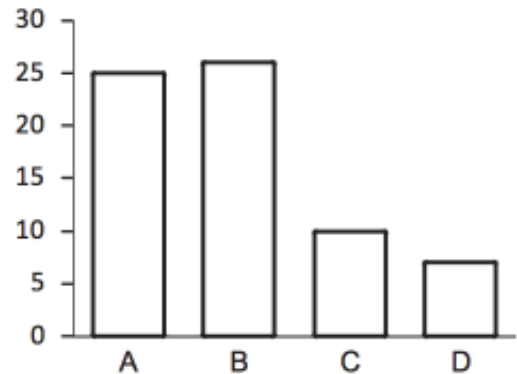
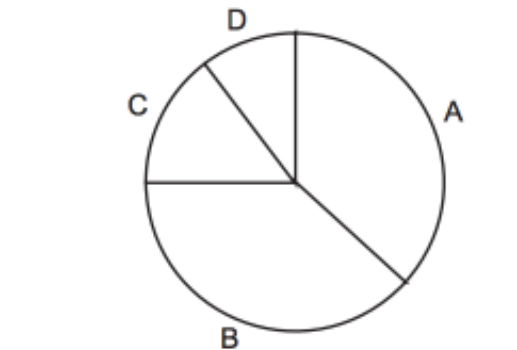
## 6. Shows comparisons easily.

aka:  
Save the “pie” for dessert



Credit:

- Stephen Few (Perceptual Edge)
- <http://www.perceptualedge.com/articles/08-21-07.pdf>

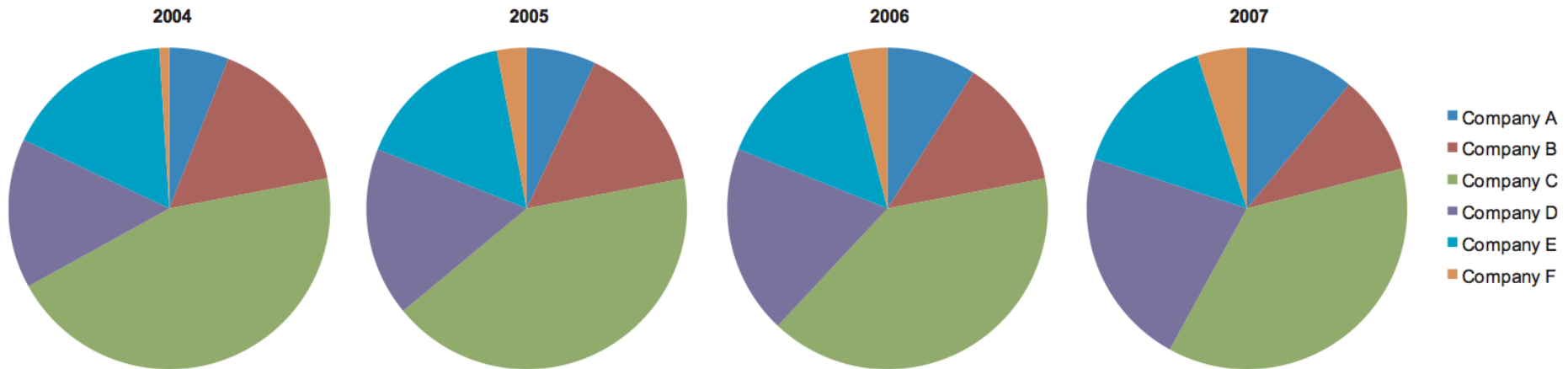




## 6. Shows comparisons easily. (continued)

Can you compare the market share from one year to the next?

Quickly: Which two companies are growing share the fastest?



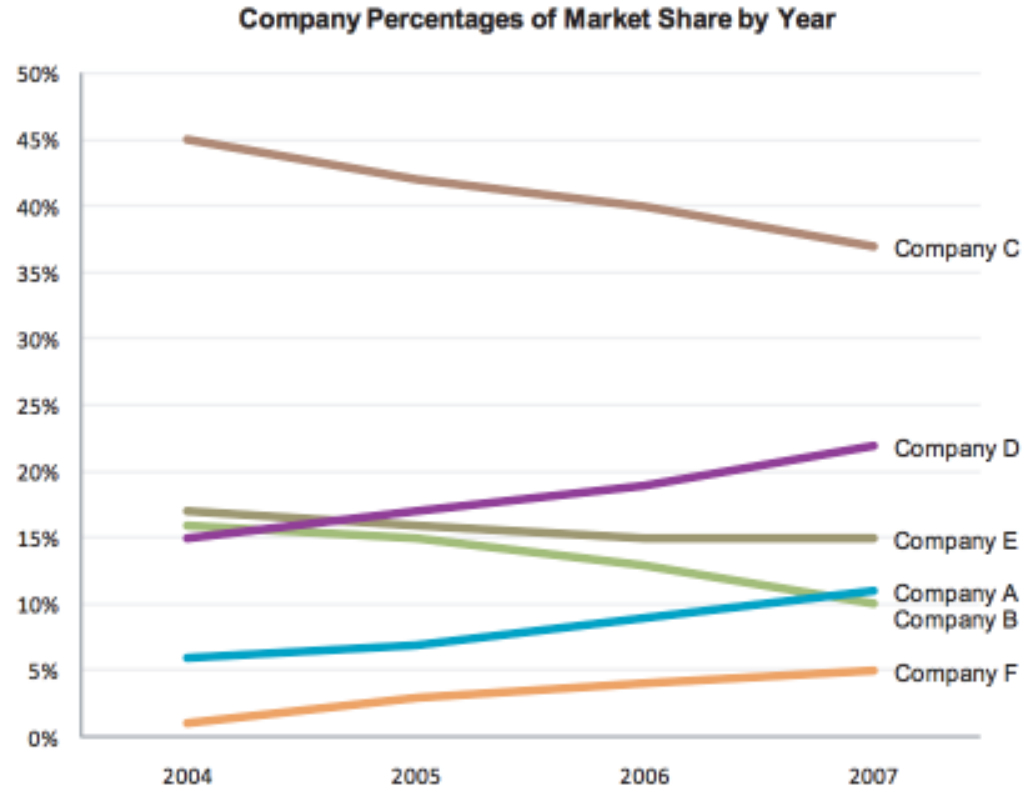
**One pie chart is bad. Multiple pie charts are worse!!!**



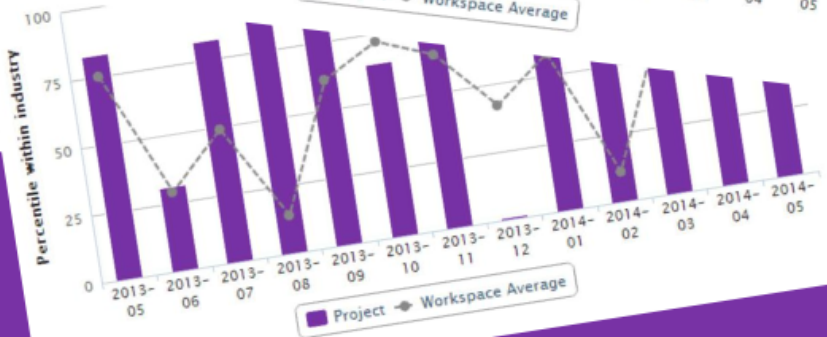
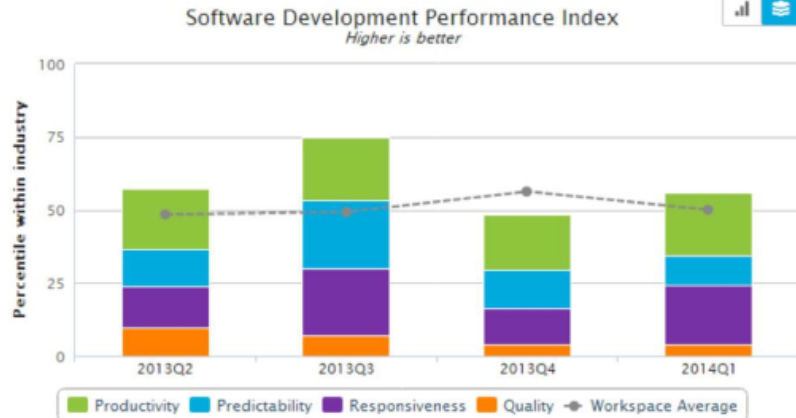
## 6. Shows comparisons easily. (continued)

How about now?

Can you compare the market share from one year to the next?

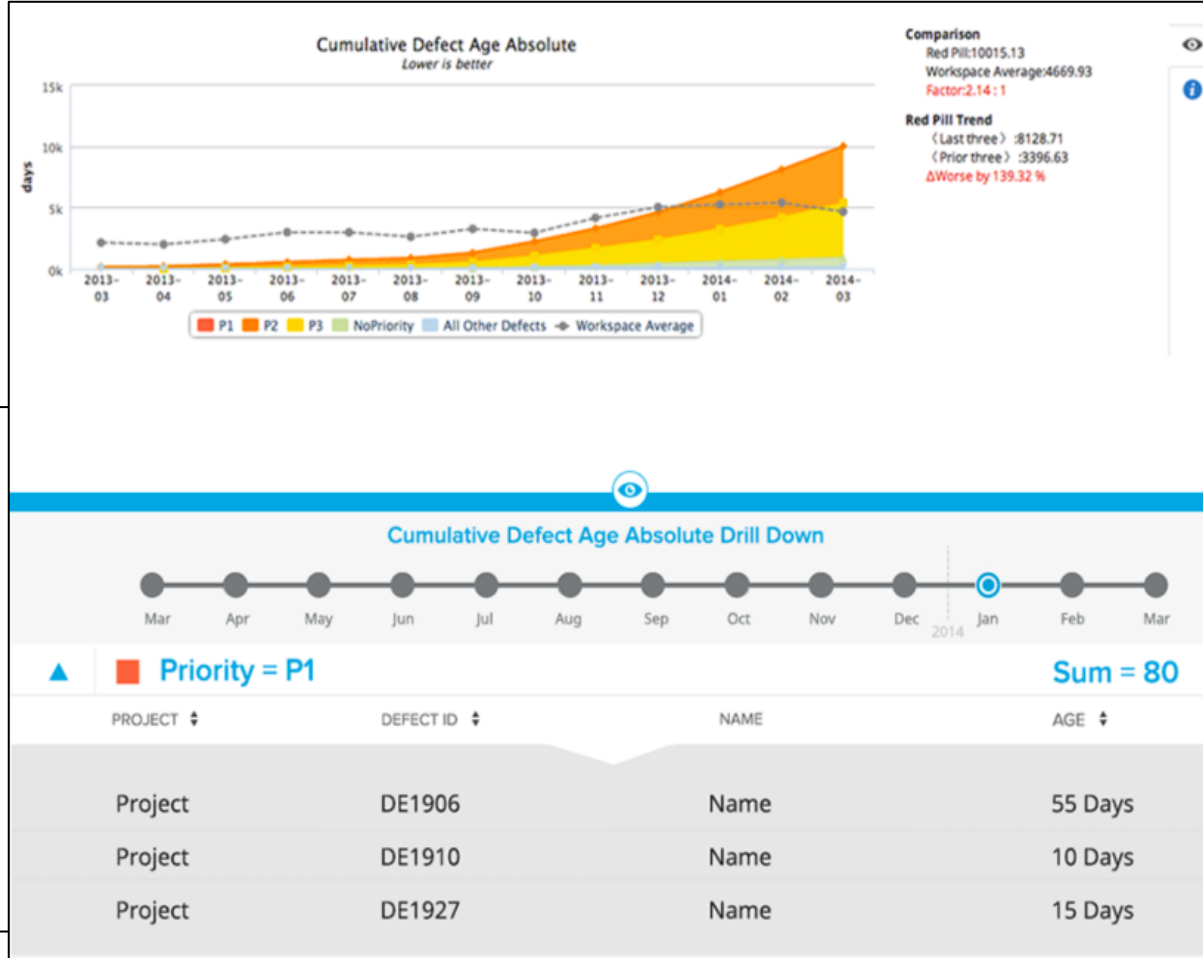


# Example of benchmarks



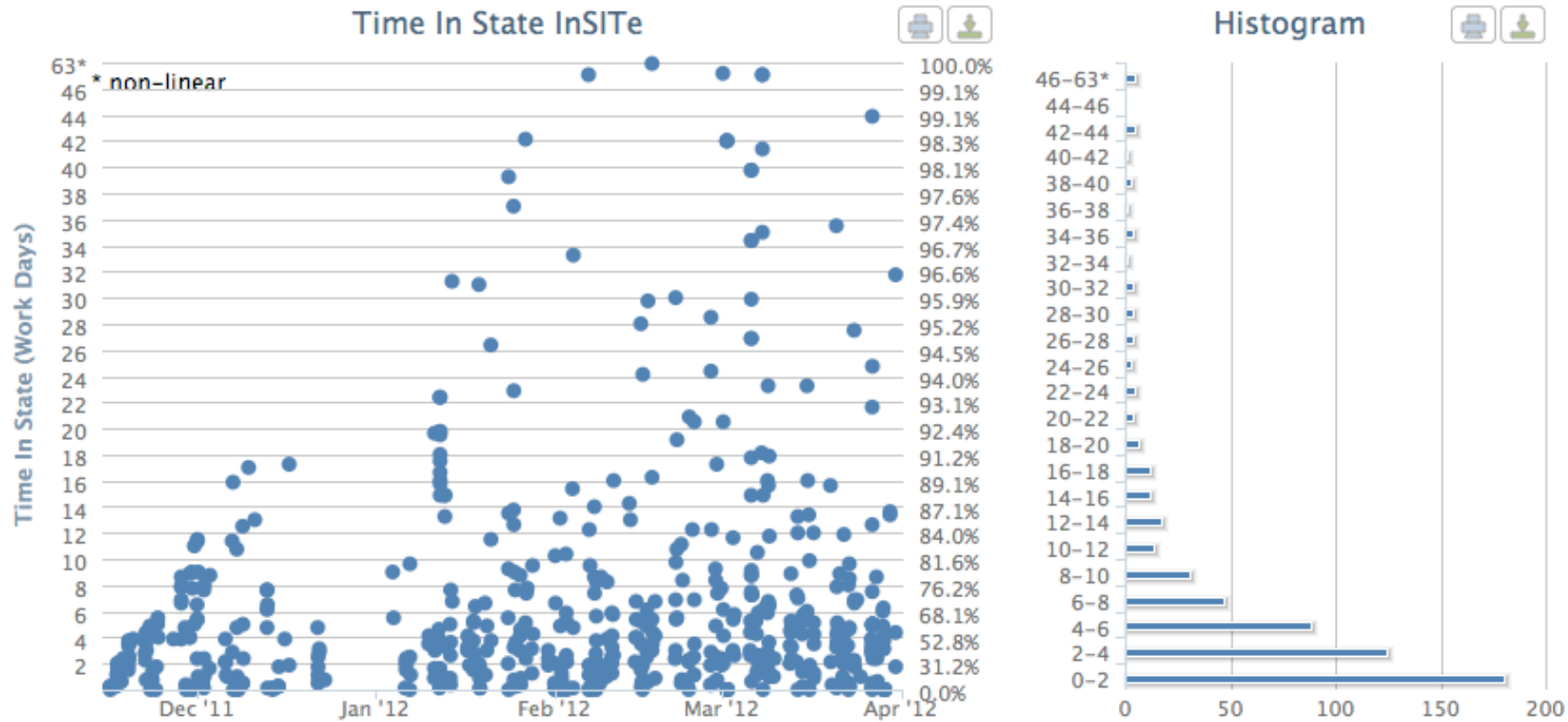


# 7. Allows you to see the forest AND the trees.



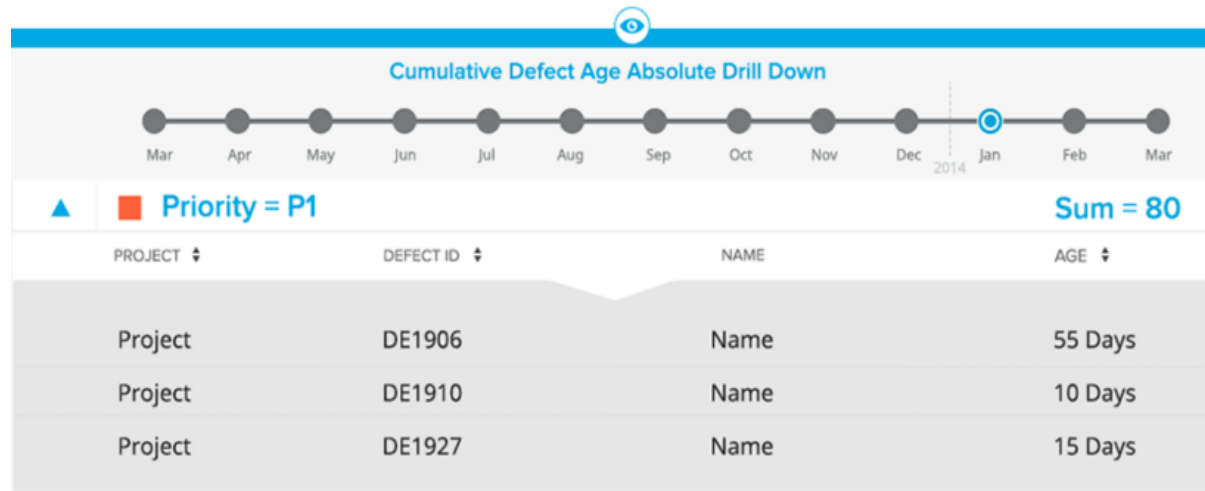
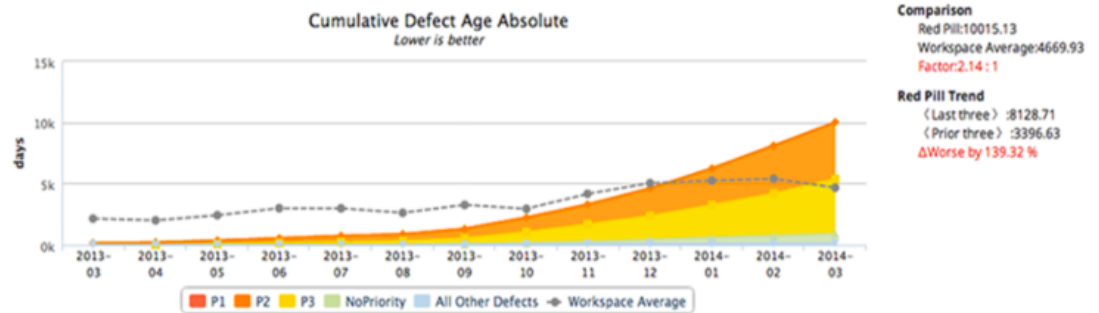


## 8. Informs along multiple dimensions. Is multivariate.





## 9. Leaves in the numbers where possible.

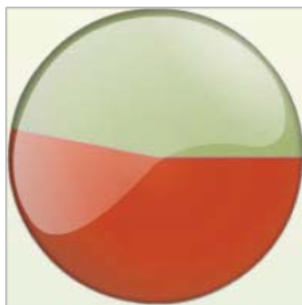




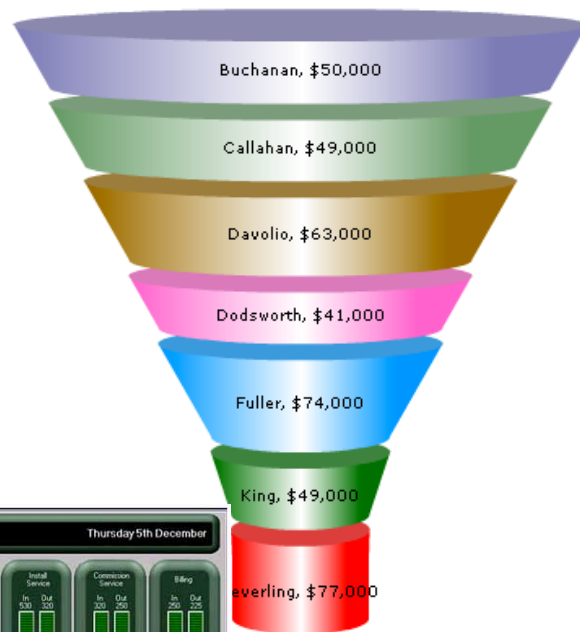
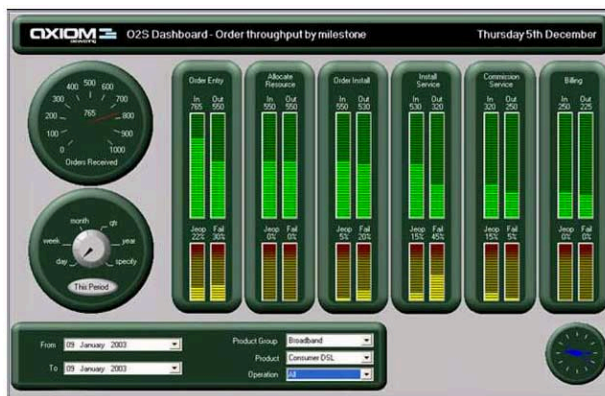
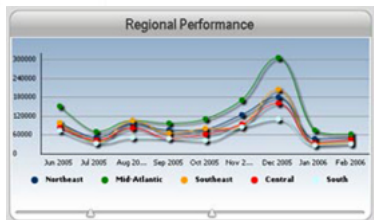
## 10. Leaves out glitter.

### Examples of how NOT to do it.

FusionCharts FREE - Funnel Chart



Evidence Break Out By Geography







## Top 10 criteria for great visualization

1. Answers the question, "Compared with what?" **(SO What?)**
2. Shows causality, or is at least informed by it. **(NOW What?)**
3. Tells a story with whatever it takes.
4. Is credible.
5. Is impactful in the social context. Has business value.
6. Shows comparisons easily.
7. Allows you to see the forest AND the trees.
8. Informs along multiple dimensions. Is multivariate.
9. Leaves in the numbers where possible.
10. Leaves out glitter.

### Credits:

- Edward Tufte
- Stephen Few
- Gestalt (School of Psychology)

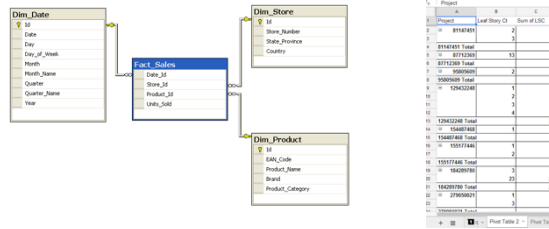
**Big data  
changes everything**



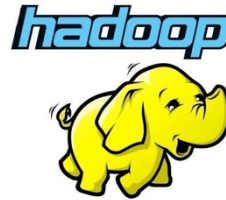
# What? So what? NOW WHAT?

Presenting metrics to get results

**1. Before big data** - Data warehousing, OLAP and other business intelligence tools ... big investment



**2. After big data** - Warehouses PLUS hadoop and NoSQL ... even bigger investment and complexity



**3. Now. Data enriched offerings**  
- Pre-packaged big data and machine learning fit to purpose... dramatically lower cost and complexity



Firms dealing with analytics saw everything change when big data came along. Now another major shift is under way, as the emphasis turns to building analytical power into customer products and services.

Thomas H. Davenport,  
Harvard Business Review

Imagine an  
Agile Tool  
that...



# Bayesian techniques

- Use new information to update prior knowledge
- Uses
  - Classifiers
  - Regression
- Cautions
  - Assumes independence (most of the time)
  - You still have to clean the data
  - You still need a model





## What do you mean, “You still need a model.”

This is the single line in my Lumenize open source analysis library that is the Bayes Theorem:

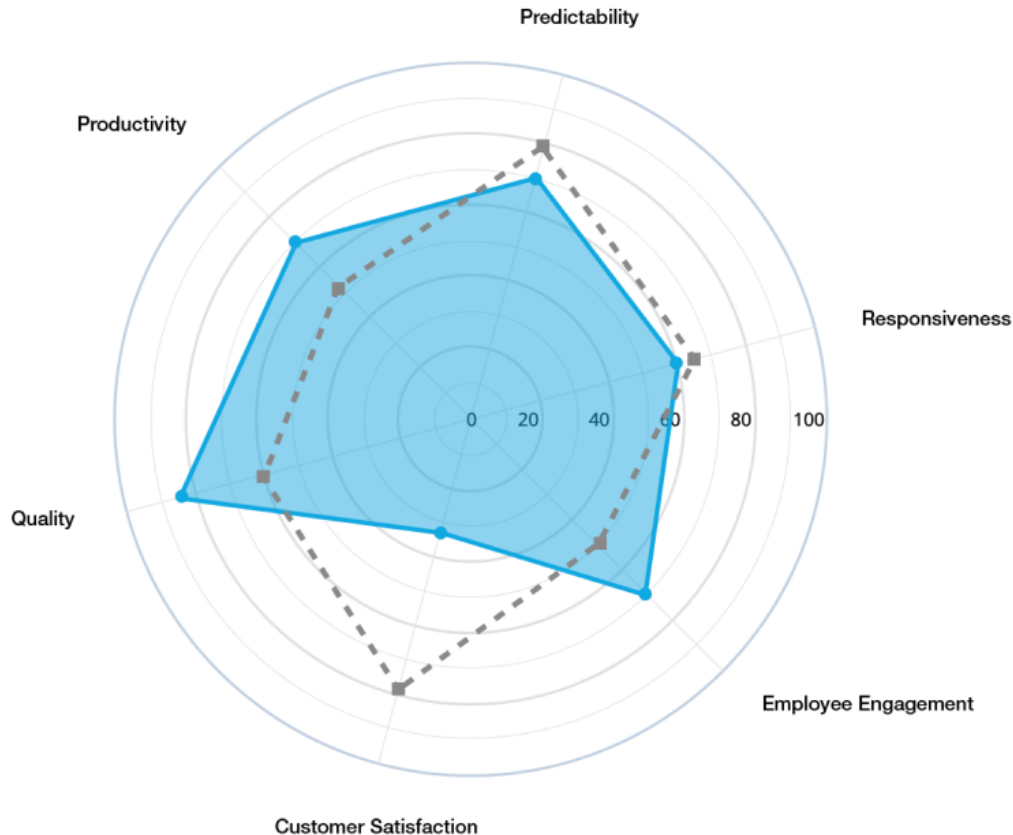
```
p[out] = p * prior.p[o] /  
        (p * prior.p[out] + (1 - p) * (1 - prior.p[out]))
```

Lumenize.Classifier is over 500 lines long including roughly 200 lines dedicated to explaining how this particular instance models the world (non-parametric modeling with v-optimal bucketing, depending upon training set size).





## Benchmarking with Big Data



At Rally:

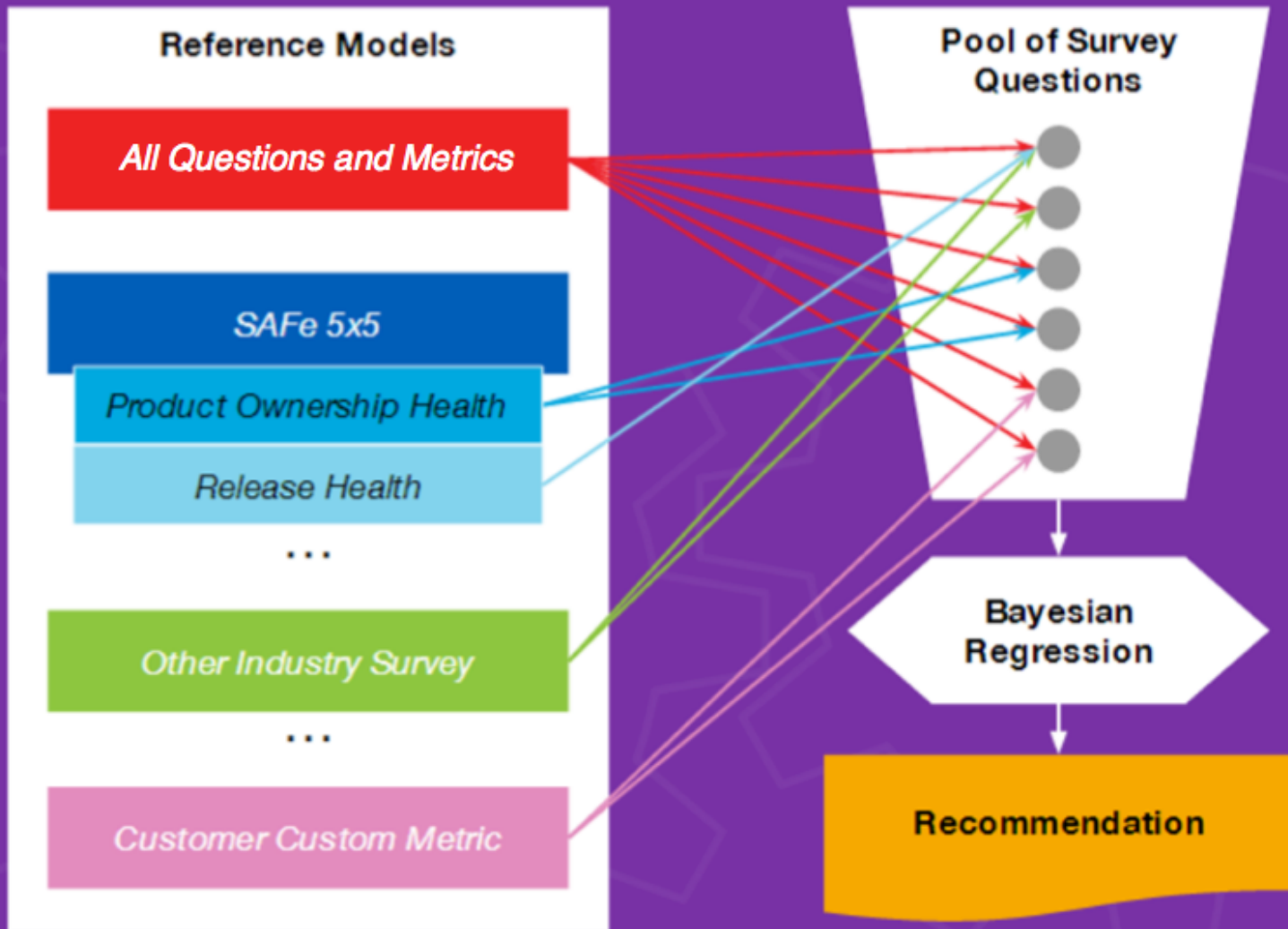
- Analyzed data from 10's of thousands of teams
- Created the **Software Development Performance Index (SDPI)** using principle component analysis, qualitative correlation, etc.
- Used the SDPI to conduct research **quantifying the impact** of decisions around behaviors, roles, motivations, process, etc. (possible additional presentation for this seminar)
- Used the SDPI to create industry-wide **benchmark**.



# What? So what? NOW WHAT?

Presenting metrics to get results

## Recommendation Engine



**Denying the evidence**





We don't see things  
the way *they* are.

We see  
things the way *we*  
are.

~The Talmud

**Next slide is a movie  
click to play**

OBAMA HQ  
CHICAGO  
10:26 PM CT



FOX  
NEWS  
LIVE

**BARACK OBAMA RE-ELECTED PRESIDENT**

**PRESIDENT OKLAHOMA D OBAMA 33% R ✓ ROMNEY 67% IN 83%**

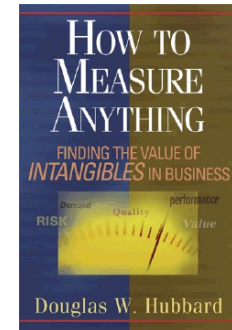




## Some truths about cognitive bias

1. Very few people are immune to it.
2. We all think that we are part of that small group.
3. You can be trained to get much much better.  
Douglass Hubbard – How to Measure Anything
4. We do a first fit pattern match. Not a best fit pattern match. And we only use about 5% of the information to do the matching.

I am... of course. ;-)





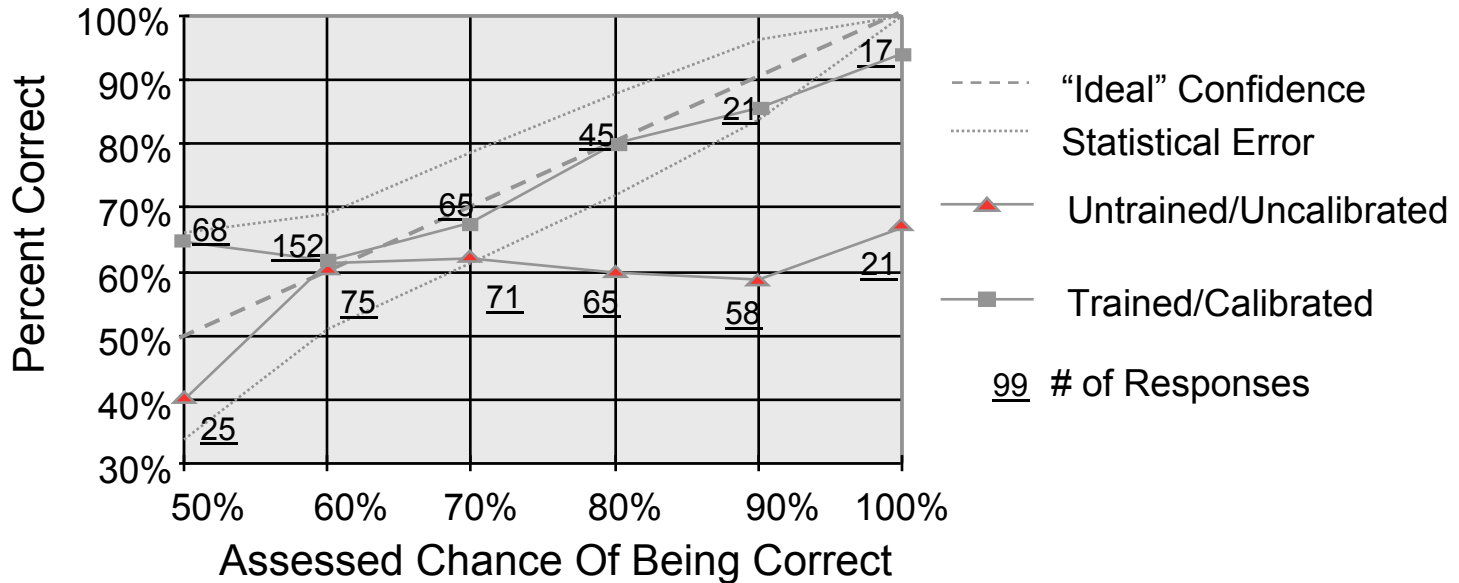
# Calibrated Estimates

- Decades of studies show that most managers are statistically “overconfident” when assessing their own uncertainty
- Studies also show that measuring *your own* uncertainty about a quantity is a general skill that **can be taught** with a ***measurable*** improvement
- Training can “calibrate” people so that of all the times they say they are 90% confident, they will be right 90% of the time



## 1997 Calibration Experiment

- 16 IT Industry Analysts and 16 CIO's , the analysts were calibrated
- In January 1997, they were asked To Predict 20 IT Industry events
- Example: Steve Jobs will be CEO of Apple again, by Aug 8, 1997 - True or False?



Copyright HDR 2007  
dwhubbard@hubbardresearch.com



## Equivalent Bet calibration

Suppose you're asked to give a 90% CI for the year in which Newton published the universal laws of gravitation, and you can win \$1,000 in one of two ways:

1. You win \$1,000 if the true year of publication falls within your 90% CI. Otherwise, you win nothing.
2. You spin a dial divided into two "pie slices," one covering 10% of the dial, and the other covering 90%. If the dial lands on the small slice, you win nothing. If it lands on the big slice, you win \$1,000.

Adjust your 90% CI until option #1 and option #2 seem equally good to you. Research suggests that even pretending to bet money in this way will improve your calibration.



# Types of bias

<http://srconstantin.wordpress.com/2014/06/09/do-rationalists-exist/>





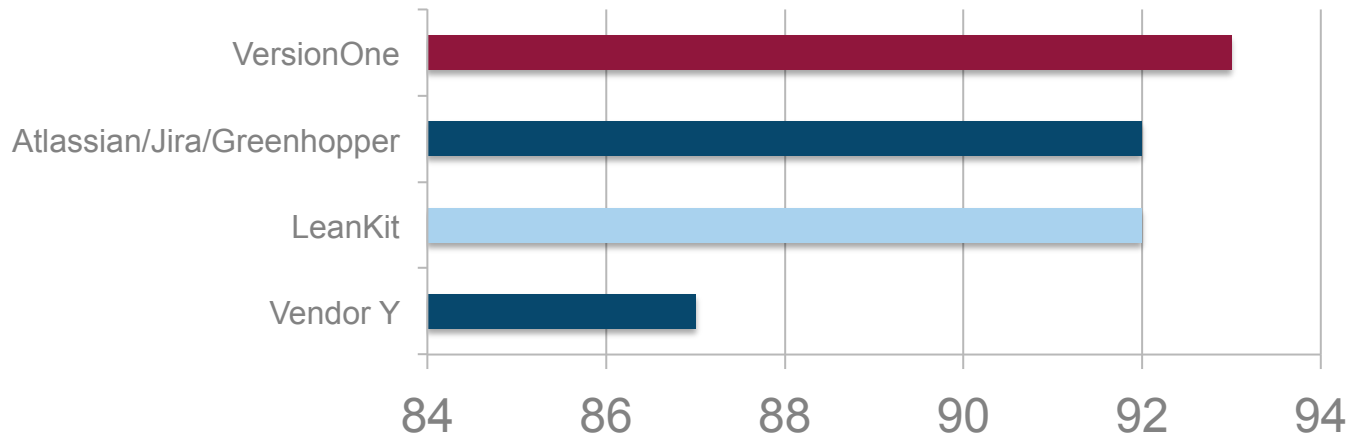
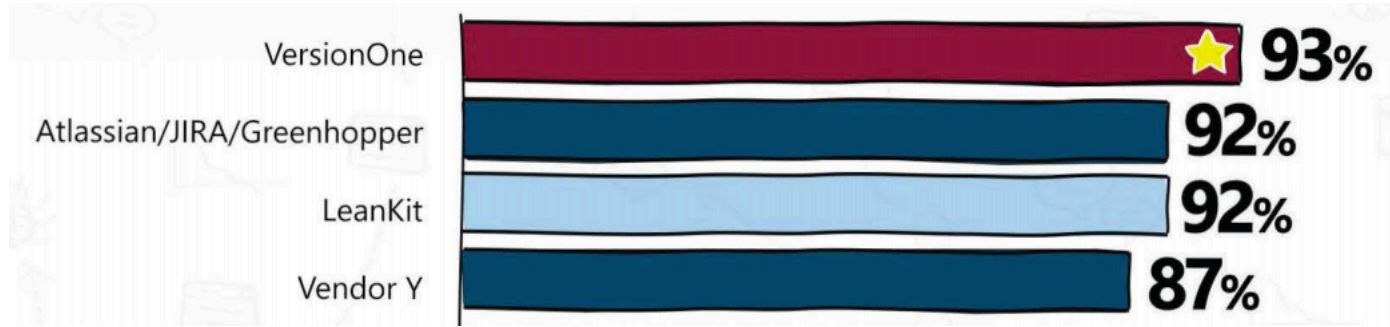
## Other tips

- **Don't focus on consensus.**  
Ritual dissent is a much more successful approach.
- **Don't reach a conclusion too soon.**  
Someone always sees the disaster in advance. An FBI agent knew that some folks were being trained to fly but not take off and land.
- **Use counter-actuals.**  
What would have happened, if? What-if? What confidence level would you need to do anything about it? How to get to that confidence level?
- **Assign someone the role of devil's advocate.**  
Israel's 10<sup>th</sup> man.

**Lying with statistics**



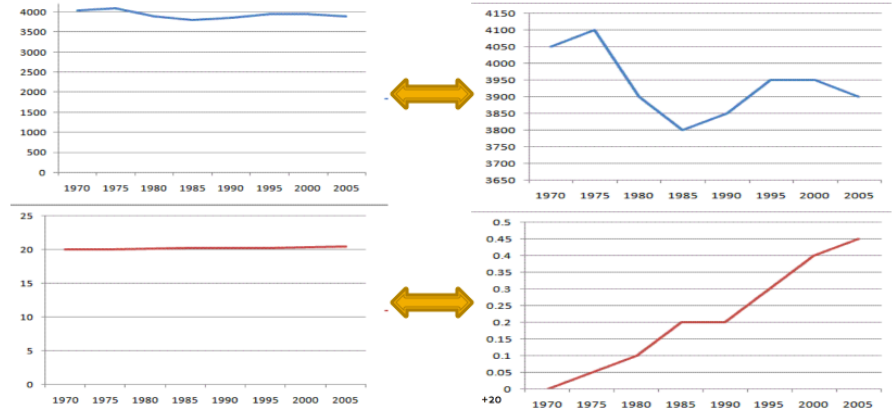
## What's wrong with this?





## Other ways to lie with statistics

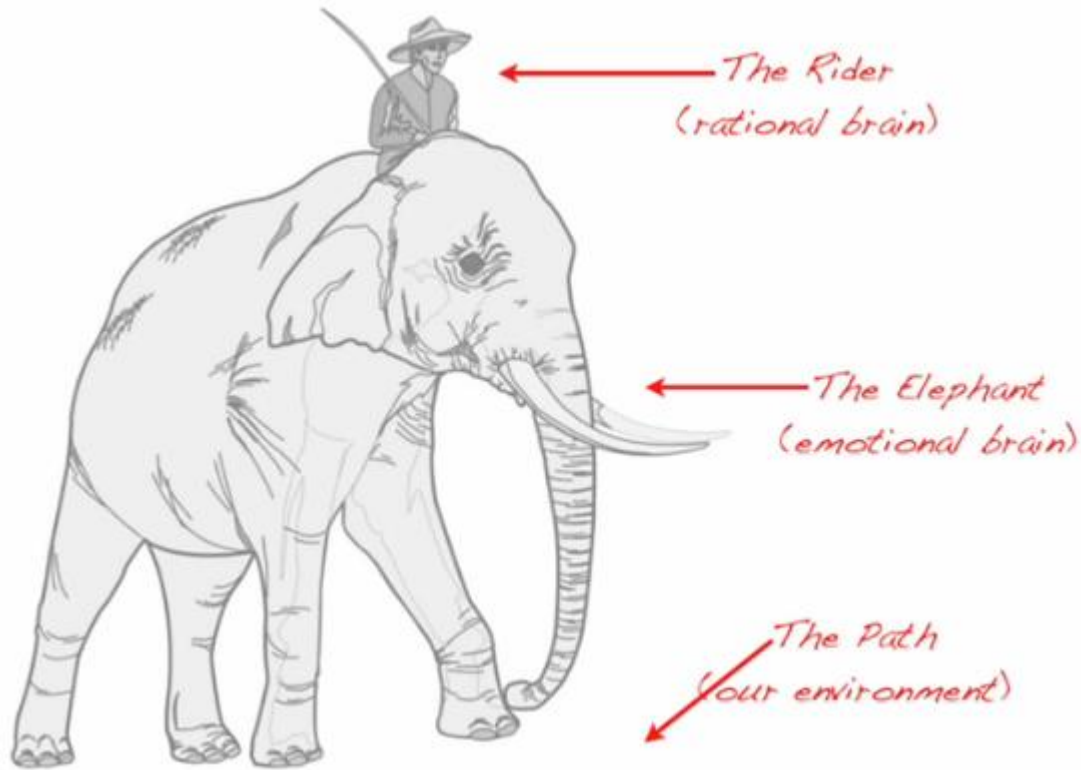
- Sampling bias
  - Self selection bias
- Leading question bias
- Social desirability bias
- Median vs Mean
- The big “zoom-in”
- Correlation does not necessarily mean causation



**Influencing with data**



# The rider and the elephant



- ◆ Direct the rider
- ◆ Motivate the elephant
- ◆ Shape the path

Jonathan Haidt  
The Happiness Hypothesis  
(also mentioned in Switch)



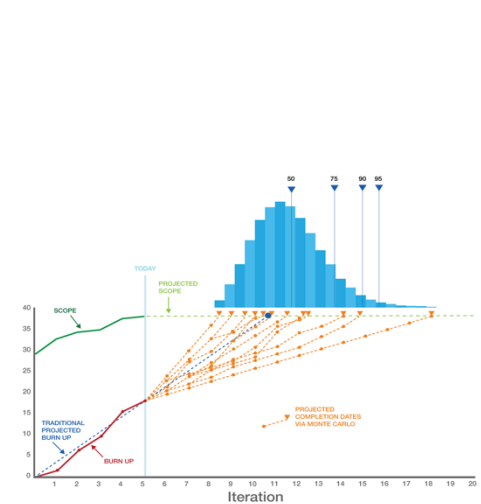
## How to Influence People with Data

Top tips for influencing people with data

- Tell a good story
- Become known for being right
- Avoid wars about semantics
- Imperfect evidence is better than no evidence

And ...

- Change the nature of the conversation  
(remember the Monte Carlo burn chart forecast?)



Larry Maccherone

<http://www.businesscomputingworld.co.uk/top-tips-for-influencing-people-with-data/>

Connecting the world of software delivery

## ■ Tasktop Data

- Provides a single aggregated stream of Data from connected tools:
  - ALM, Build, SCM, Support, Sales, etc.
- Operates in real time.
- Maintains complete history.
- Normalizes data models. Resolves users and projects.
- Supports analytics and reporting tools.
- Does not directly provide visualization or analysis.

## ■ Get insights for your teams

What's Next?



Connecting the world of software delivery

- Attend a metrics seminar or have it delivered on-site
  - Impact of agile quantified
  - Forecasting
  - Data science
- Sign up for webinar series (free)
  - Just leave me your business card or send me an email

What's Next?