NA Regional Summit 2008 NAFEMS
2020 Vision of Engineering Analysis and Simulation
October 29 - 31, 2008 | Hampton, Virginia

Why Design Analysis Works...

Vince Adams

Dassault Systemes SolidWorks Corporation

Remember the Good Ol' Days?

- IGES "Wars"
- Avoiding Contact (Part-Part contact that is…)
- Making each element count…
- "Selling" FEA
- Undying respect and admiration from those not fortunate enough to have been inducted into the mystical brotherhood of analysis, with all the secret handshakes, code words, and commando skills that we in the brotherhood would never expect the "common" engineer or designer to be able to understand, not that we'd take the time to explain it to them because then they might know what we

My Answer to Design Simulation…

So What Changed?

- Despite my preaching and warnings of imminent doom…

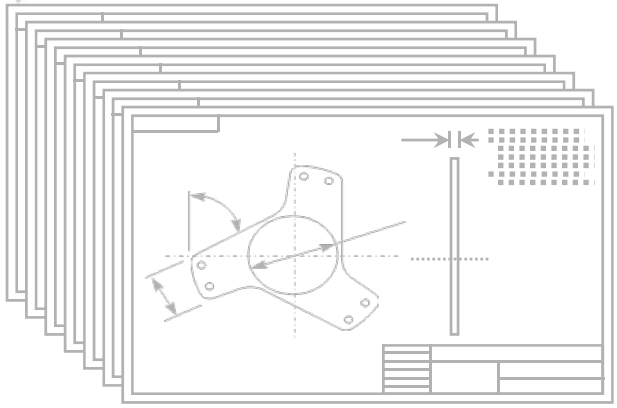
So What Changed?

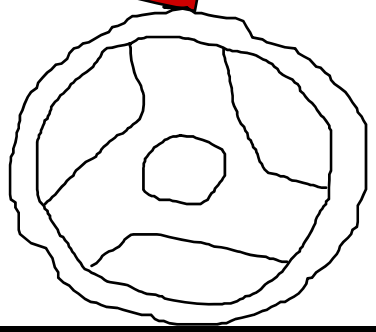
- Despite my preaching and warnings of imminent doom…
  - Design Engineers kept doing their own simulation
  - Design Engineers want to do their own simulation
  - Their managers want them to do their own simulation
  - Planes weren't dropping out of the sky and the world is still spinning
  - And I kept hearing…

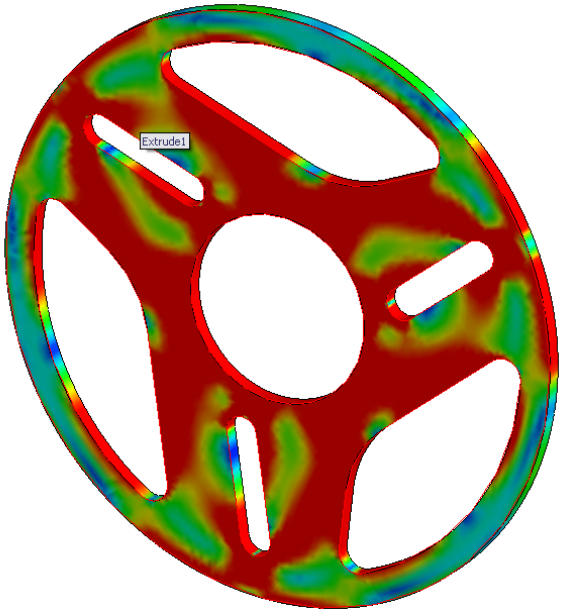
"We're not that concerned about accurate answers."

The Product Development Process…

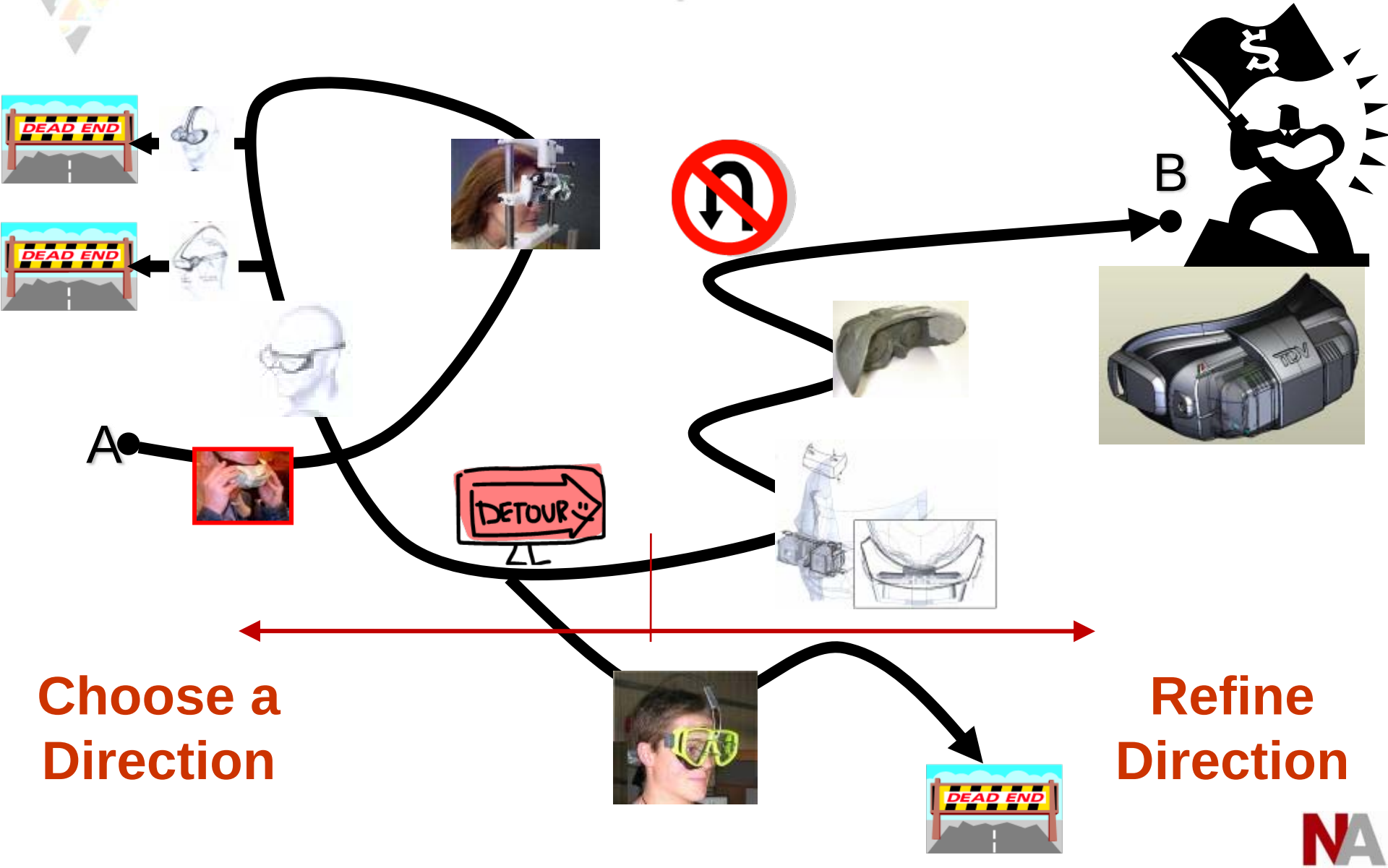
Off-loading to the expert…







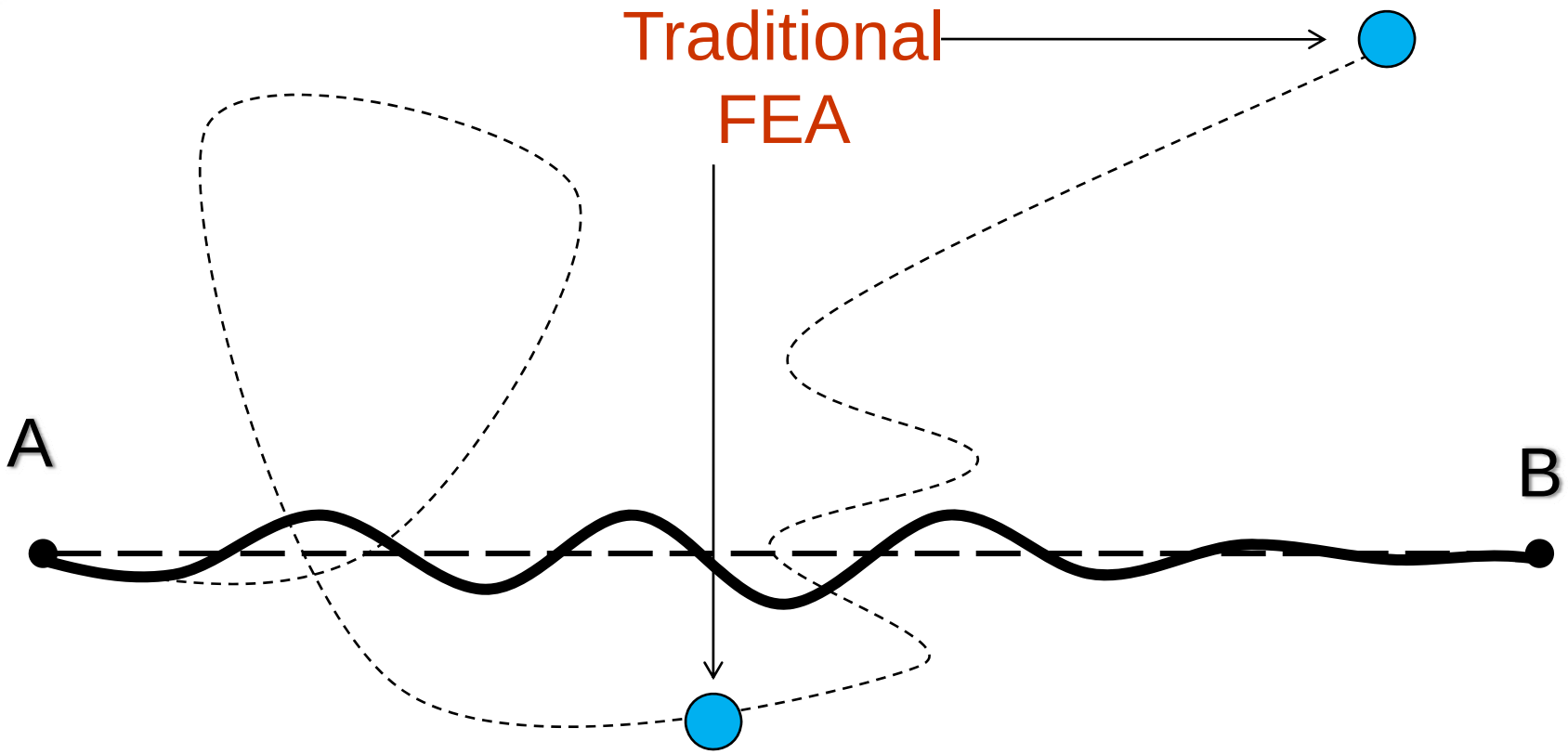
The Product Development Process…



Choose a Direction

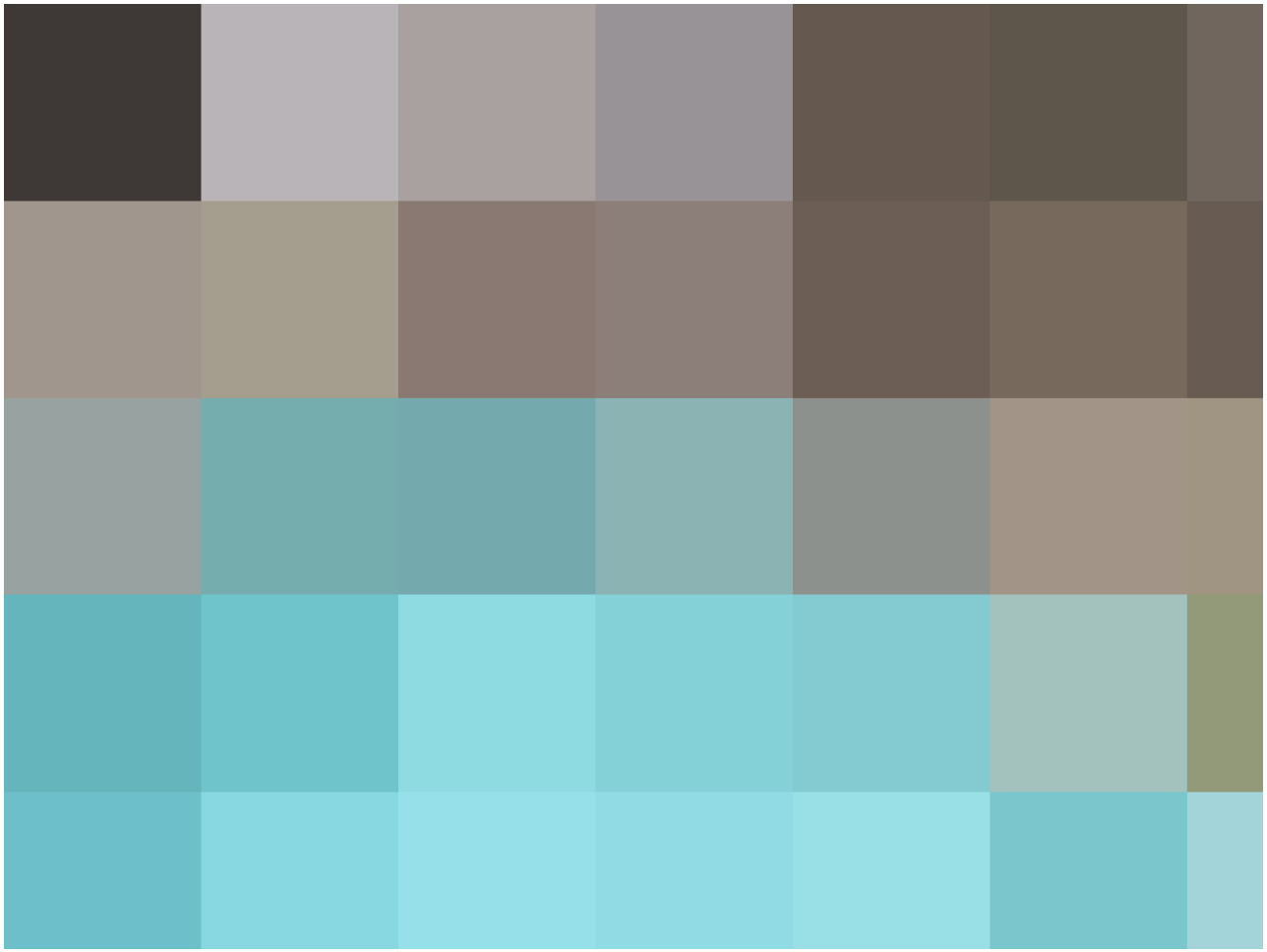
Refine Direction

The Product Development Process…



How much data do you need to linearize the process?

How Much Data Do You Need…



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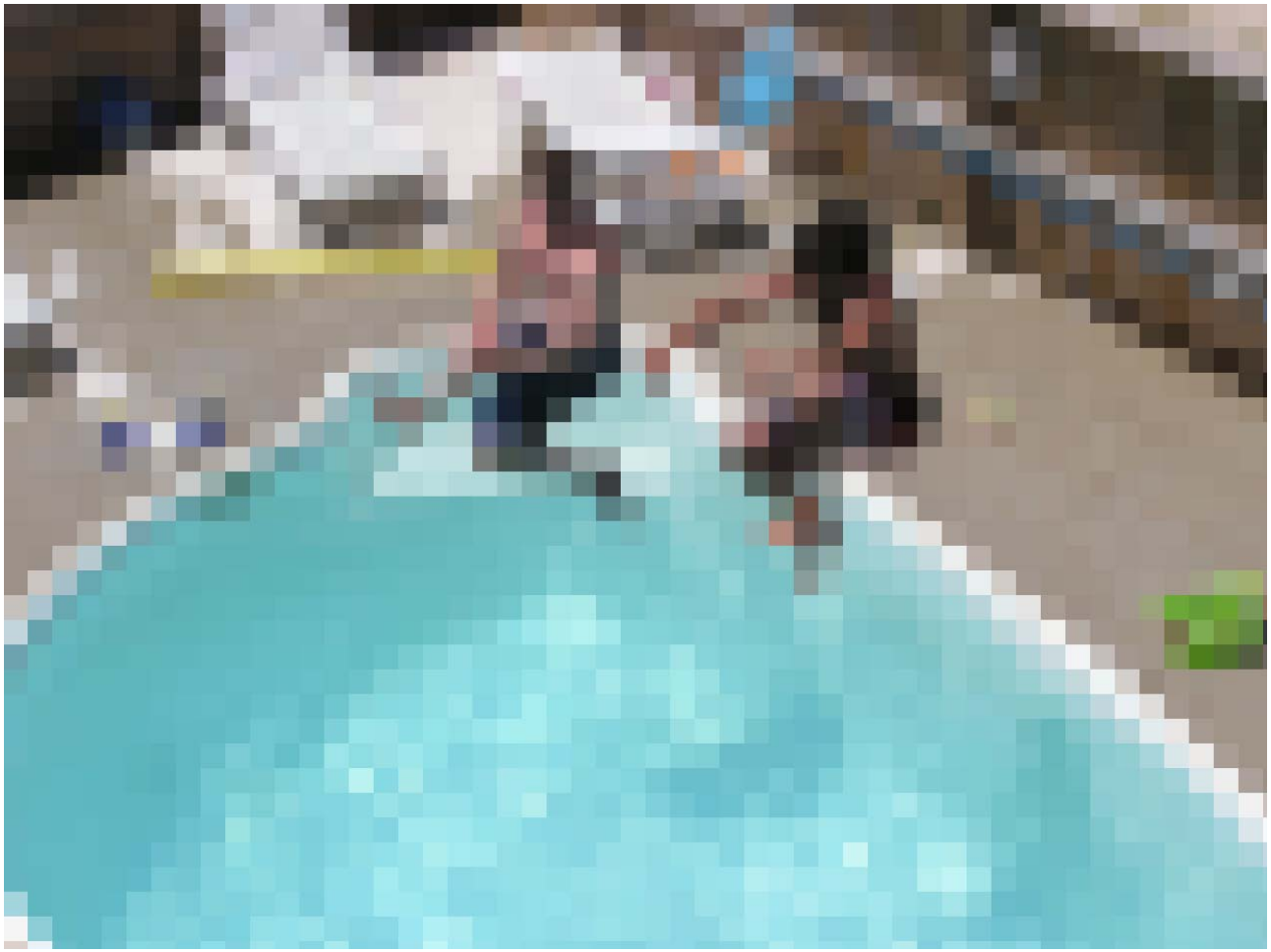

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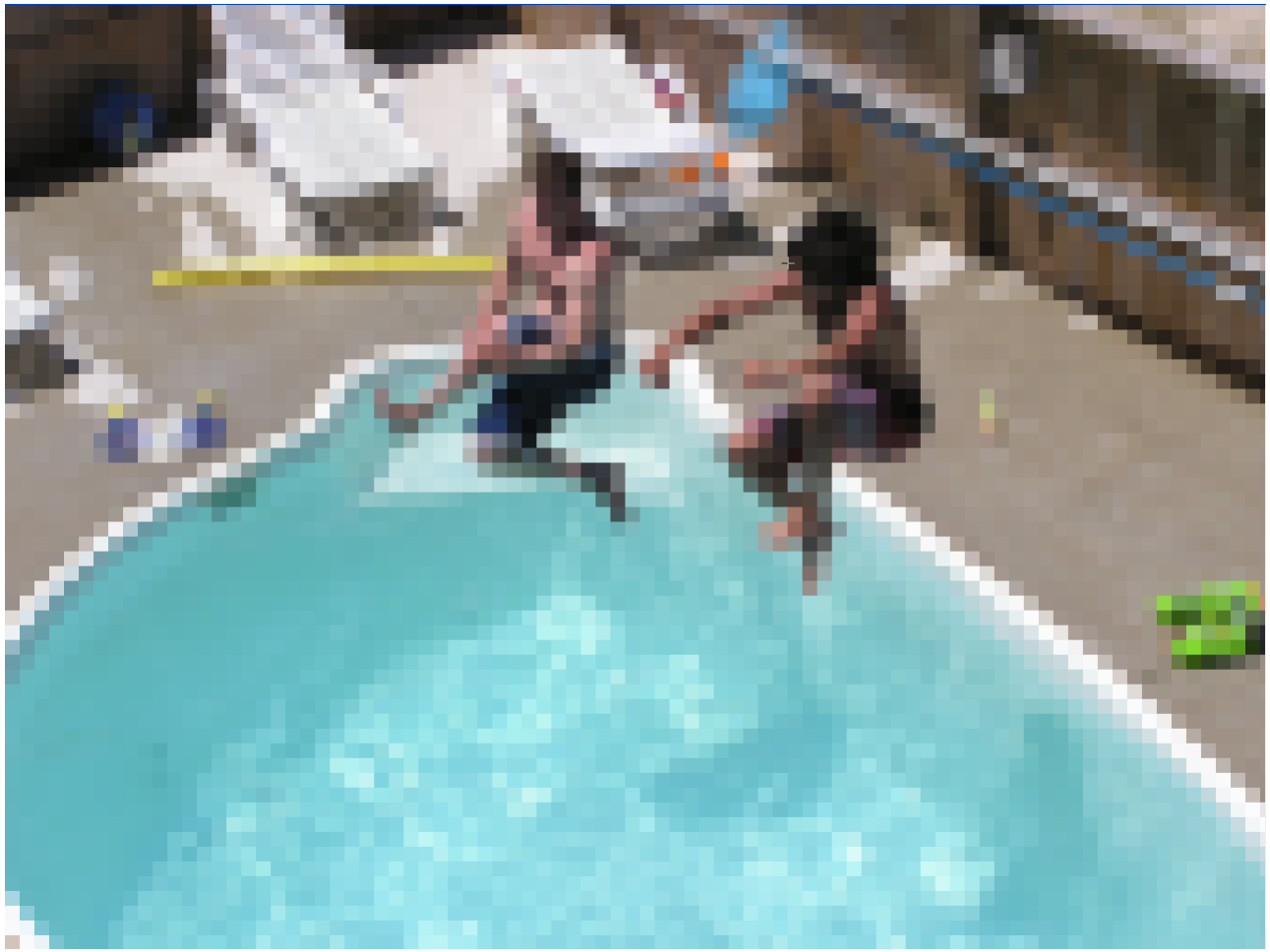


How Much Data Do You Need…

How Much Data Do You Need…

Resources

350
300
250
200
150
100
50
0

0 50 100 150 200 250

"Pixel" Size

500%

Who is at the pool?

What are they doing at the pool?

Is someone at the pool?

Is there a pool?

How Much Data Do You Need…

"…it is not necessarily **what** the customer is looking at, but **how** he or she is looking at it, that directs the choice of tool."

Cyon Research™

Classes of MCAE Software: Clarifying the Market
A Cyon Research White Paper
July 9, 2008

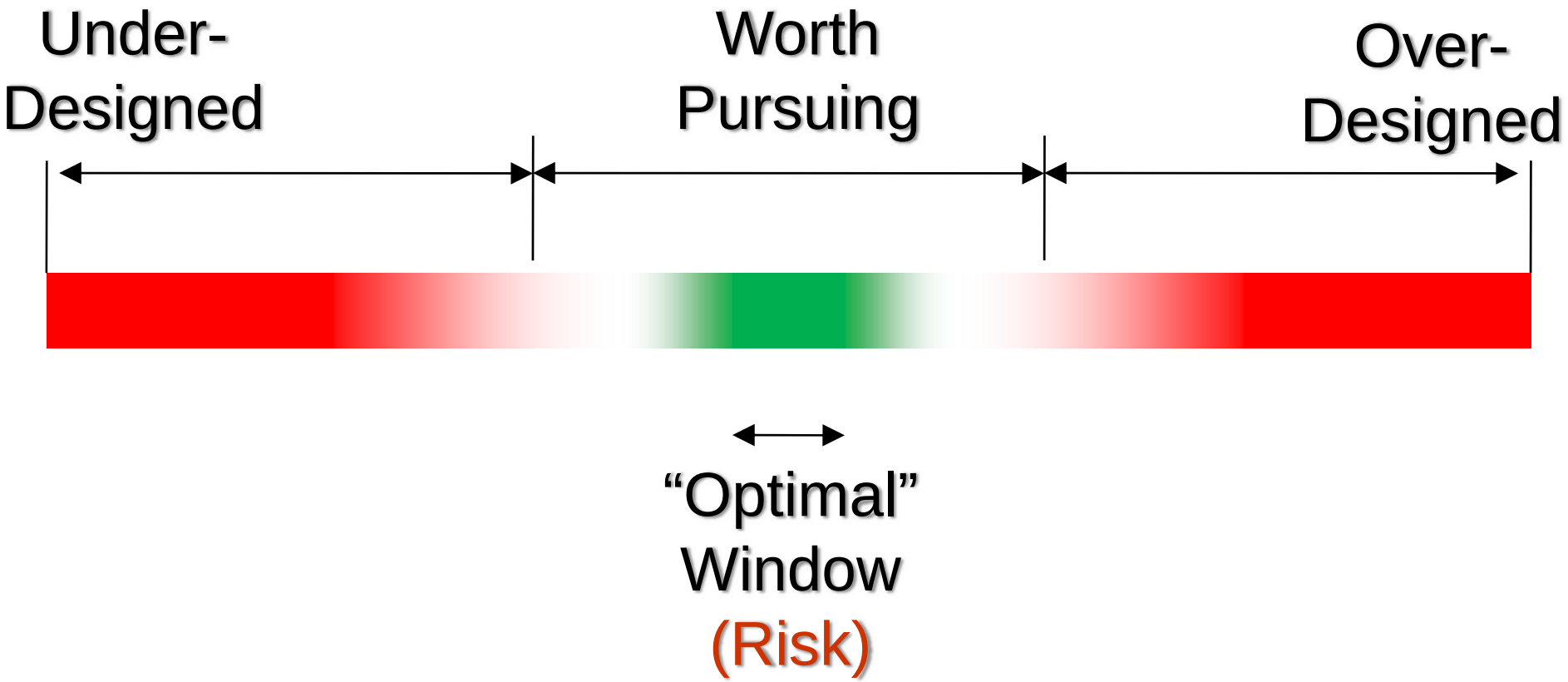
"FEA provides precise answers to imprecise questions."

Some Long Forgotten Sage…

In Support of “Imprecise Questions”

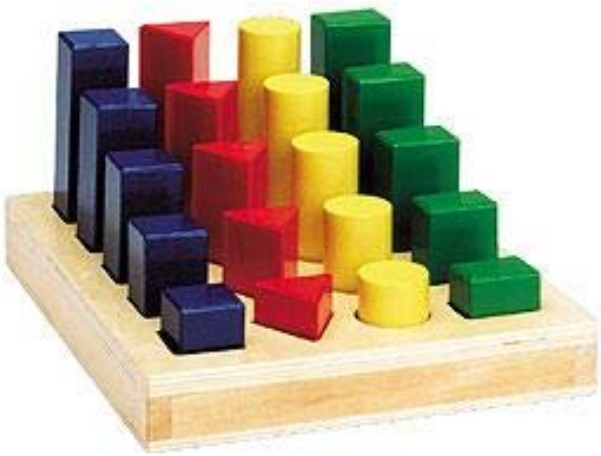
- Precise Question
  - What is the exact stress in operation?
- Assumptions
  - You know exactly what the material properties are
  - You know exactly what the manufactured geometry really is
  - You know exactly what any residual stresses that exist might be
  - You know exactly what the user input is
  - You know that you can exactly reproduce the improvement
  - Implication of Precise Question:
    - You know exactly how that stress correlates to failure
- Imprecise Question
  - Does this design change substantially change the stress?

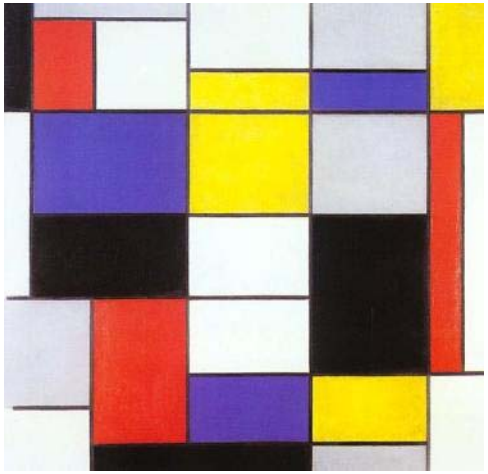
In Support of “Imprecise Questions”



Where Does Simulation Fit in Design?

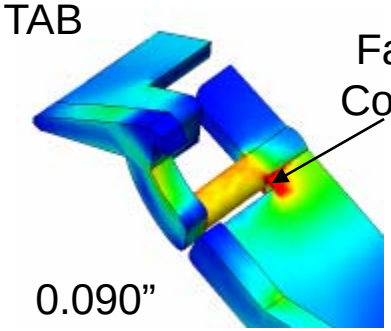
- *Design* is an **iterative process of reduced & refined abstractions**
- *Design* **challenges** everything
- *Design* is inherently a **prototyping** process
- *Design* is imprecise



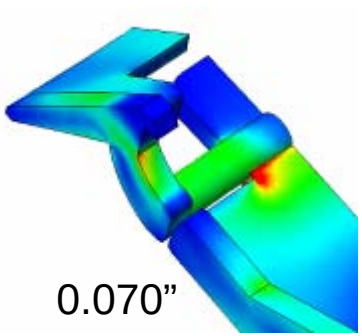


Engineer ⟷ Designer

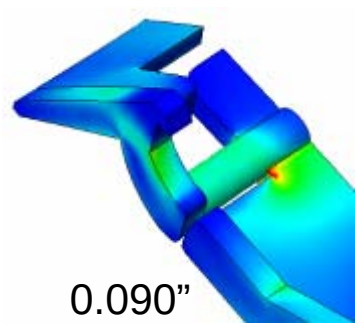
Where Does Simulation Fit in Design?



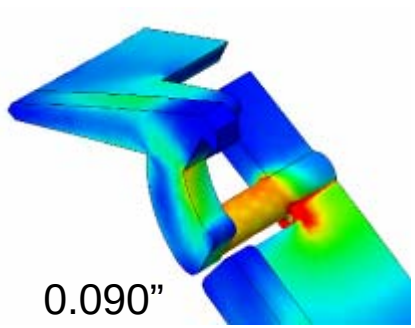
Original Design



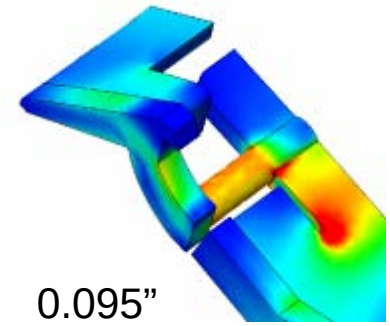
Increase Diameter by 20%



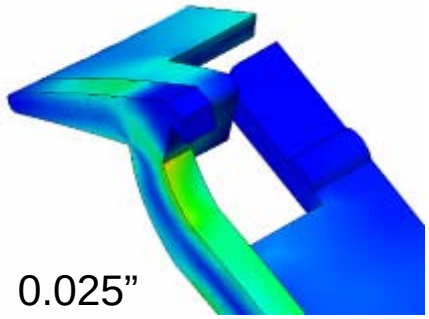
Use Acetal with 10ksi Yield



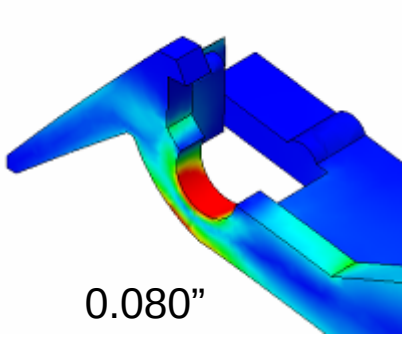
Increase Blend Radii to Max possible



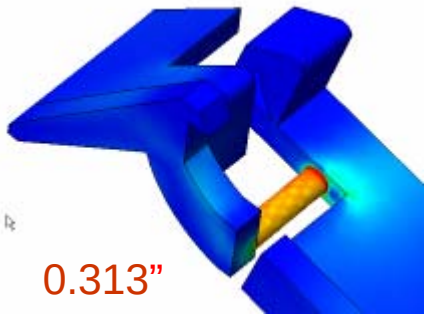
Add Slot



Use Cantilever instead of Torsion Bar



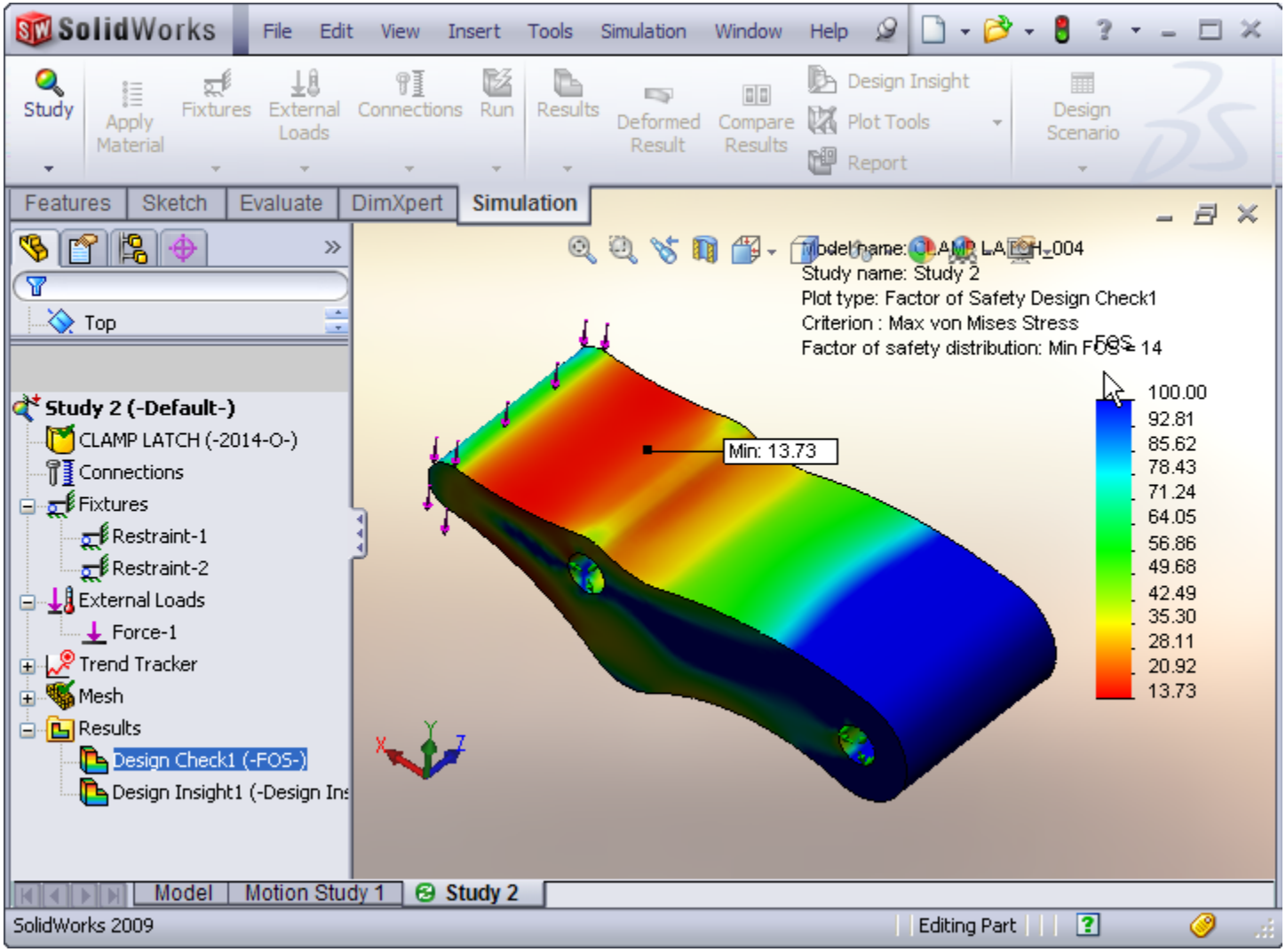
Thin Cantilever to Increase Pivot



Decrease Diameter by 20%

What to Expect from A Design Simulation Tool

- It has to work with the way Design Engineers think!



What to Expect from A Design Simulation Tool

- Integrated into your Design Process
  - Minimizes redundant work or data entry
- Empowers you to evaluate concepts and decisions on the fly
- Allows you to ask “imprecise questions”
  - Should still provide accurate results to precise questions
- Allows you to filter and refine concepts
- Allows you to focus on:
  - Design, not Tools
  - Insight, not Accuracy
  - Possibilities, not Limitations

Why Does Design Simulation Work?

- It can “linearize” the design process
- It gives information to the person who needs it when it is needed
- It supports “imprecise questions” when that’s all you’ve got
- It doesn’t replace traditional gates in the design process, just lets you get to them faster
- It’s All Design!