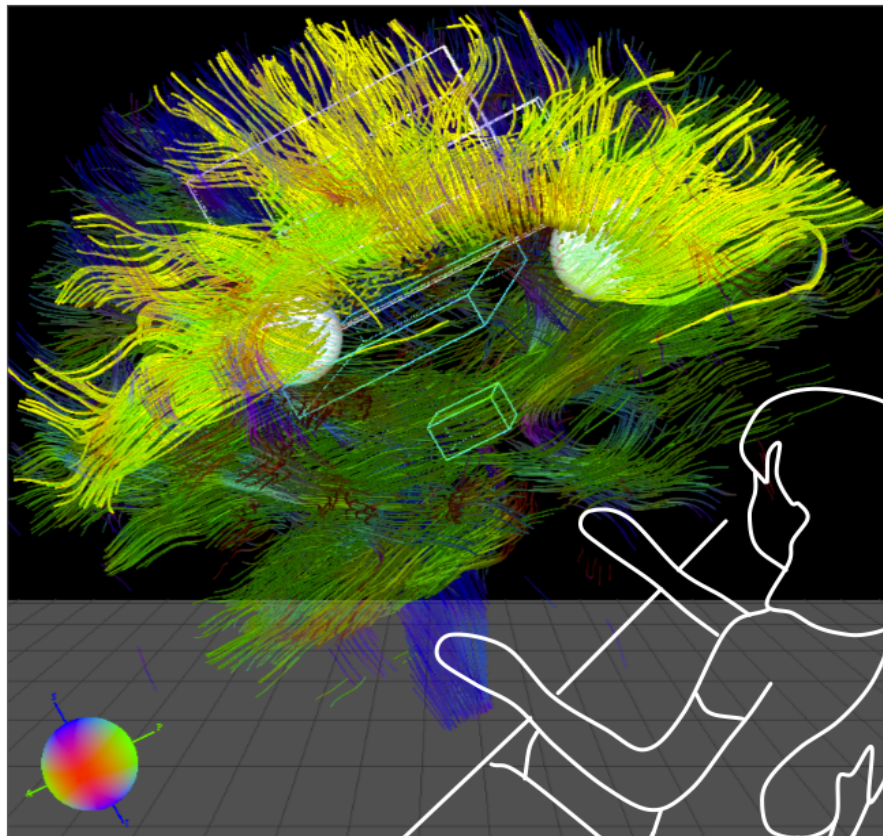


Visualization: from data to discovery

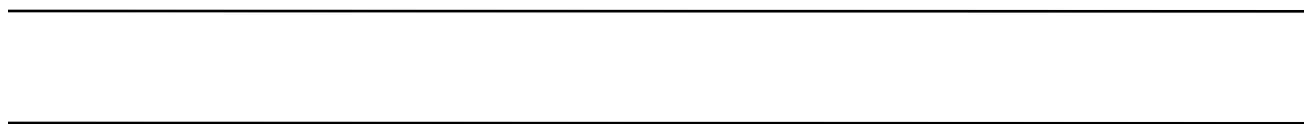
Jian Chen, PhD

<http://www.cs.umbc.edu/~jichen>

Office: ITE 357

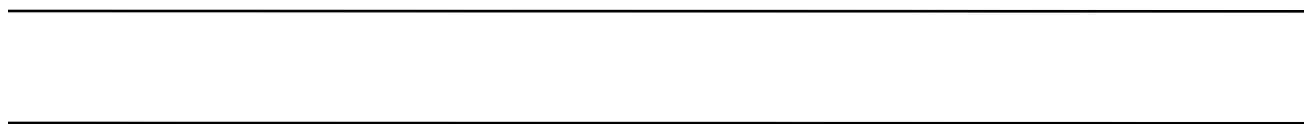


How much data (bytes) did we
produce in 2010?



How much data (bytes) did we produce in 2010?

- What are the different data sources?
 - Every photos, videos, financial transactions; emails, a good part of your social life;



How much data (bytes) did we produce in 2010?

- What are the different data sources?
 - Every photos, videos, financial transactions; emails, a good part of your social life;
- Answer: 1200 exabytes
 - 16 million times of the physical holding of the library of congress
 - Take a DVD, stack to the moon and back and you get this number.
- And 10x increase over 5 years

What do we do with that?

- The ability to take data – to be able to **understand** it, to **process** it, to **extract value** from it, to **visualize** it, to **communicate** it – that is going to be a hugely important skill in the next decades, ... because now we really do have **essentially free and ubiquitous data**. So the complimentary scarce factor is the ability to understand the data and extract value from it.
 - Hal Varian, Google's chief Economist, The McKinsey Quarterly, Jan 2009

Goals: how do we go with data visualization to improve the life and society?

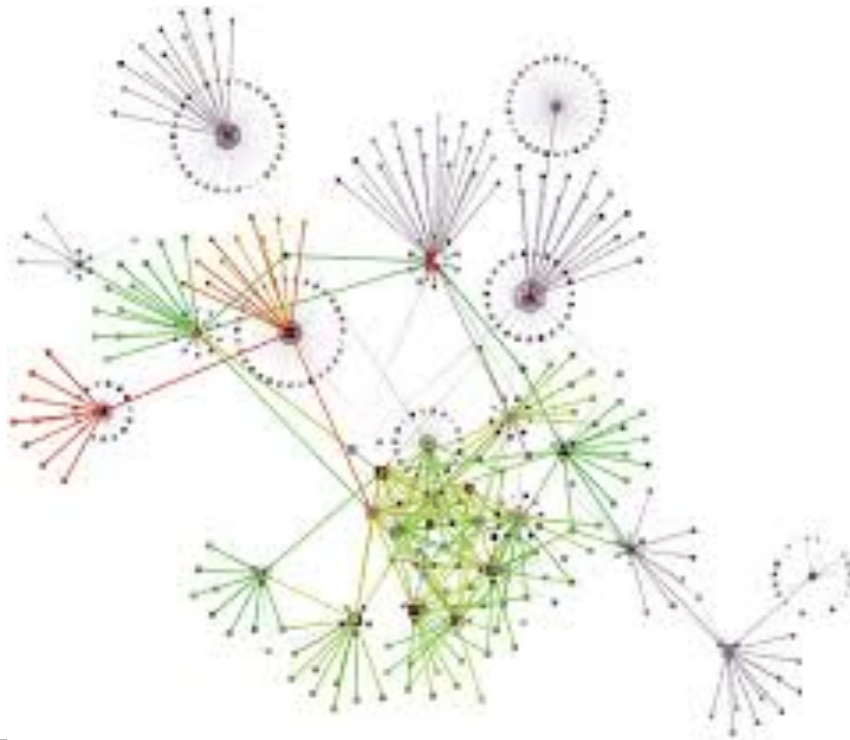
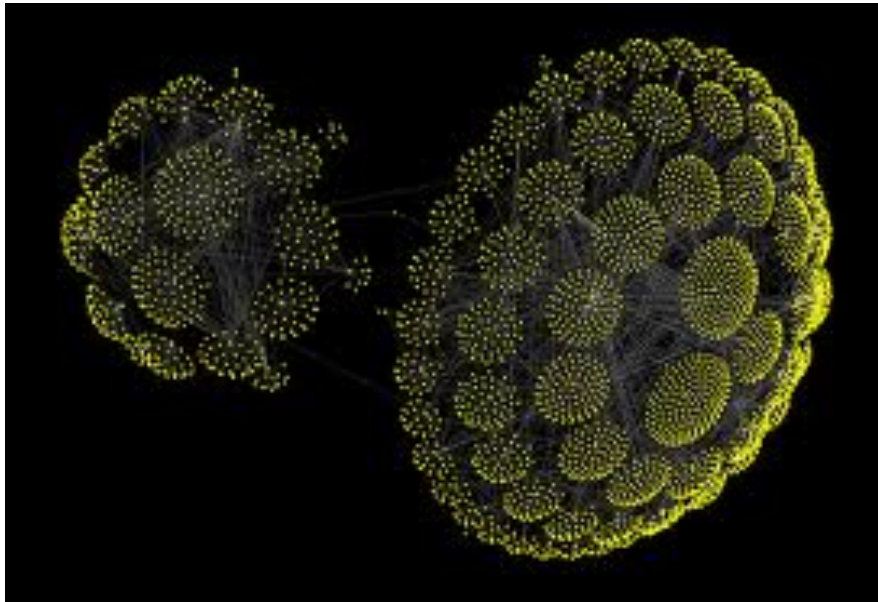
Visualization process

- Acquisition
 - Cleaning
 - Integration
 - Visualization
 - Modeling
 - Presentation
 - Dissemination
-
-

Social network visualization

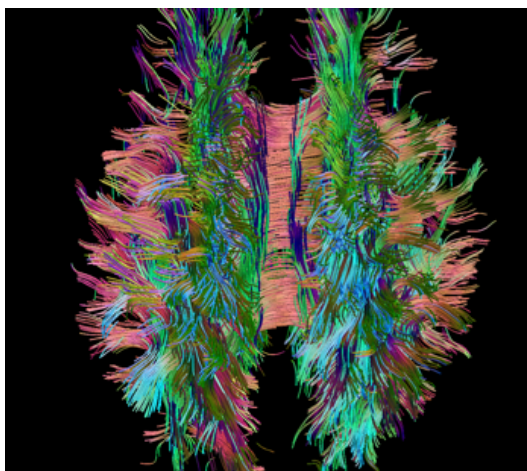
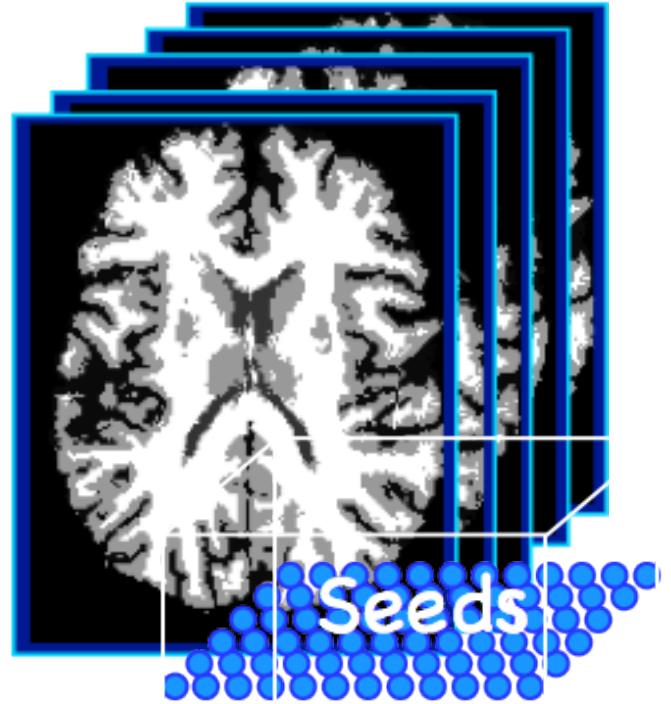


Social network visualization

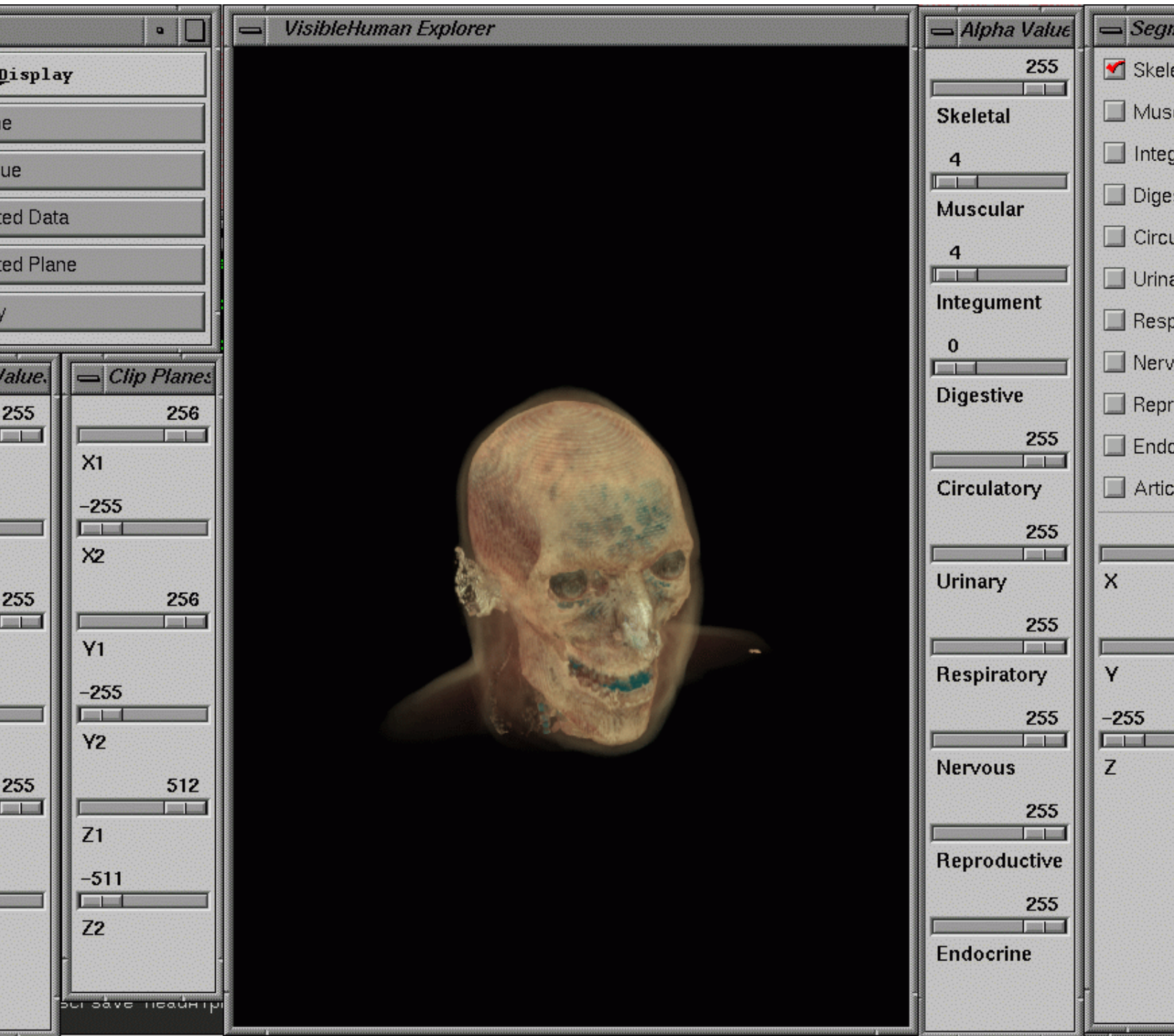


Visualization process

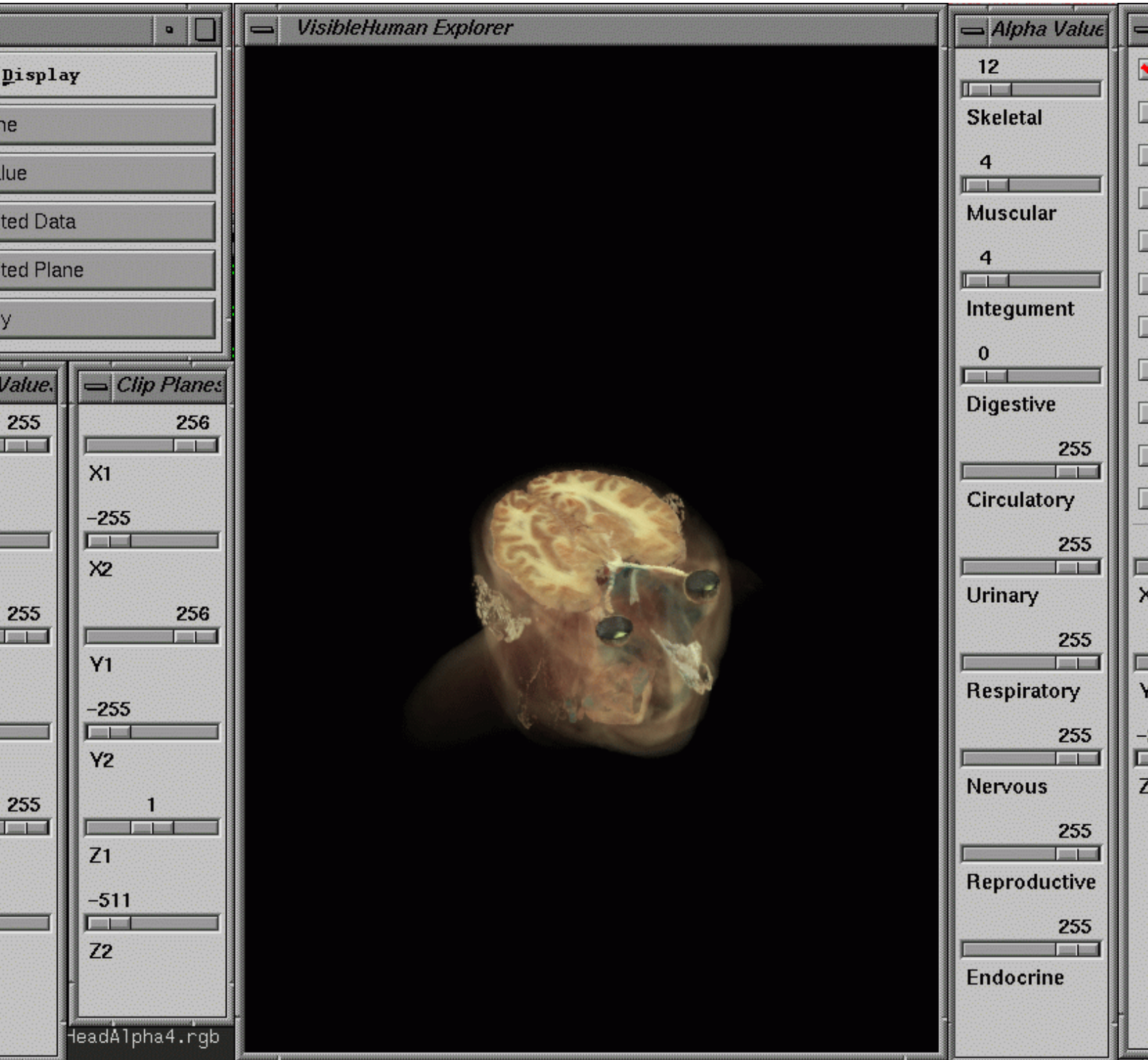
- Acquisition
- Cleaning
- Integration
- Visualization
- Modeling
- Presentation
- Dissemination



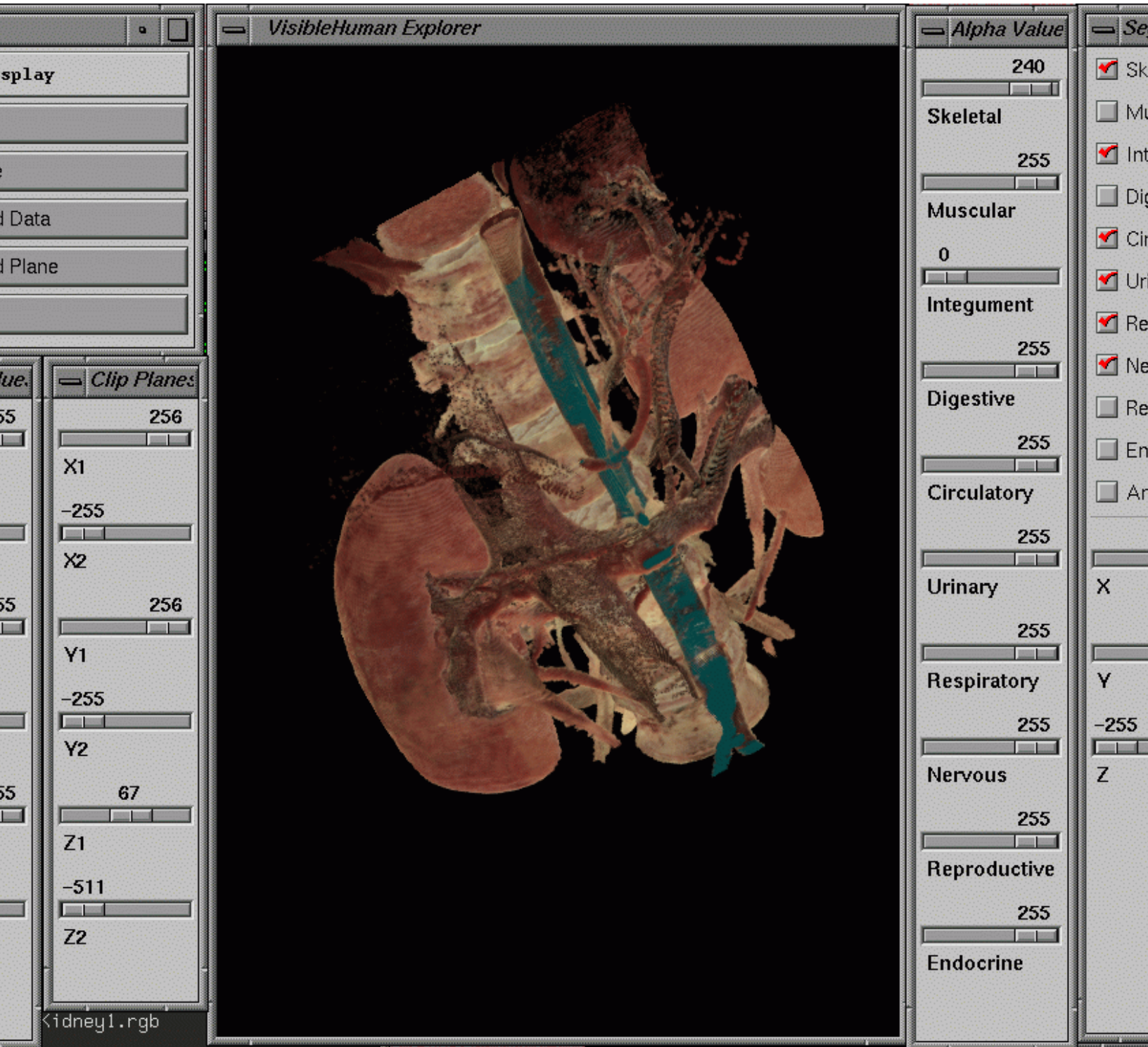
COMPUTER GRAPHICS



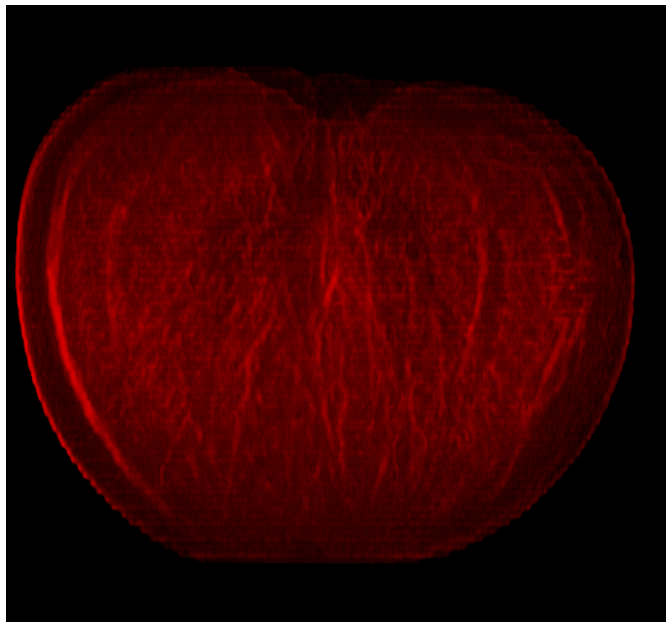
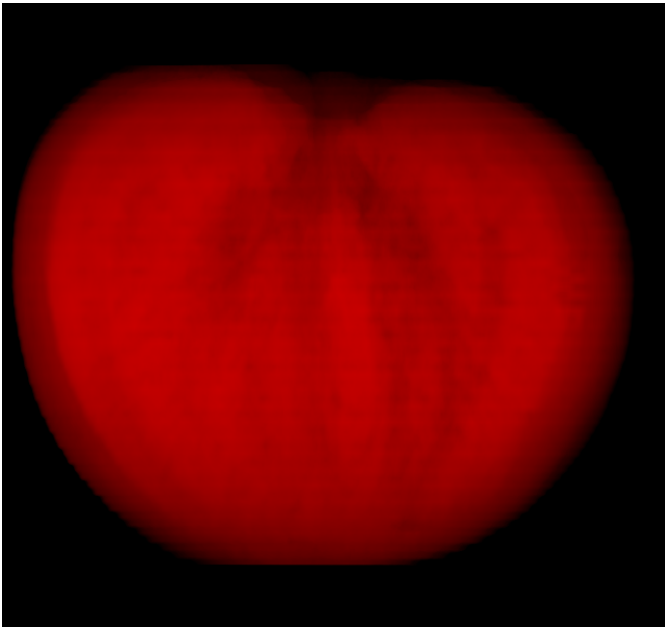
COMPUTER GRAPHICS



COMPUTER GRAPHICS



Artistic rendering

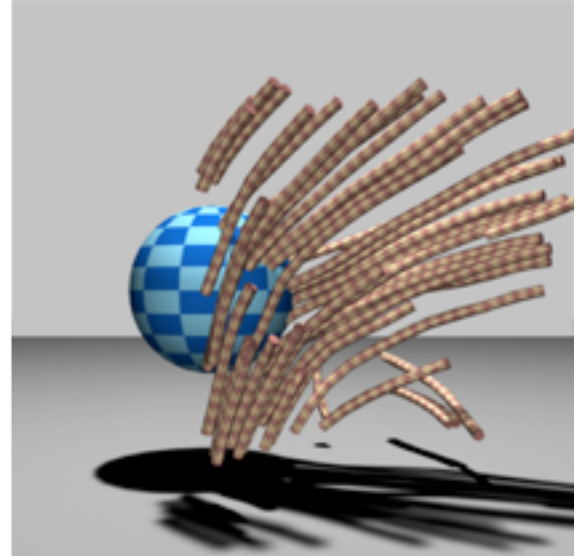
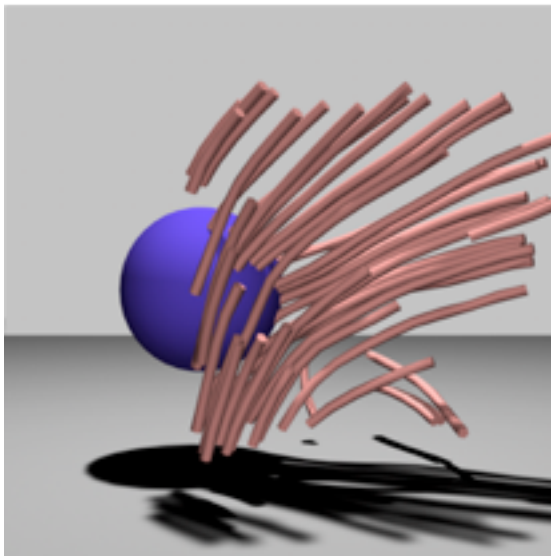
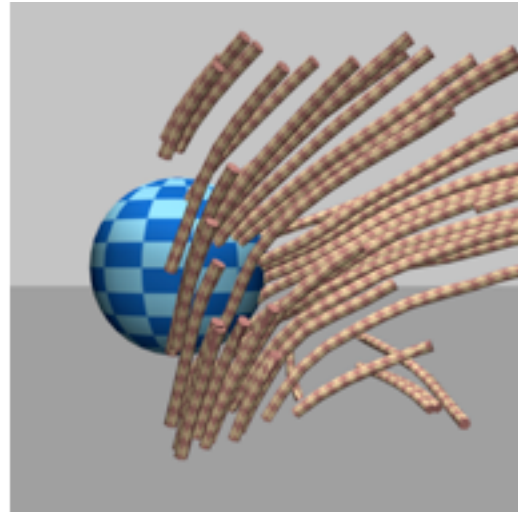
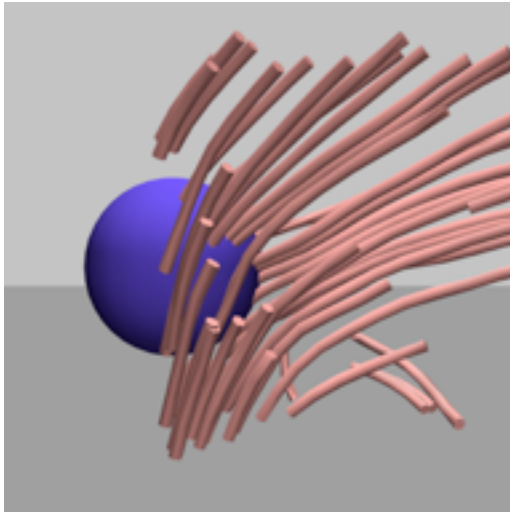


Penny Rheingans

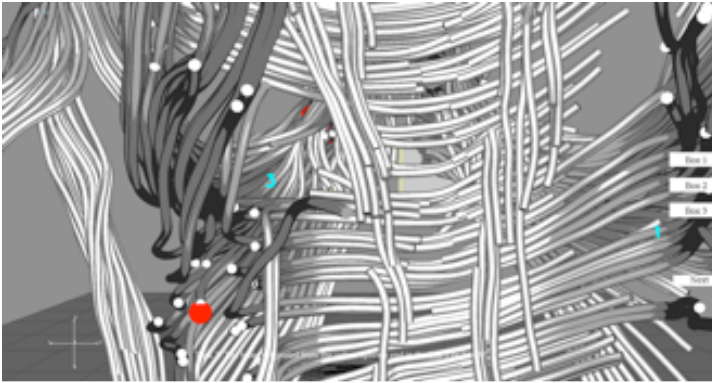
- Today's first task is not to invent wholly new [graphical] techniques, though these are needed. Rather we need most vitally to **recognize and reorganize the essential of old techniques**, to make easy their assembly in new ways, and to modify their external appearances to fit the new opportunities
 - John W. Tukey, The future of data analysis, 1962

Understanding visualizations

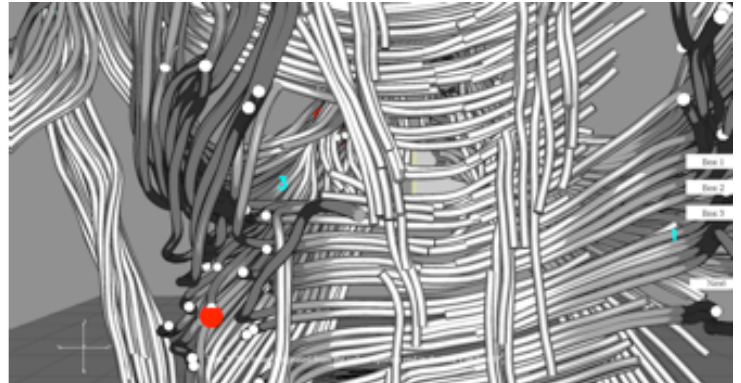
Illumination models



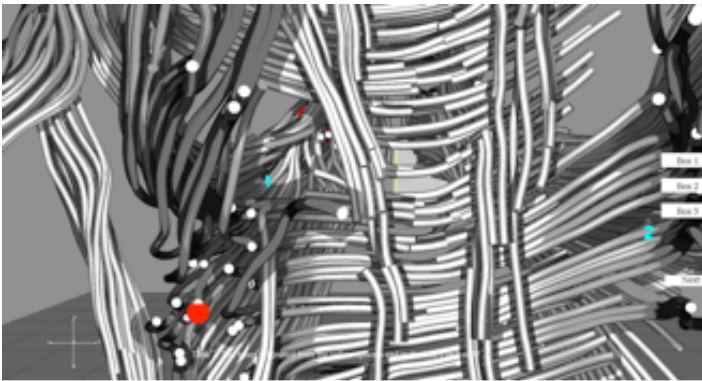
Rendering styles



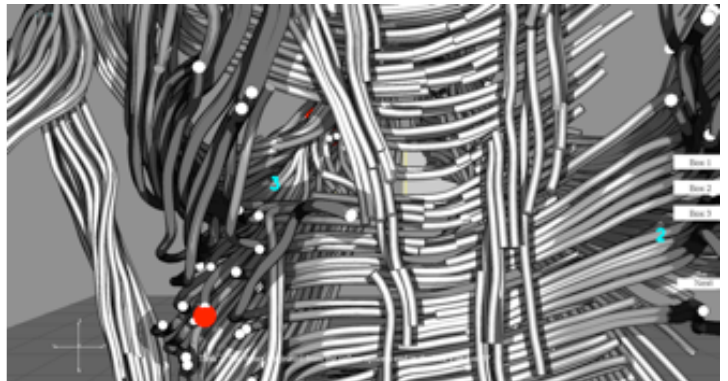
tone



Tone + halo

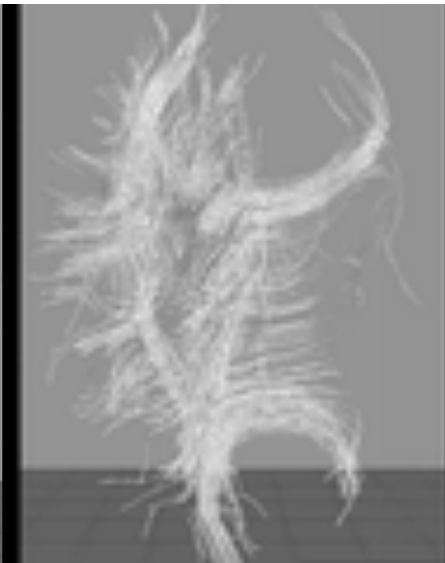
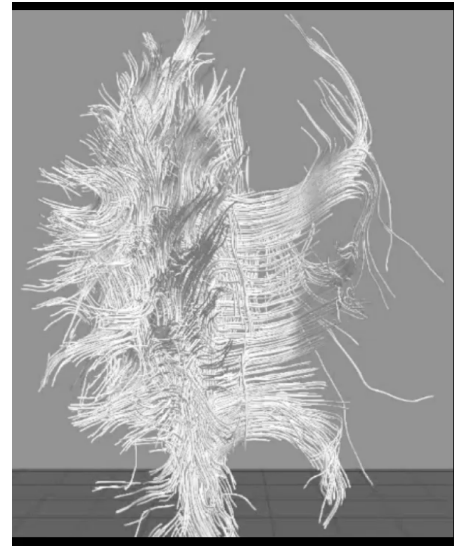
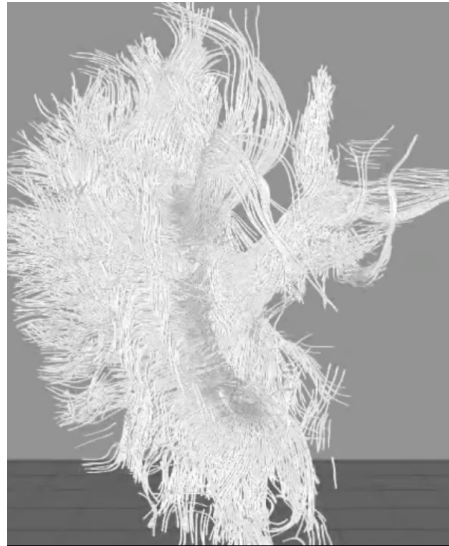
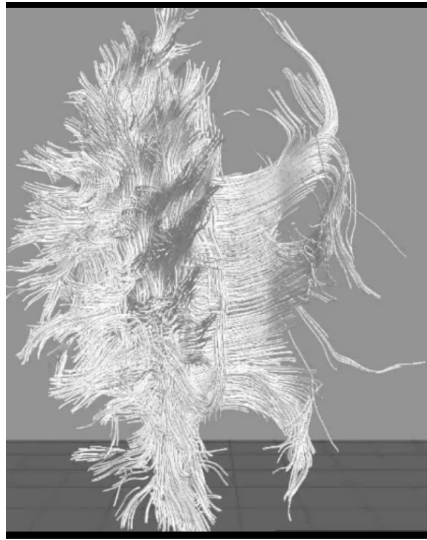


Tone+shadow



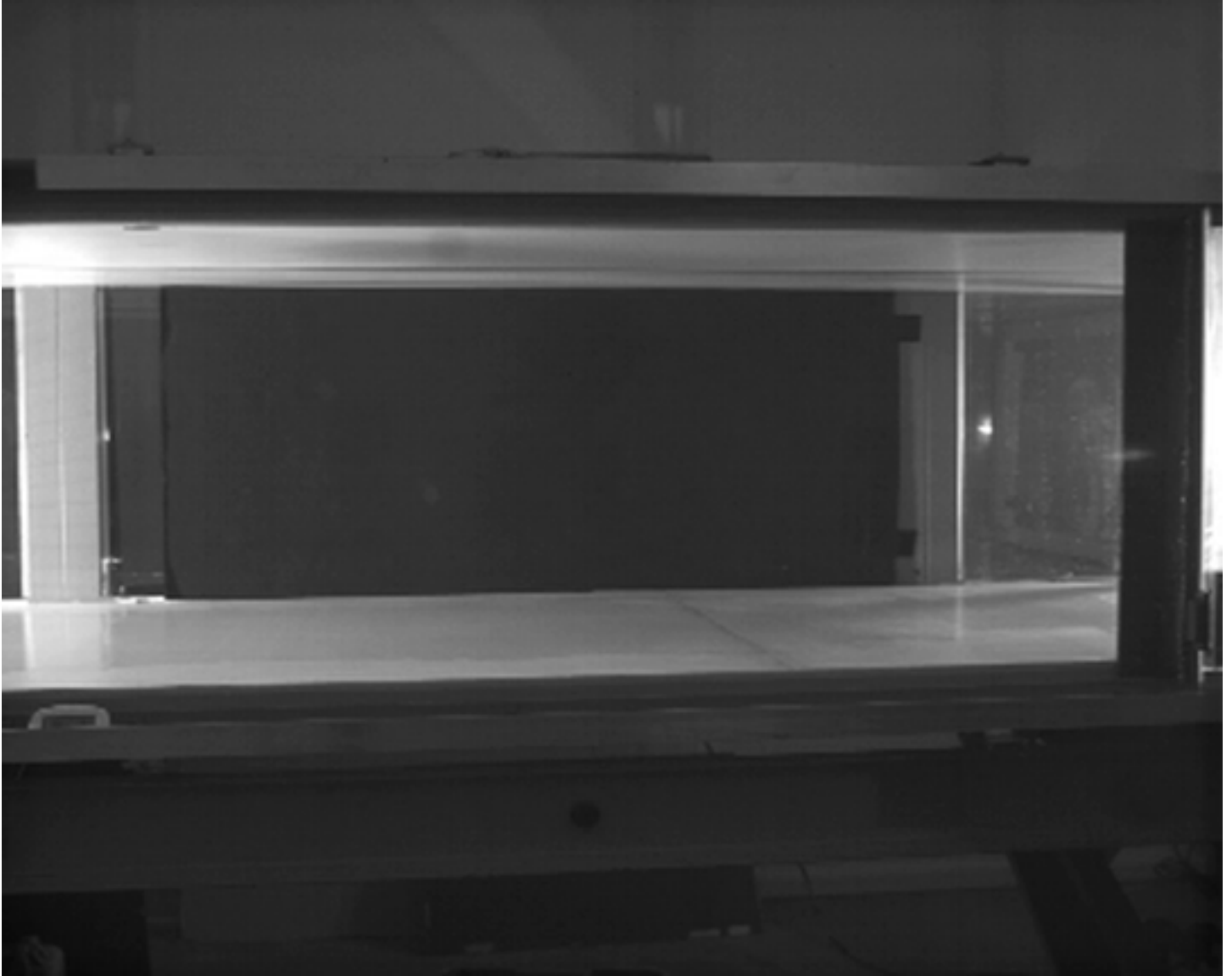
Tone+shadow+halo

Are there any differences in accuracy and efficiency when we use artistic rendering?

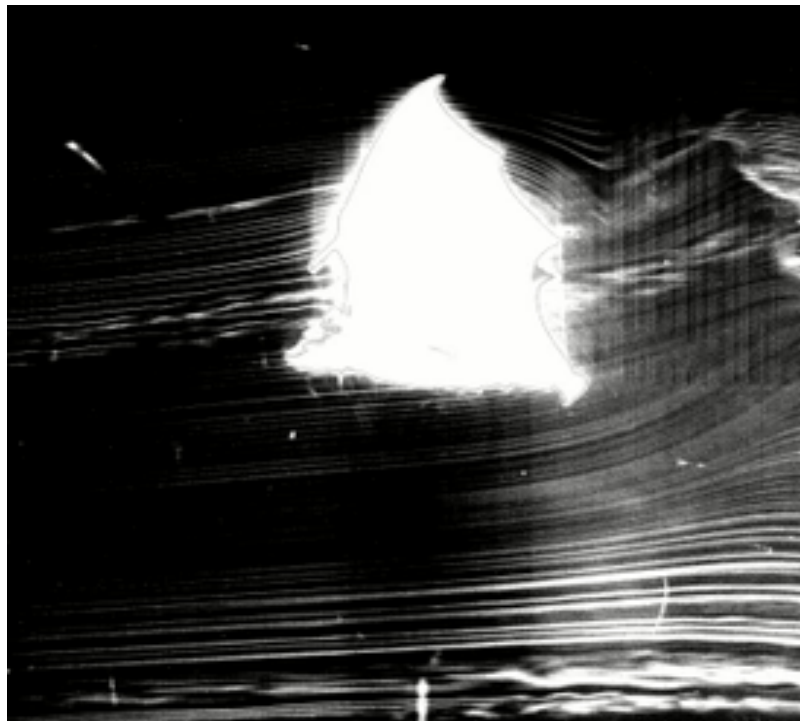
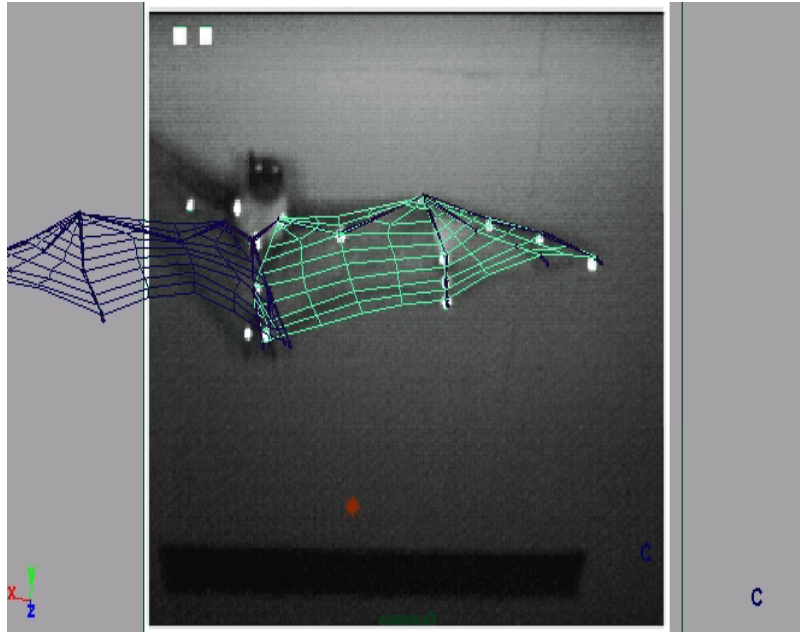


What is the optimal seeding resolution?

COMPUTER GRAPHICS



Complexity



Source code visualization

Code Bubbles

Andrew Bragdon¹, Robert Zeleznik¹, Steven P. Reiss¹, Suman Karumuri¹, William Cheung¹,
Joshua Kaplan¹, Christopher Coleman¹, Ferdi Adeputra¹, Joseph J. LaViola Jr.²

¹Brown University
Department of Computer Science

²University of Central Florida
School of EECS

CHI 2010

Visualization leads to innovations:

- Youtube sensation:

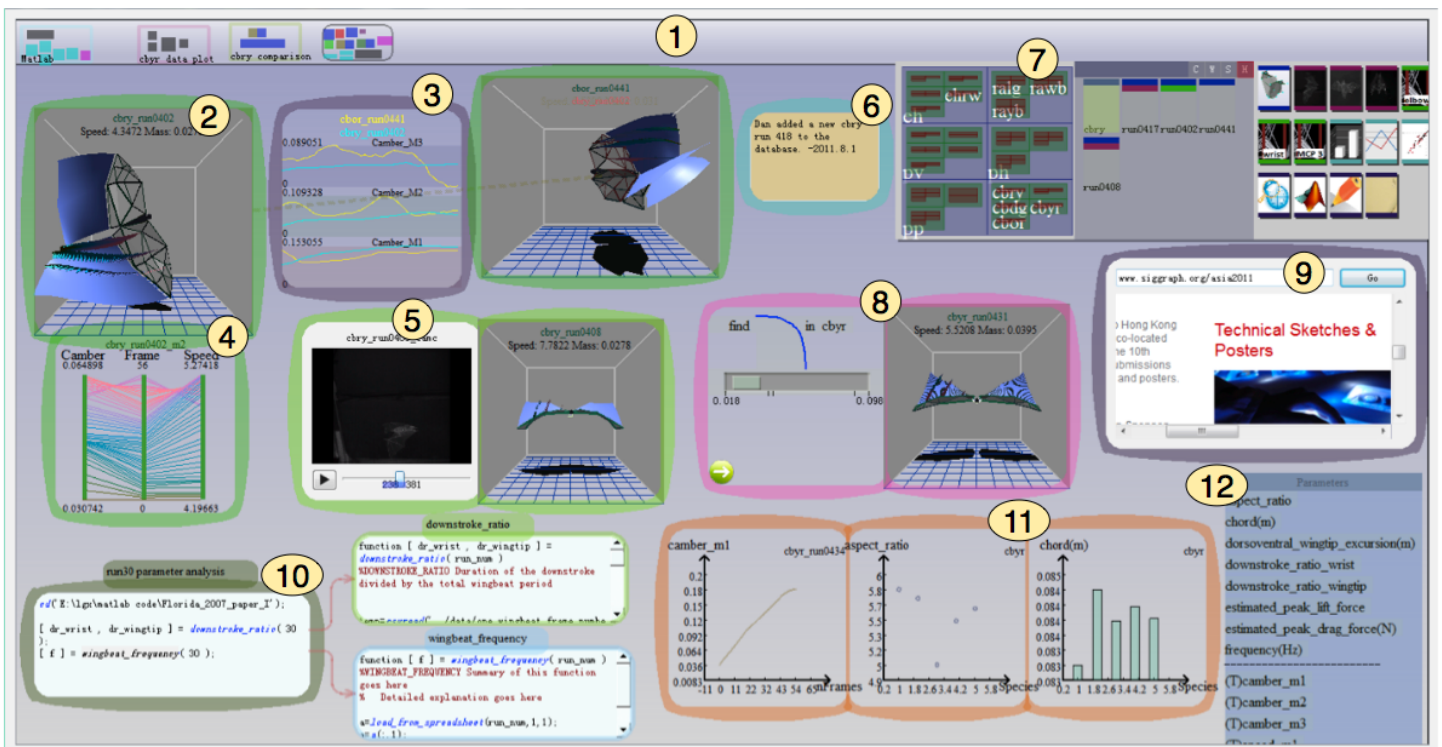
<http://www.youtube.com/watch?v=PsPX0nEIJ0k>

- Methods adopted by Microsoft in the Visual Studio professional version

- Grads get paid, profs get funded – for sustainable innovations.

Trend: increased importance of design process (tools, practice, and teaching)

Storytelling, creativity, integrated infoVis + sciVis



VisBubbles: By Jian Chen, Andrew Bragdon *et. al.*

Trend: rapid advances in interactive technologies

