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Why Don't Those Dunderheads Agree With Us?

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Who am I?



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Those academics just play games and develop theories. No real work!



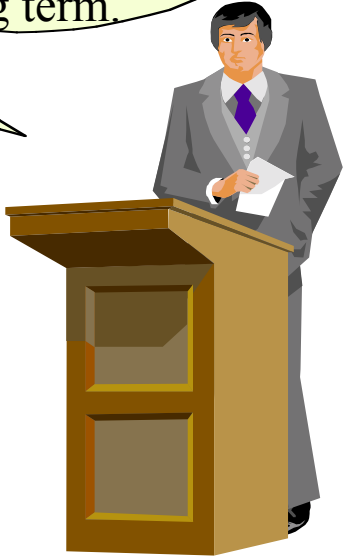
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Industry

Those people in industry focus on short term profits and don't prepare for the long term.



Me



Academia

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Symptoms



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Gedanken Experiment

An experiment you perform in your mind because to actually perform the experiment would be impossible or excessively costly



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Experiment 1 - The Pumpkin Vendor

- The Problem: Pumpkins are Too Pale This Year



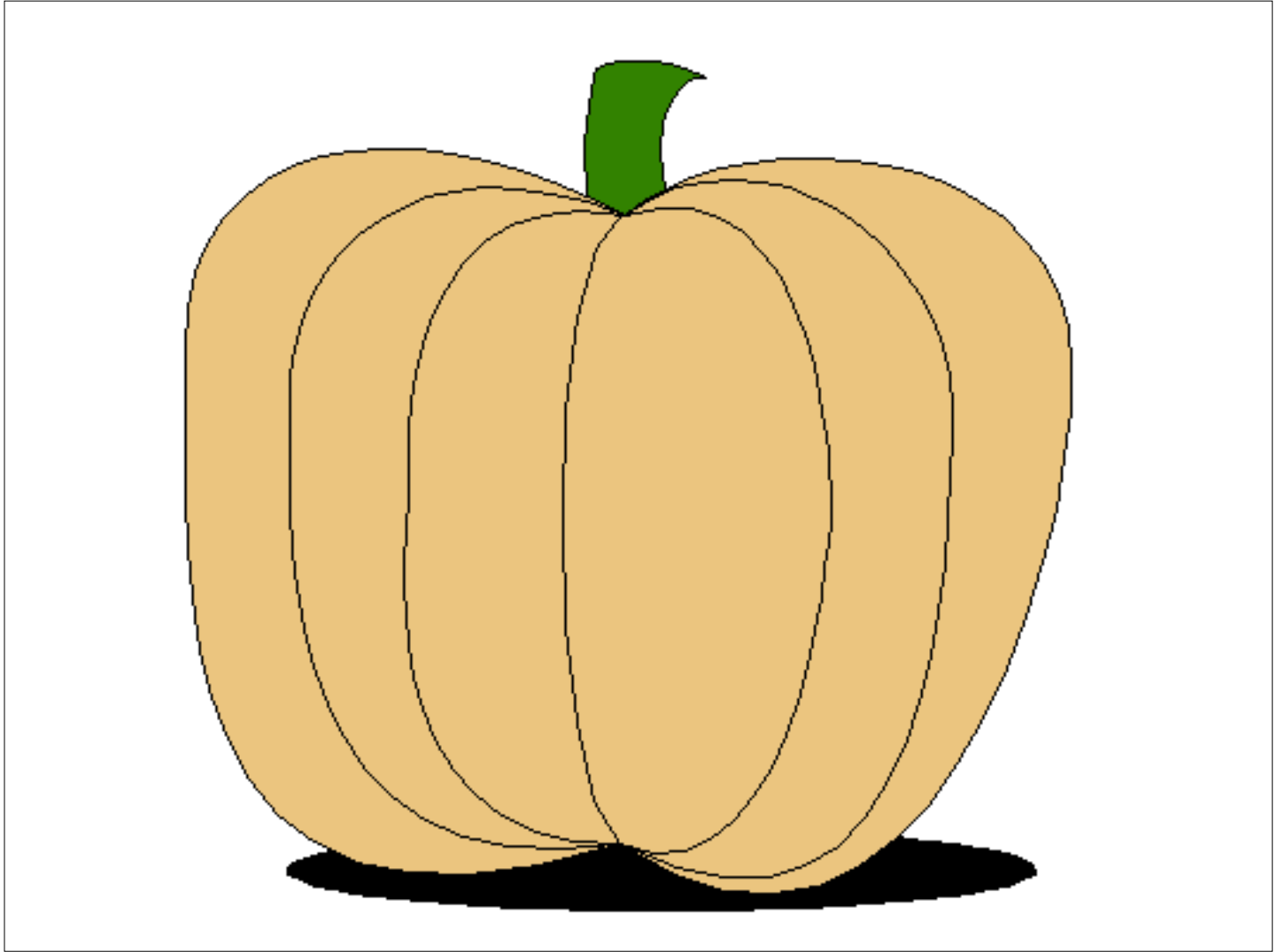
- The Need: Spray the Pumpkins to Make them a Deeper Shade of Orange

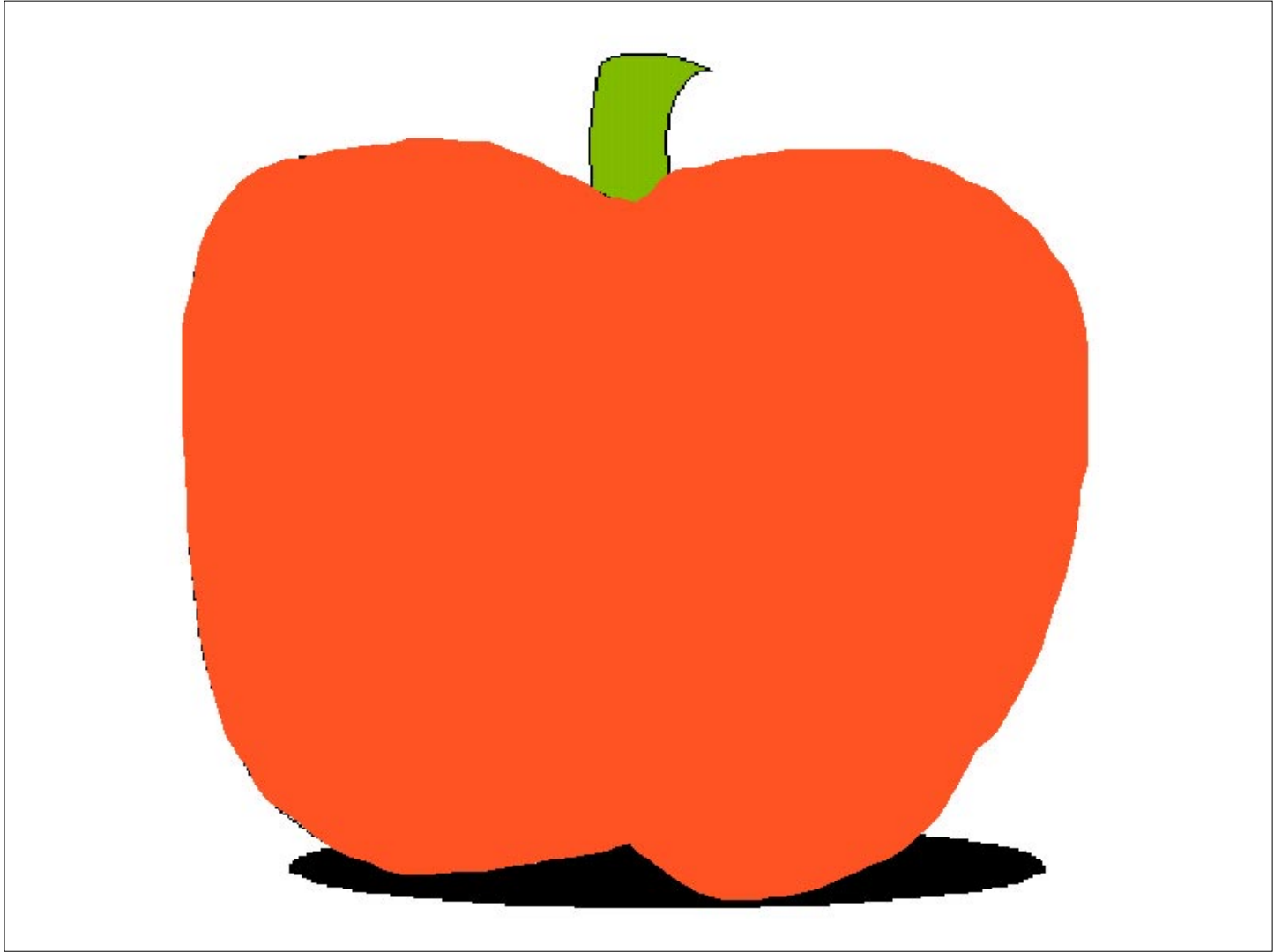


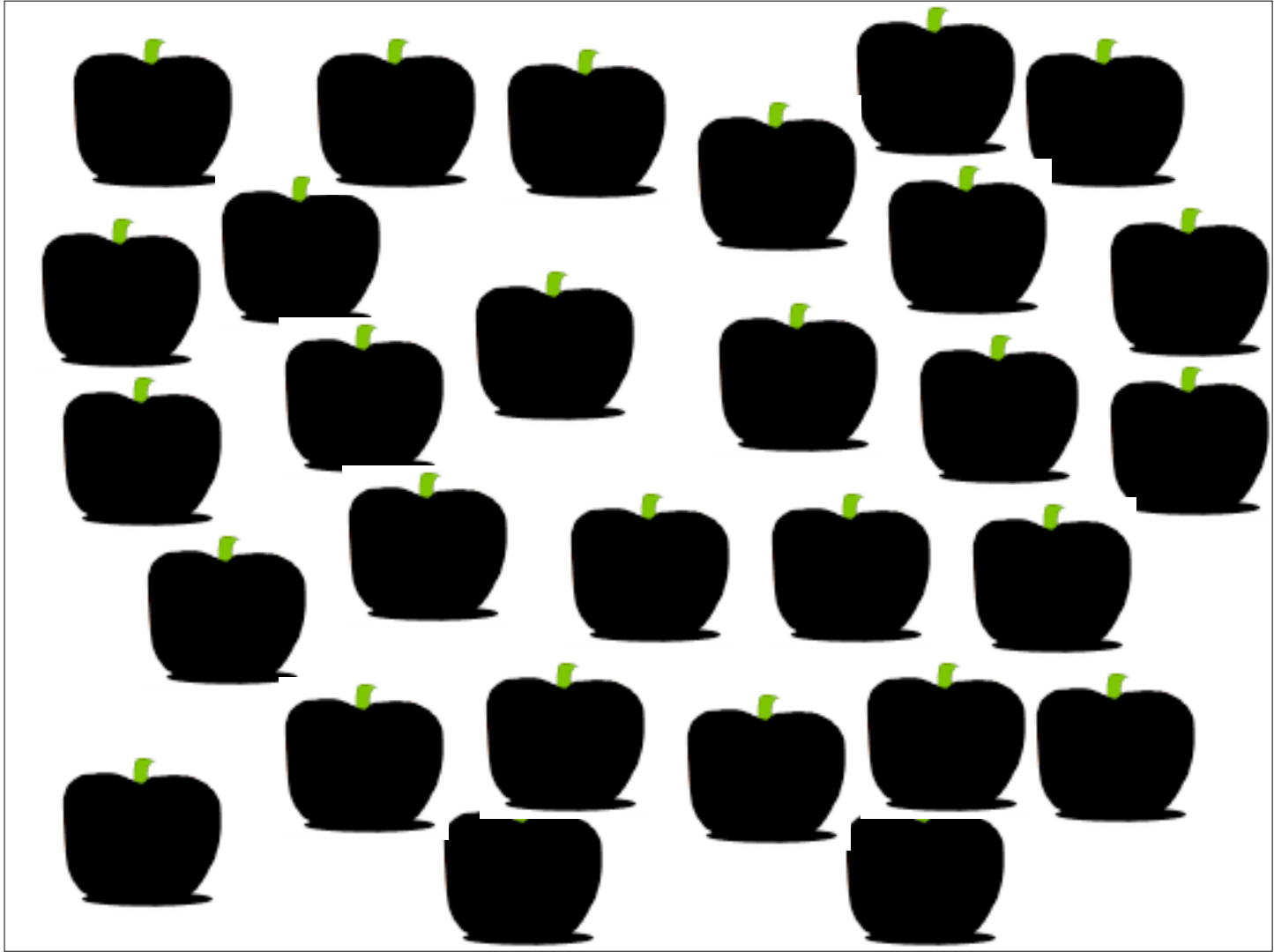
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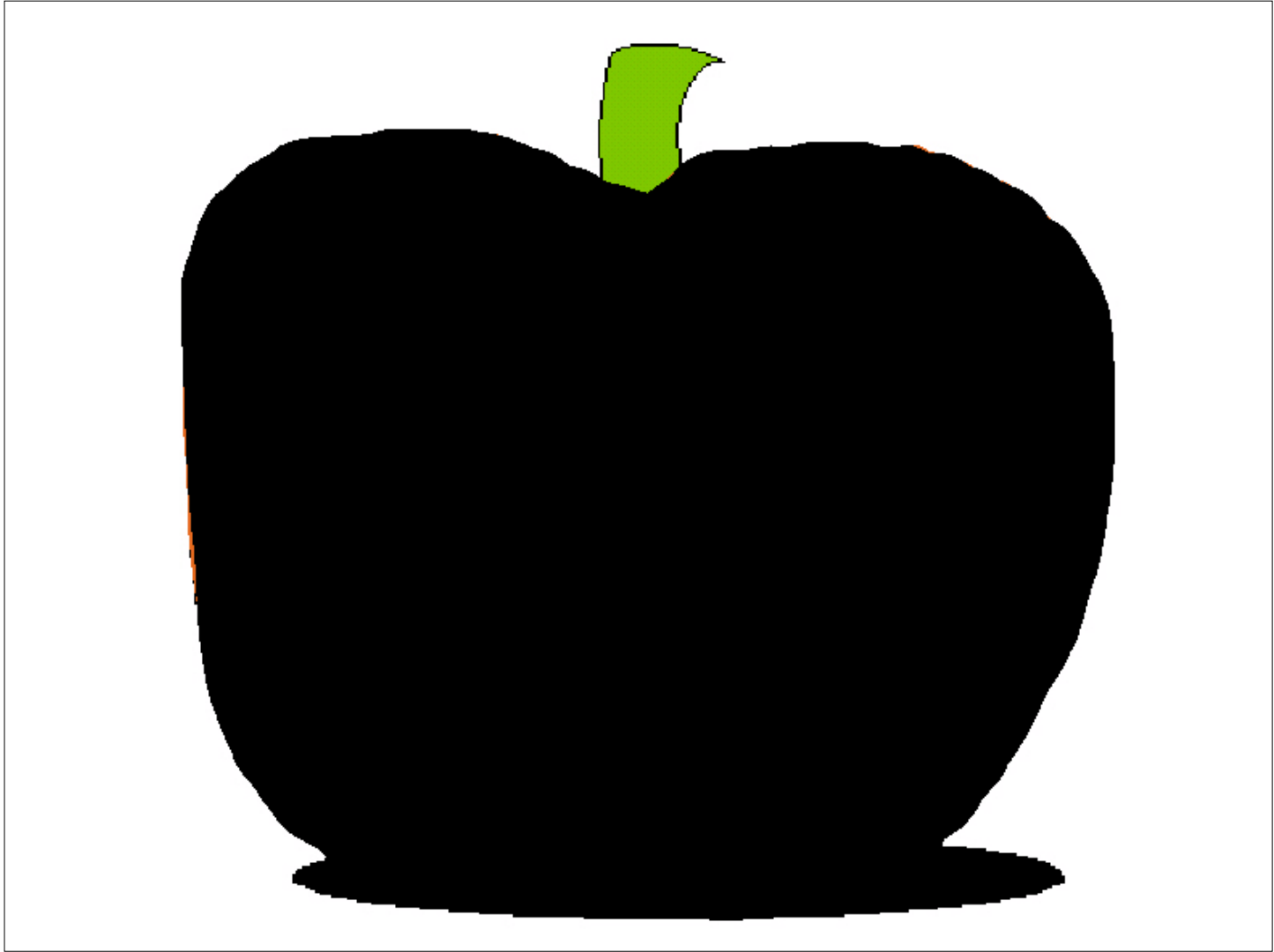


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Lessons Learned

Acting Too Soon can lead to Disaster

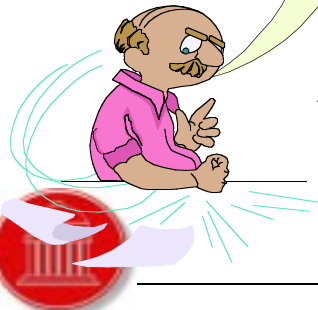
Understanding Principles is Important



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Experiment 2 - The Wright Brothers

**We can
make a machine
that will fly!**



Wilbur

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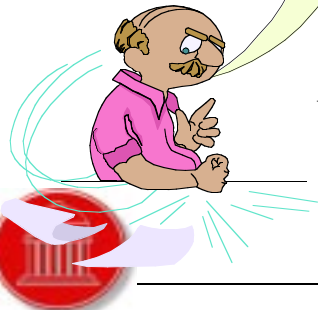
Orville



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Experiment 2 - The Wright Brothers

**We can
make a machine
that will fly!**



Wilbur

Loop Invariant:
.....

**But
we must prove
the software
is correct!**



Orville

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Lessons Learned

Sometimes We Must Take Risks

Doing Things is a Catalyst that Forces
Us to Understand the Principles

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Problems

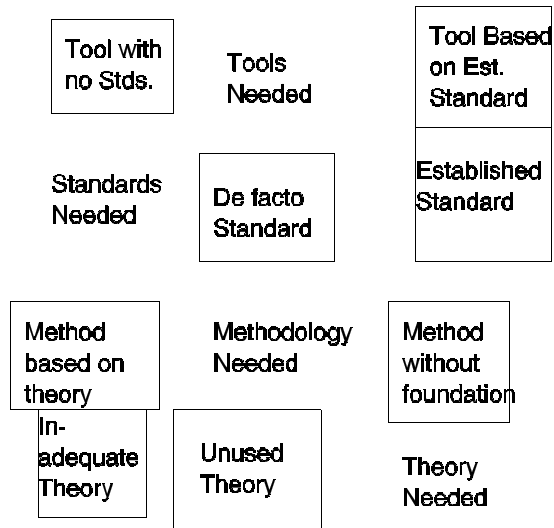


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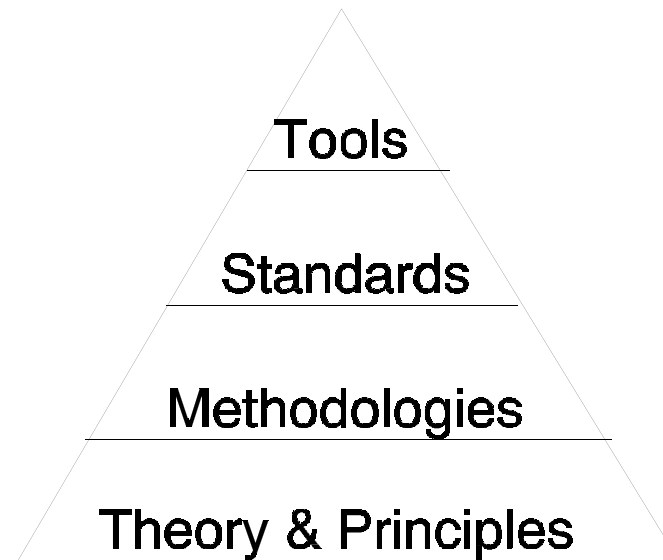
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Problem 1 - The State of Software Engineering

Today



Goal



Problem 2 - Technology Transfer

Universities

- Brilliant New Concepts
- Taught Mainly to PhD Students
- Masters Degrees Prepare You for the PhD Program
- Terminal or “Service” Masters Degrees are unimportant
- Practical application of advanced concepts is left as an exercise for the student



Companies

- Thousands of employees who want advanced education



- Subsidized Masters Degrees
- Many other forms of subsidized continuing education



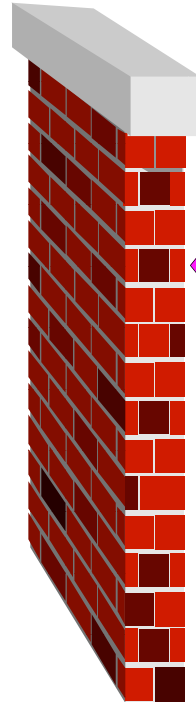
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Problem 2A - Technology Transfer

Universities

- Struggling to simulate real work environments with inadequate laboratories
- Collecting data from unrealistic experiments
- Seeking but rarely finding opportunities for sabbaticals and summer jobs in industry



Companies

- Many new developments that really work well
- Many projects with much data
- Employees not encouraged to take the time to write papers
- Key advances are kept hidden because they are proprietary



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Why Does This Happen?



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Academics and Specialists Probe Nature
and Focus to Develop New Knowledge

Managers and Industry Harvest
Knowledge and Transform It Into Useful
Products

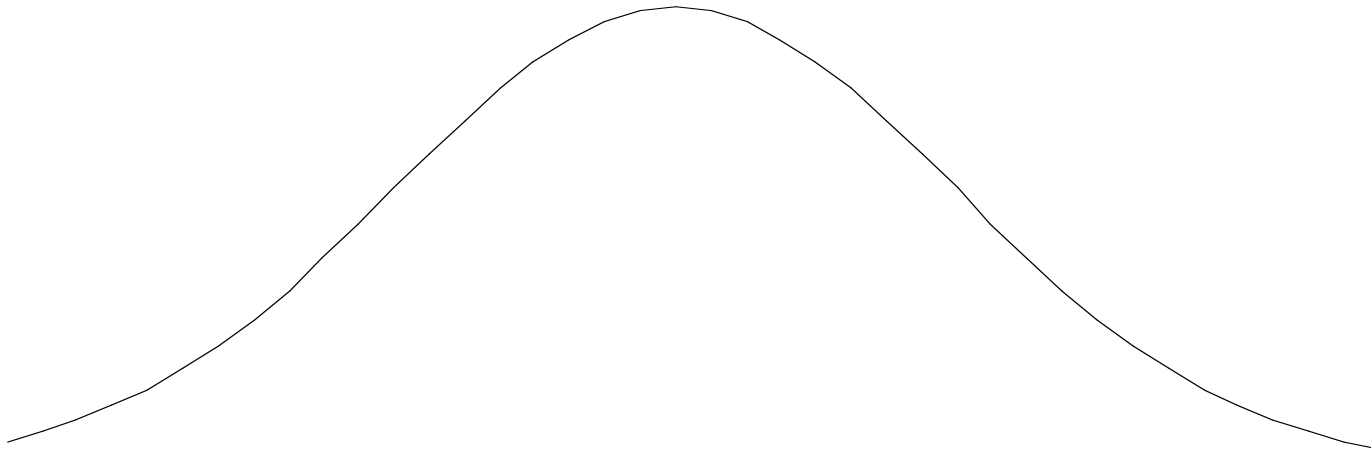
**Our Values and our Reward
Systems Focus on the Extremes**



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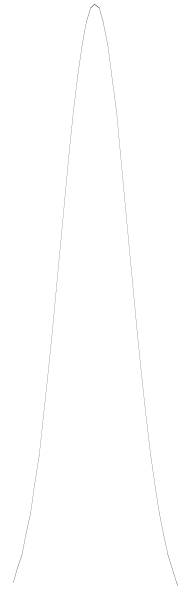
“The Well Educated Person”
A Broad Range of Knowledge in
Many Areas of Discourse



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“Academics Learn More and More
about Less and Less until They Know
Absolutely Everything about Nothing”



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“Managers Learn Less and Less
about More and More until They
Know Absolutely Nothing about
Everything”



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The Middle Ground is Sometimes Not Valued or Rewarded

- The benefits are long term
- But the costs are immediate



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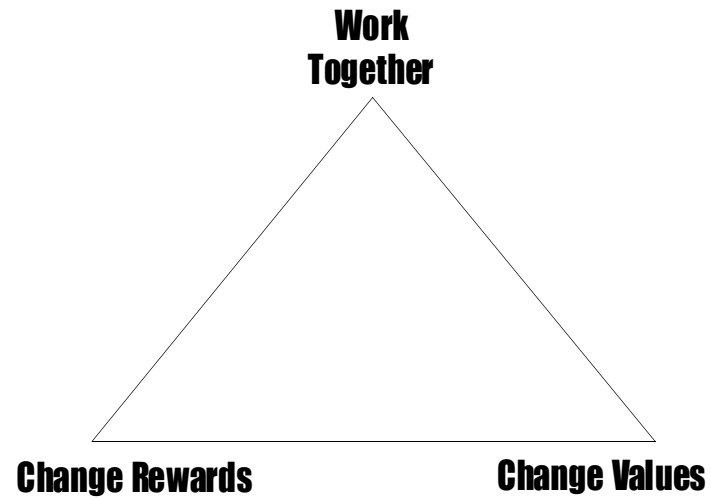
Towards a Solution



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Three Elements of Improvement



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Work Together

- Industry and Academia both want to improve society
 - Their methods are different - but complementary
- They both have much to learn from each other
 - And much to give to each other
- Many of the barriers to cooperation are cultural
 - “us” vs “them”
 - this is human nature, but it is destructive
- Experience shows the value of working together
 - Graphics User Interfaces
 - Ada
 - many other advances in the computing field

Theory

Practice



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Change Rewards

- For many years both industry and academia have built up reward systems that pull them apart
 - Academics reward research
 - Industry rewards short term results
- The economics of these systems encourage the current reward systems
 - So they must change the economics!
 - This takes bold initiatives
 - New funding paradigms for research grants
 - New models of investment and reward for businesses



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Change Values

- Human nature says one should value the similar and distrust the different
- Values are influenced by culture
 - Universities are ranked by their research faculty, not by their teaching and effective knowledge transfer
 - Companies are ranked by their stock prices, not their long term contributions to society
- Change happens in either of two ways:
 - a enlightened leadership, or
 - b unbearable pain



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Are We as Smart as we Think We Are?

“...whereas Newton could say, ‘If I have seen a little farther than others it is because I have stood on the shoulders of giants,’

I am forced to say [that in computer science], ‘Today we stand on each other’s feet.’”

Hamming, R. W., One Man’s View of Computer Science, *ACM Turing Award Lectures, The First Twenty Years, 1966-1985*, ACM Press, 1987, ISBN 0-201-07794-9.



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Let's Prove Hamming Wrong!



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END



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Outline

- The Symptoms
 - My Background - Industry and Academia
 - In industry, I am viewed as impeding progress
 - In academia, I am viewed as lacking depth
 - Gedanken Experiments - budget limits prevent real experiments
 - pumpkins - why we need to understand the foundations
 - moving too soon can lead to disaster (pumpkins)
 - airplanes - why we need to take risky action
- The Problem and the Need
 - Software Engineering as an illustration
 - Technology Transfer as an illustration



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Outline (continued)

- The Causes
 - Academics and Specialists Probe and Focus
 - But on Different Things
 - More and More about Less and Less
 - Managers and Industry Types Integrate
 - But They Harvest, not Plant
 - Less and Less about More and More
 - The Middle ground is Not Rewarded
 - Benefits are long term but costs are immediate



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Outline (continued)

- Toward a Solution
 - Common Ground (goals and objectives)



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