

NA Regional Summit 2008 NAFEMS

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

Unified FEA

Ken Short
Dassault Systemes
SIMULIA



What is Unified FEA?

- Finite Element Analysis which:
 - Helps design and manufacture better products in less time
 - Allows timely design decisions to be made with confidence
 - Enables enterprise collaboration throughout the design process



Quality



Design
time



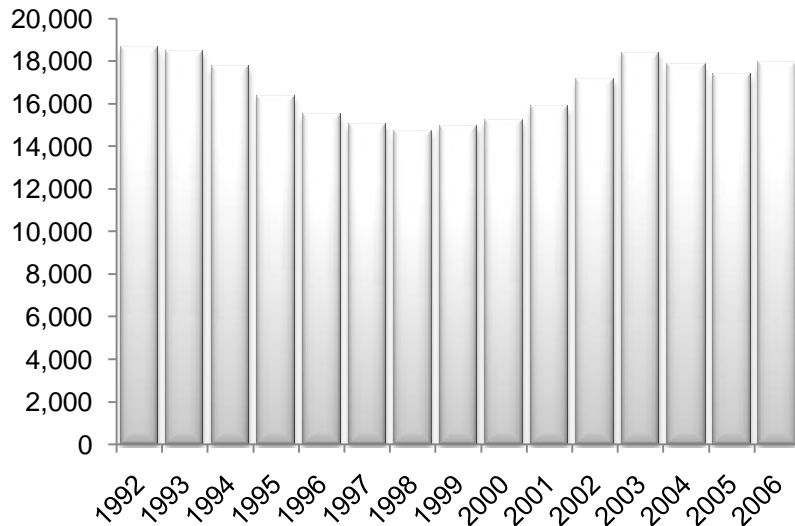


What will Unified FEA need?

- Realistic simulation
- Accessibility
- Ultra-high performance computing
- Collaboration tools and media
- Business process integration

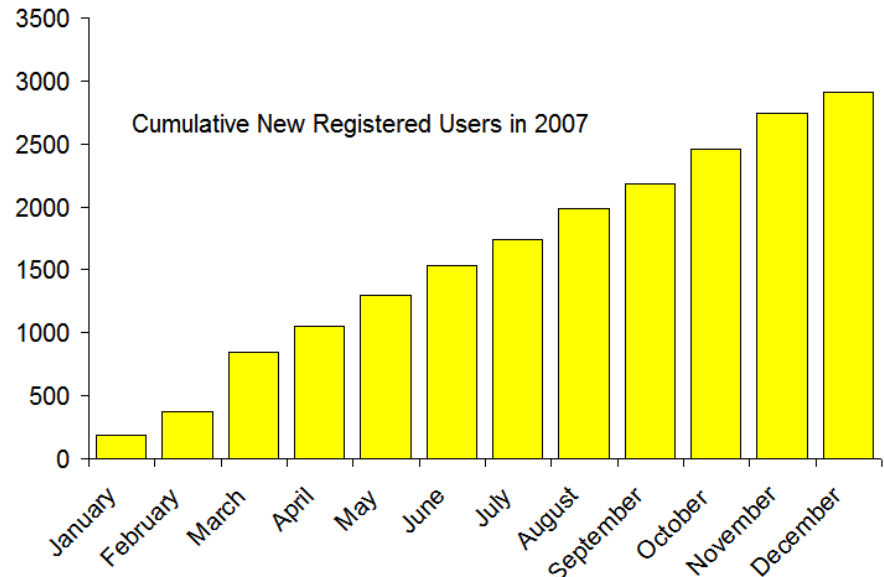
Why does simulation need to be realistic?

- To reduce interpretation to a minimum
 - Interpretation requires expertise which is in short supply



United States Graduate
Mechanical Engineering Students

Source: NSF



Abaqus online support system

Source: SIMULIA

Why does simulation need to be realistic?

- To increase confidence and understanding
 - Confidence and understanding drive innovation

Airbus to reinforce part of A380 wing after March static test rupture

By Andrew Doyle in Berlin

Manufacturer to add strips to stringers after test rupture


Airbus has briefed A380 customers on the wing modifications it is making as a result of the premature rupture of the static test specimen in March at 1.45 times limit load.

The manufacturer plans to retrofit reinforcements to certain stringers in aircraft that have already been built and produce modified components for subsequent wings, said Airbus chief operating officer and A380 programme head Charles Champion at last week's ILA air show in Berlin.

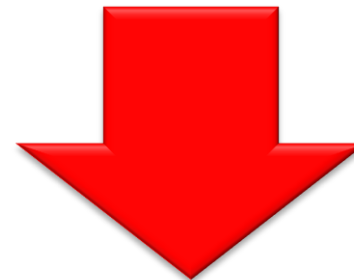
"Our conclusion is that we are going to add a few strips on some stringers in the wing in the area involved," he said. The strips will be fitted on top of the stringers to "increase the resistance of the stringers at the limit [load]". The proposed changes have been submitted to the European Aviation Safety Agency for approval.

A380 product marketing director Richard Carcaillet says the modifications to already-built wings will add 30kg (66lb) of airframe weight, comprising 16kg for the reinforcement strips and 14kg for the attachment bolts.

The wing of the A380 static test specimen suffered a rupture below the ultimate-load certification requirement of 150% of limit load during trials in Toulouse.



% nonlinear FEA in new aircraft design



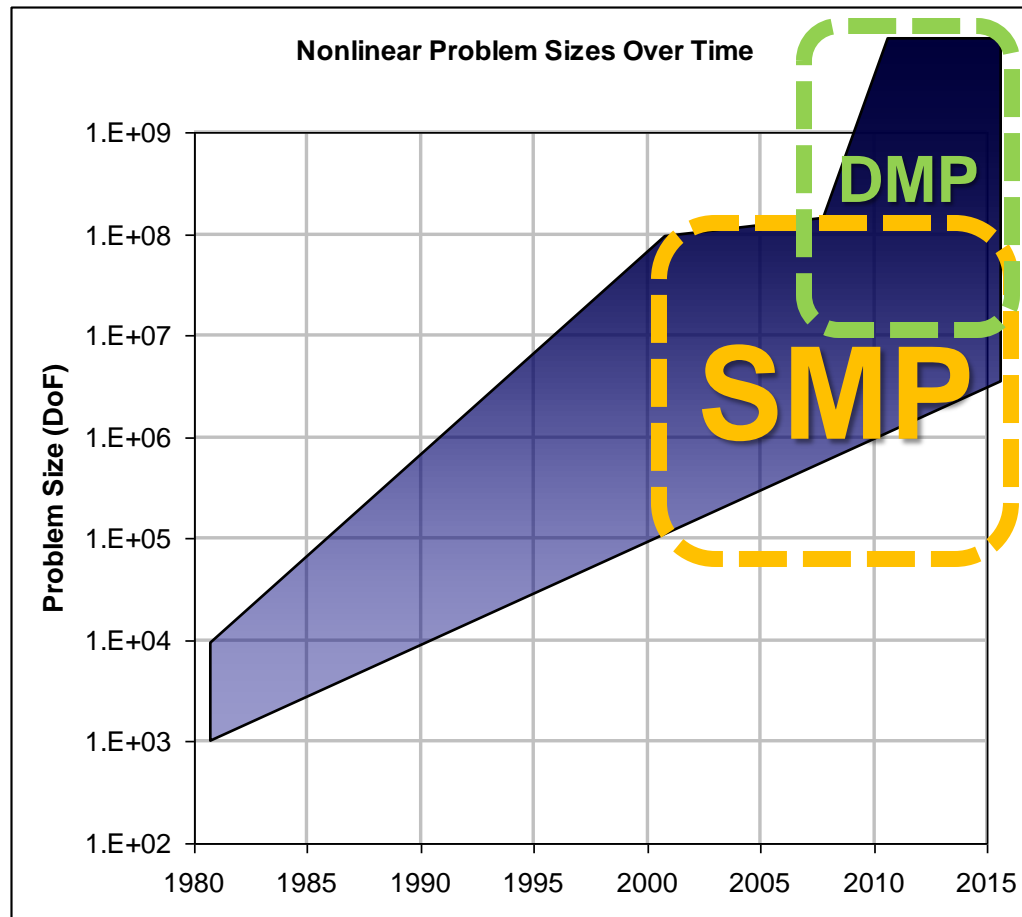
% up-front usage

How can FEA be more accessible?

- Useful tools, available on demand
 - No learning curve, a natural extension of the design experience
 - Work in collaborative, immersive 3D
 - Minimal abstraction

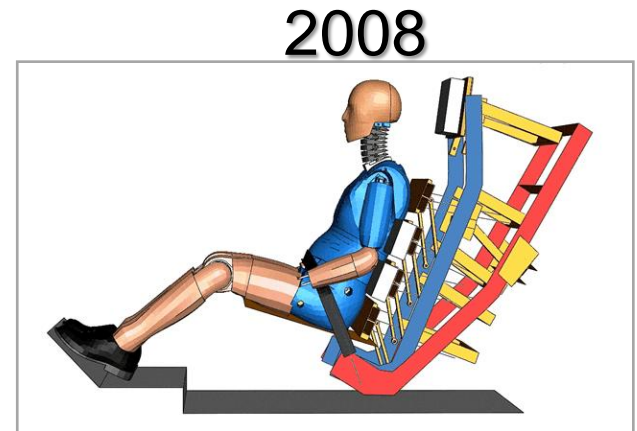
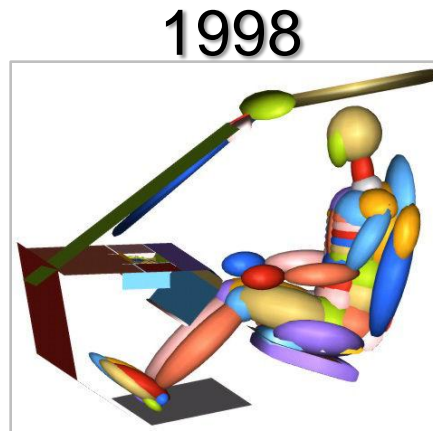


How fast is “fast enough”?

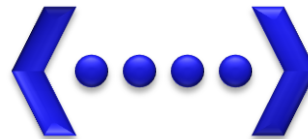


How fast is “fast enough”?

- For experts:
 - Overnight

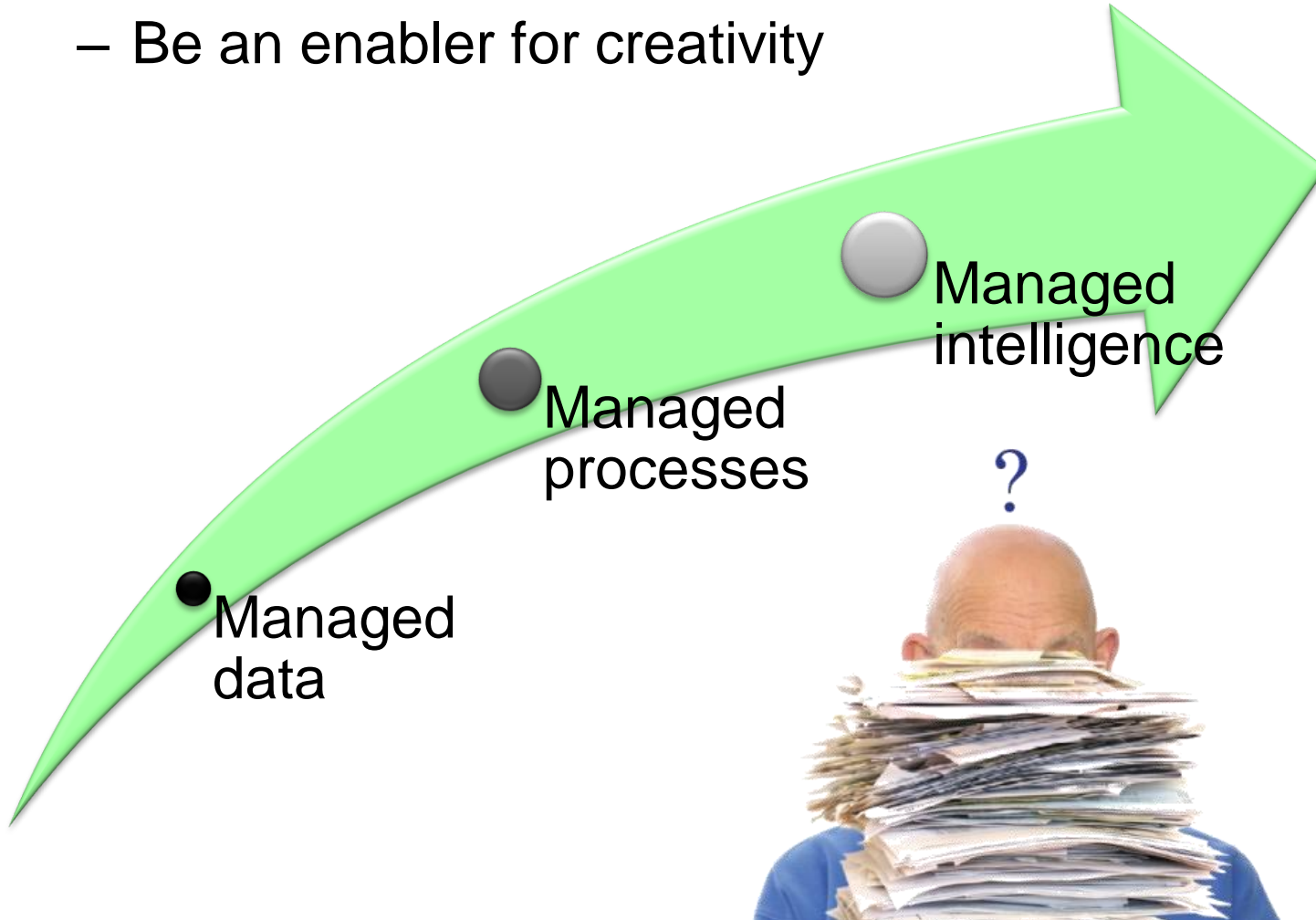


- For designers:
 - Time for a cup of coffee



How can FEA become a real enterprise asset?

- Provide business process intelligence to all
 - Be an enabler for creativity





What can we expect in 2020?

- Accelerated migration to realistic, nonlinear technology
- All users accessing massively powerful parallel computing resources
- Real-time collaboration between designers and experts throughout the extended enterprise
- FEA-driven decision support tools embedded within key business processes

Does this mean FEA becomes a commodity?

- No
 - There will be a continuous drive for better technology, robustness, accessibility and performance
 - Experts become mentors and evangelists



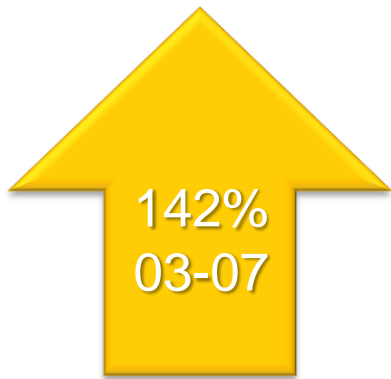
FEA Expert c. 2008



FEA Expert c. 2020

Who is leading the UFEA approach?

- Automotive and aerospace?
 - Trying, but hampered by legacy, dogma and politics
- Medical Products and Consumer Goods?
 - Yes! – little legacy, driven by business processes and creativity





Summary

- More realistic FEA technology and pervasiveness is accelerating
- Unified FEA is one key enabler for the democratization of simulation-driven design creativity
- Our challenge is to invest in the people who can make it happen



Thank you for your attention