Digital Volumetric Processing Using High Performance Computing

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North American Research Conference
Blue Sky Competition
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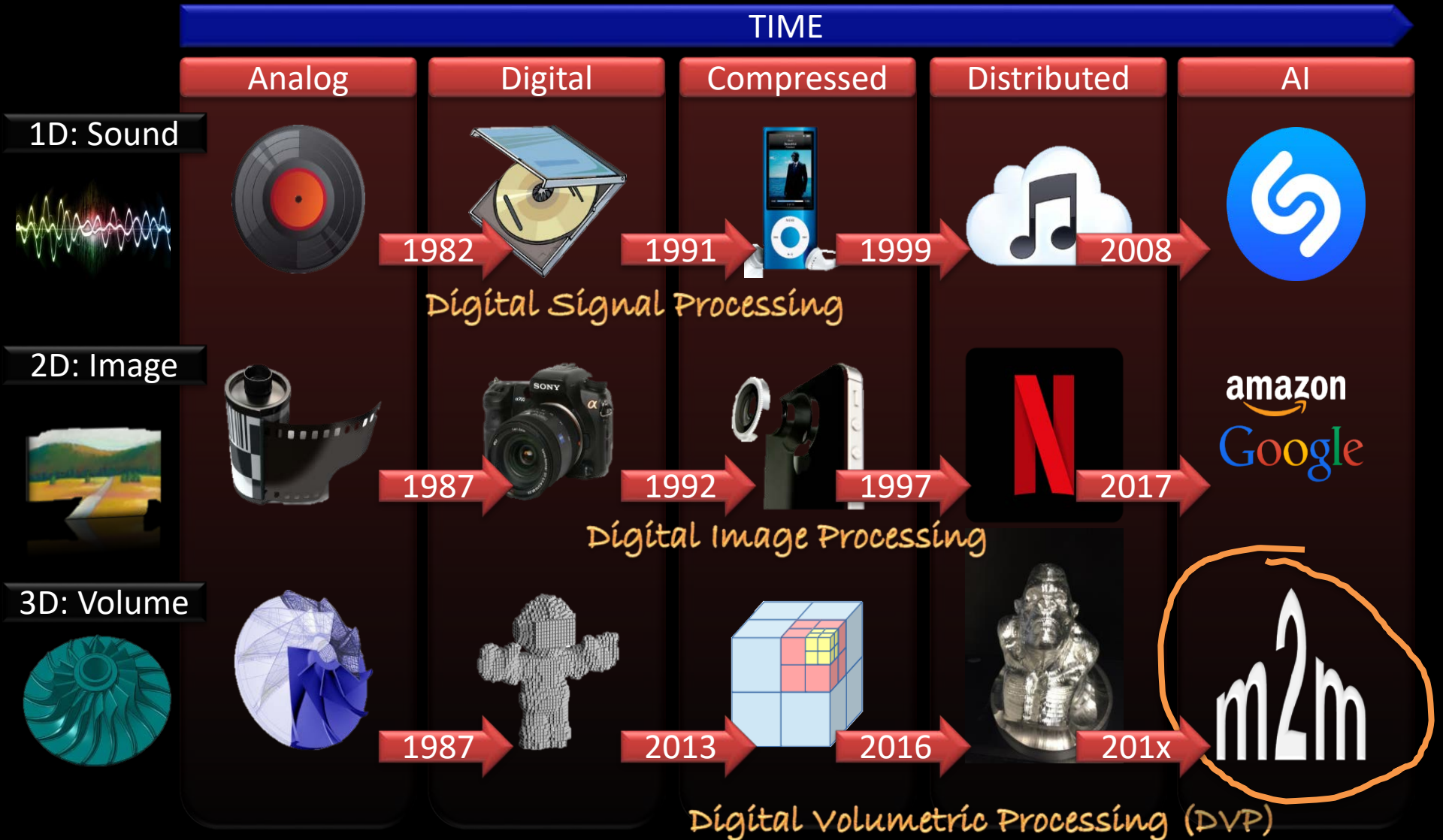
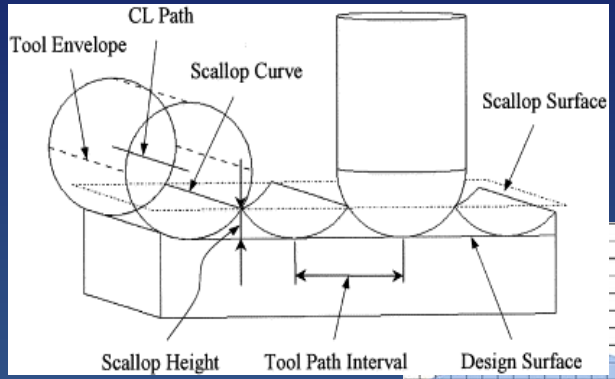
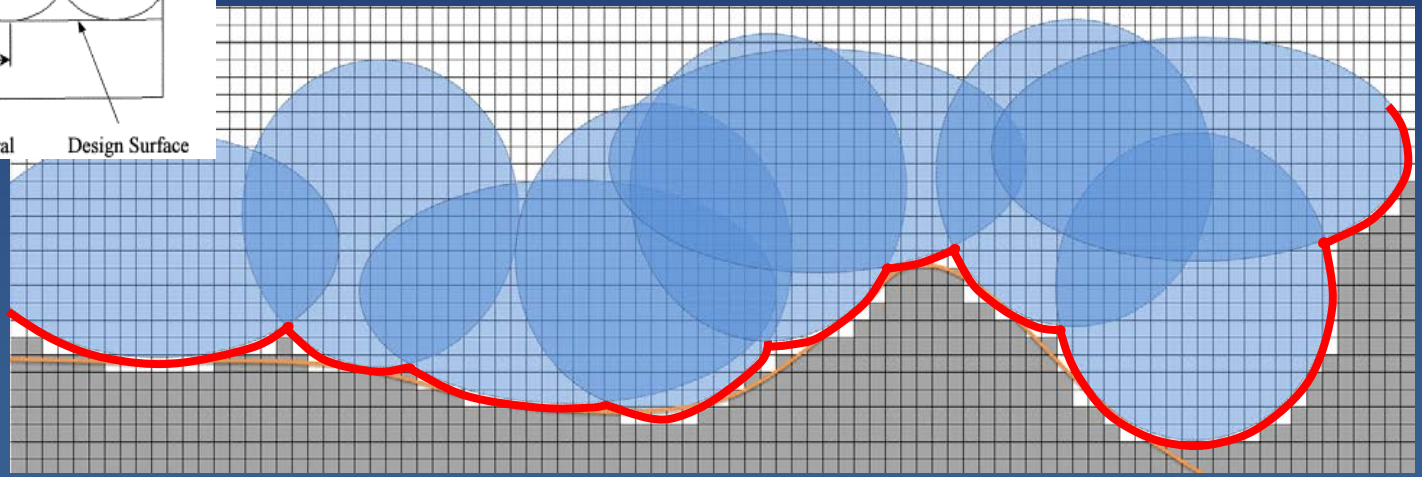

TIME
Analog
Digital
Compressed
Distributed
AI
1D: Sound
1982
1991
1999
2008
Digital Signal Processing
2D: Image
SONY
1987
1992
1997
2017
amazon
Google
Digital Image Processing
3D: Volume
1987
2013
2016
201x
m2m
Digital Volumetric Processing (DVP)

DVP and Machining (aka Subtractive)

Analog Approach

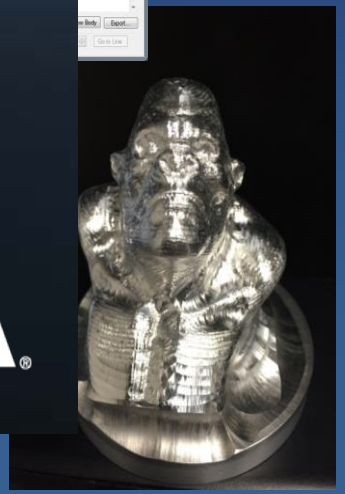


Digital Approach

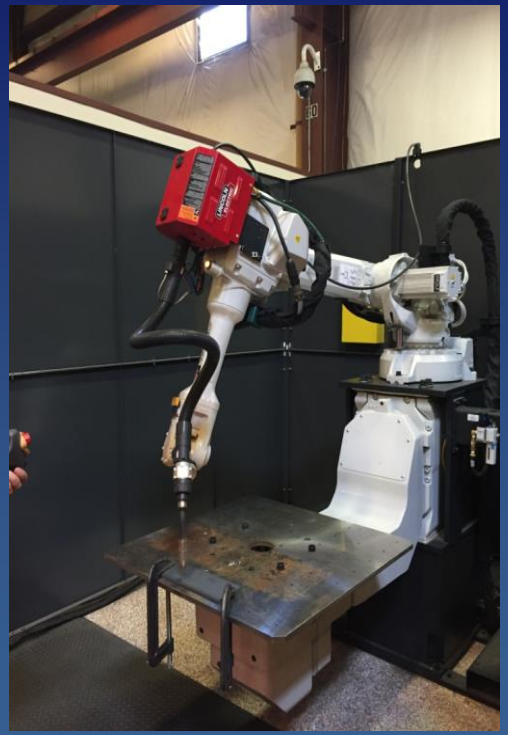


DVP – Enabling WYSIWYG MFG

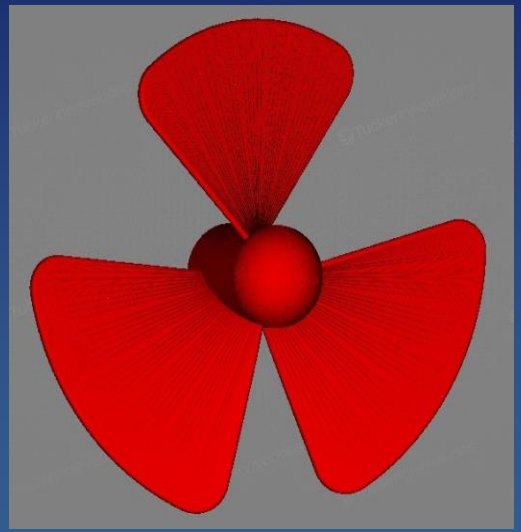
By the way, It works for Additive Manufacturing as well



Gravity – It’s not just a Recommendation, It’s the Law

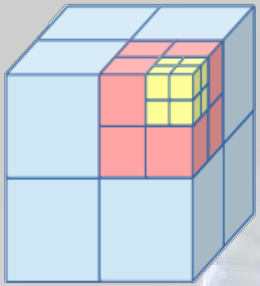


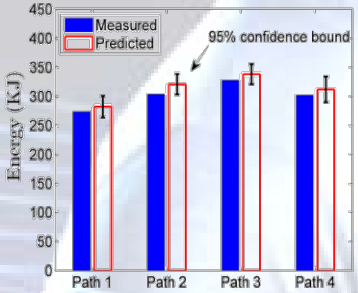
Breaking the Law – Thinking Outside the Parallelepiped



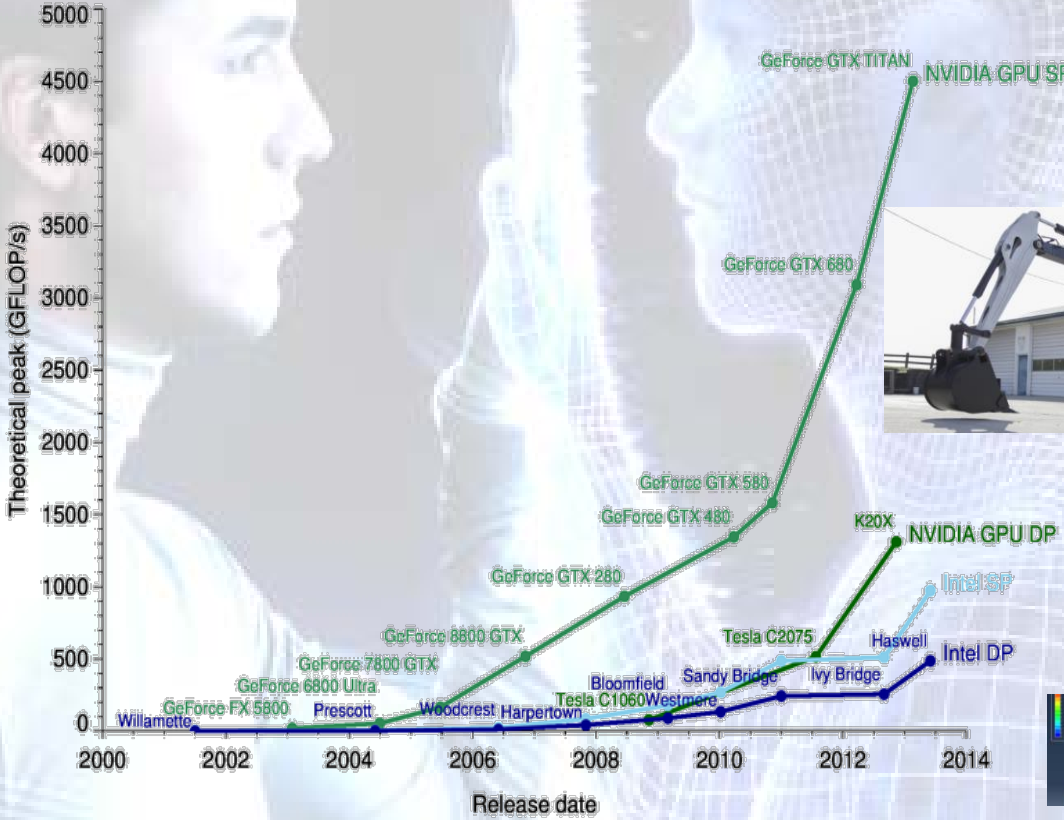
Thinking Big

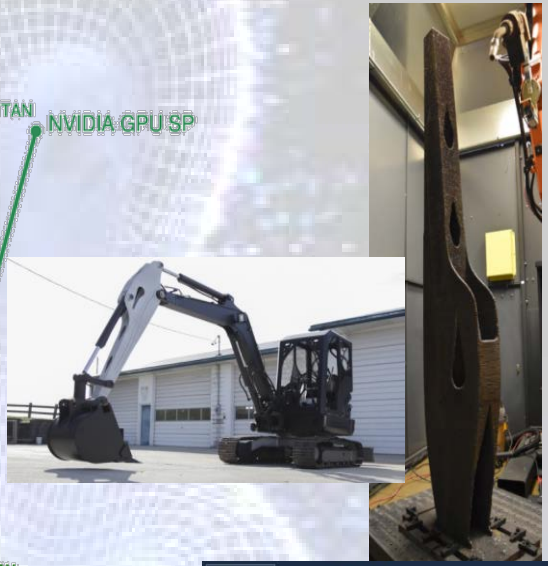
The Digital Twin – Simply Taking on Moore's Law

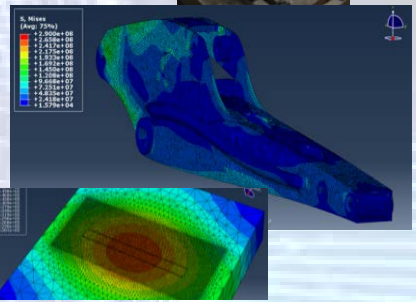




Dornfeld, et. al, 2017





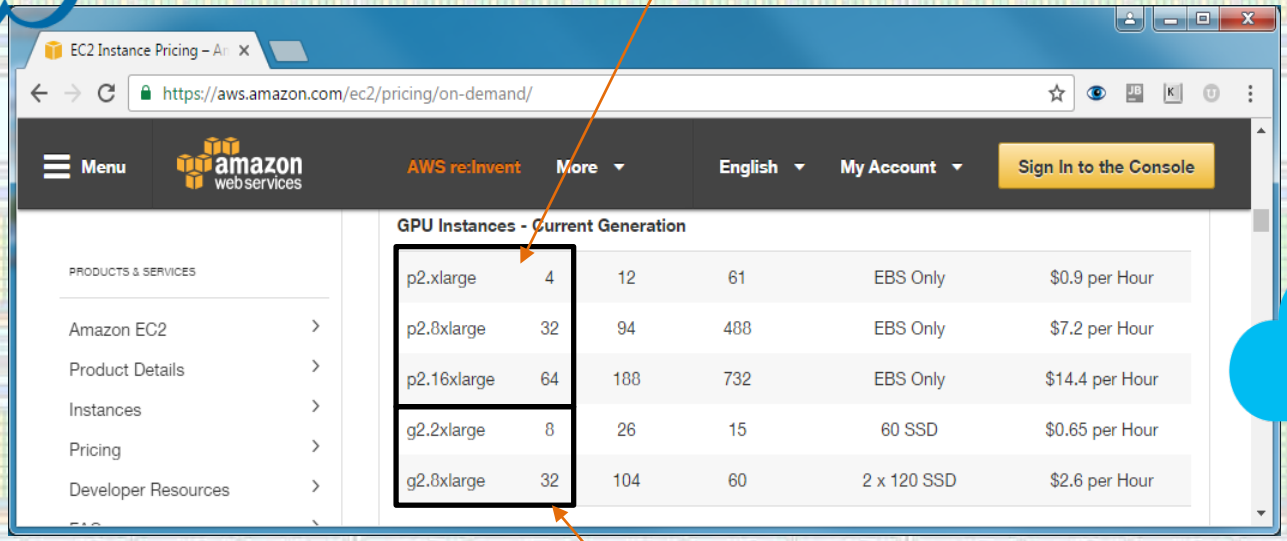


https://www.linkedin.com/pulse/moores-law-heterogeneity-deep-learning-chien-ping-lu

Let's Rent a few Tens of Thousands of Cores

bluebox cloud

Available as of September 30,2016
GPUs are 2 generations behind



Google Compute Engine

Azure

Available as of November 10, 2010
GPUs are 4 generations behind

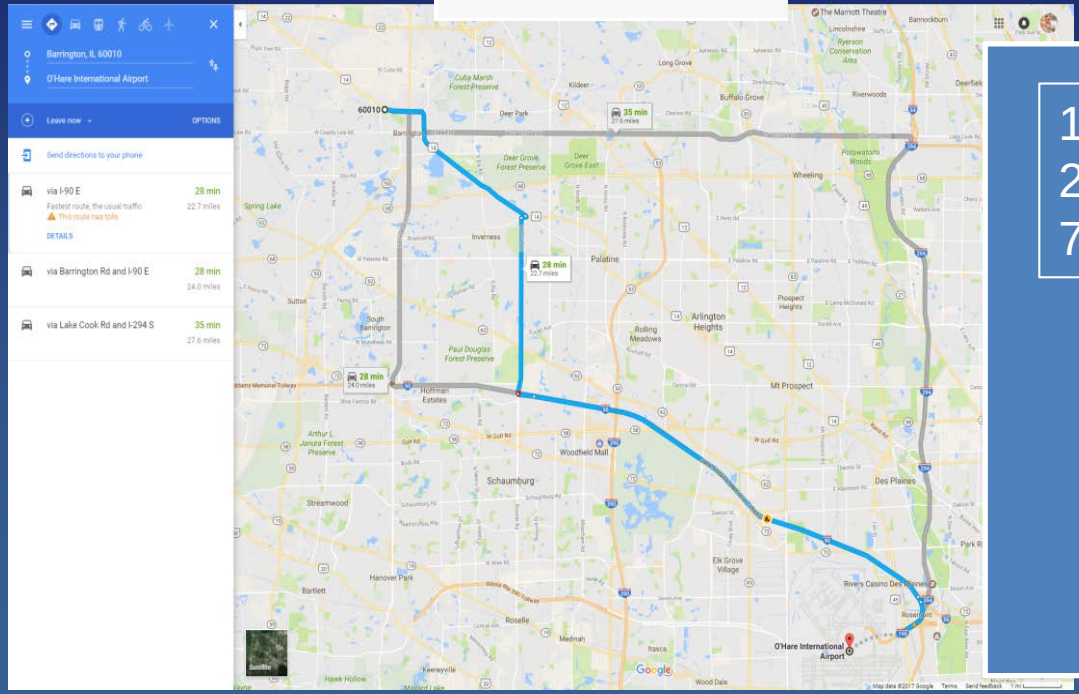
You Want it When?

GPU Instances	
p2.xlarge	$0.9 per Hour
p2.8xlarge	$7.2 per Hour
p2.16xlarge	$14.4 per Hour

2.66 hours X $0.9/hour

(2.66 hours / 8) X $7.2/hour

(2.66 hours / 16) X $14.4/hour



1 GPU- $2.40 Purchase
2 hours 40 minutes
7:29 pm Completion

8 GPU- $2.76 Purchase
23 minutes
4:50 pm Completion

16 GPU- $2.88 Purchase
12 minutes
4:39 pm Completion

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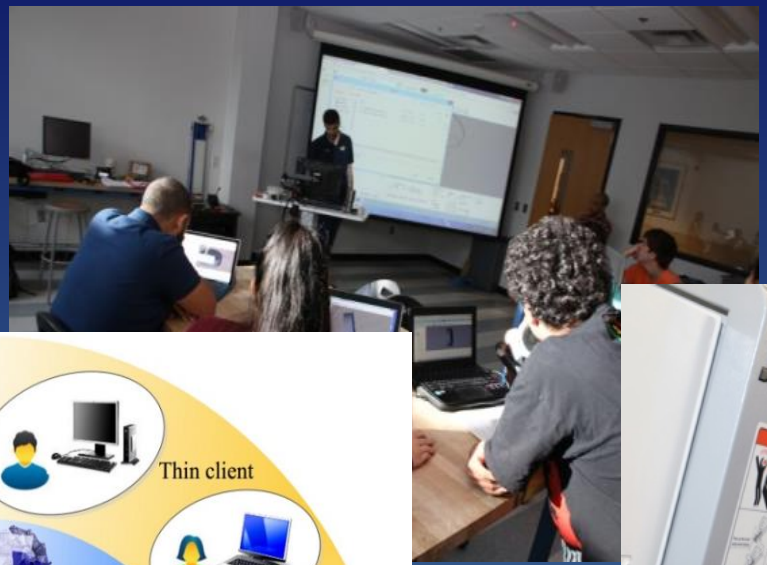
DVP & Education – Virtually There



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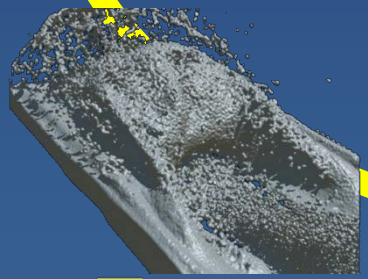
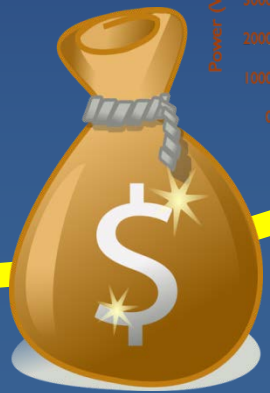
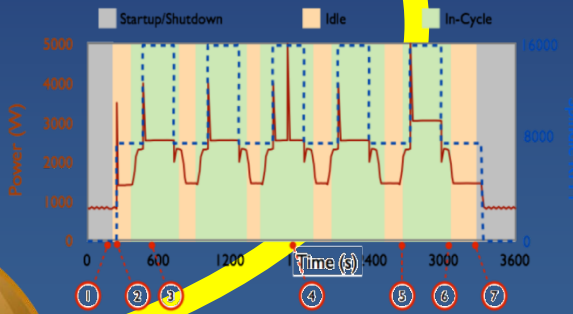
DVP – Morphing Makers to Manufacturers







Dornfeld, et. al, 2010

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