

Information Visualization

W03: Introduction to Data Visualization

Graduation School of System Informatics

Department of Computational Science

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Schedule

- W01 4/11 Guidance
- W02 4/12 Setup
- W03 4/18 Introduction to Data Visualization
- W04 4/19 CG Programming
- W05 4/25 Rendering Pipeline
- W06 4/26 Coordinate Systems and Transformations
- W07 5/09 Shading
- W08 5/10 Shader Programming
- W09 5/16 Visualization Pipeline
- W10 5/17 Data Model and Transfer Function
- W11 5/23 Scalar Data Visualization 1 (Isosurface Extraction)
- W12 5/24 Implementation of Isosurface Extraction
- W13 5/30 Scalar Data Visualization 2 (Volume Rendering)
- W14 5/31 Implementation of Volume Rendering
- W15 6/06 Student Presentations

W02: Exercise - Setup

- Example answer

- Task 1

<https://yamaokayoshiaki.github.io/yamaokakougiyou/W02/W02task1.html>

- Task 2

<https://yamaokayoshiaki.github.io/yamaokakougiyou/W02/W02task1.html>

The screenshot shows a website layout. At the top, the title "情報可視化論2017年" is displayed. Below it, a navigation menu on the left includes "Information Visualization" (with a dropdown arrow), "W01: Guidance", "W02: Exercise - Setup" (which is highlighted in a grey box), and "サイトマップ". The main content area on the right is titled "W02: Exercise - Setup" and contains the text "JavaScript programming.". At the bottom of the content area, there is a red-bordered box containing the text "Example answer" followed by "- Task 1" and "- Task 2".

Visualization?

英語 ▾



日本語 ▾



visualization

可視化

Kajika



他 3 件の翻訳



visualization



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Videos

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Tools

View saved

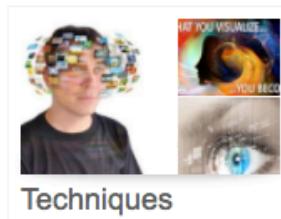
SafeSearch ▾



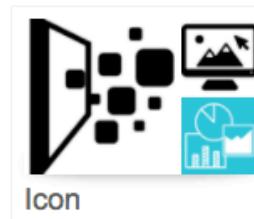
Data



Creative



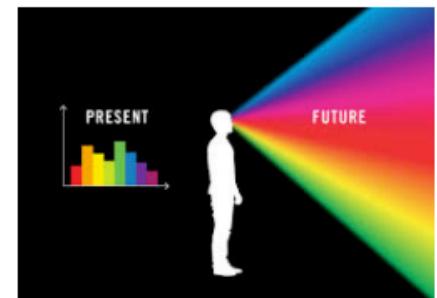
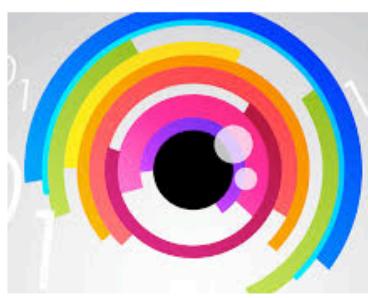
Techniques



Icon



Sports





data visualization



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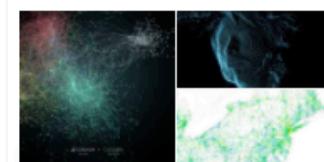
Infographics



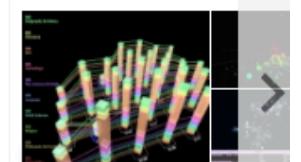
Simple



Dashboard



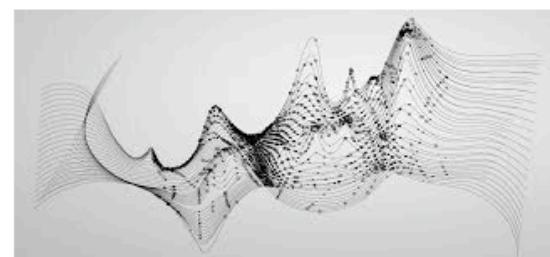
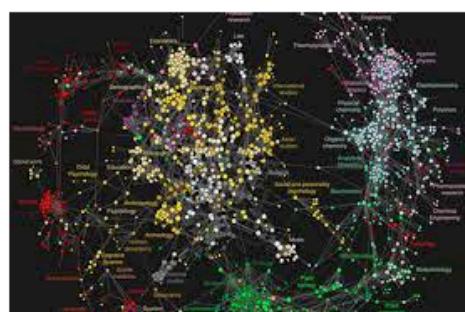
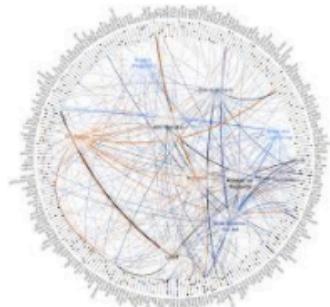
Art



3D



DATA VISUALIZATION



Visualization

- The term visualization may refer to:
 - Mental image
 - Creative visualization (sports visualization)
 - Flow visualization
 - Geovisualization
 - Illustration
 - Information graphics (visual representations of information, data, or knowledge)
 - Interactive visualization
 - Music visualization (a feature found in some media player software applications)
 - Scientific visualization
 - Security visualization
 - Software visualization
 - Visualization (computer graphics)
 - Visulation (graphic visualization + computer simulation)
 - Guided imagery

Visualization

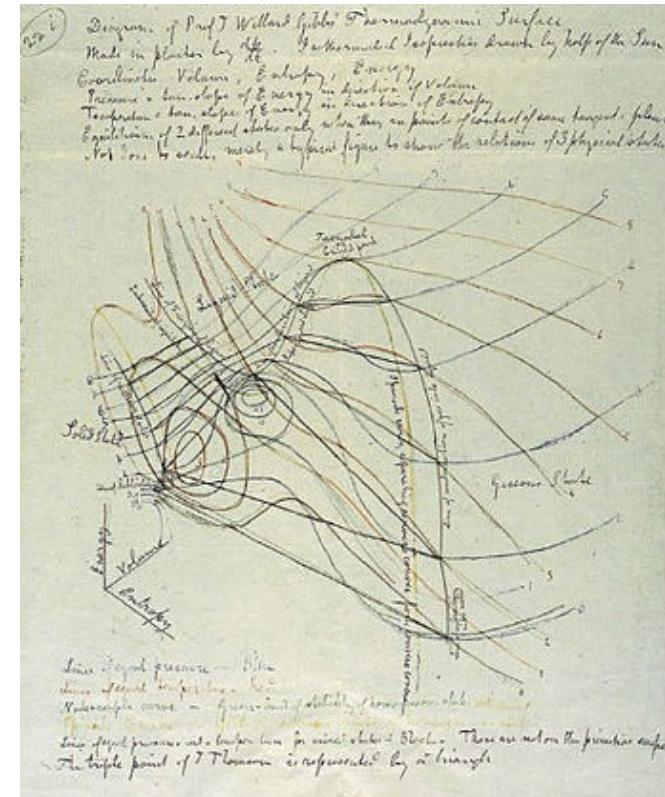
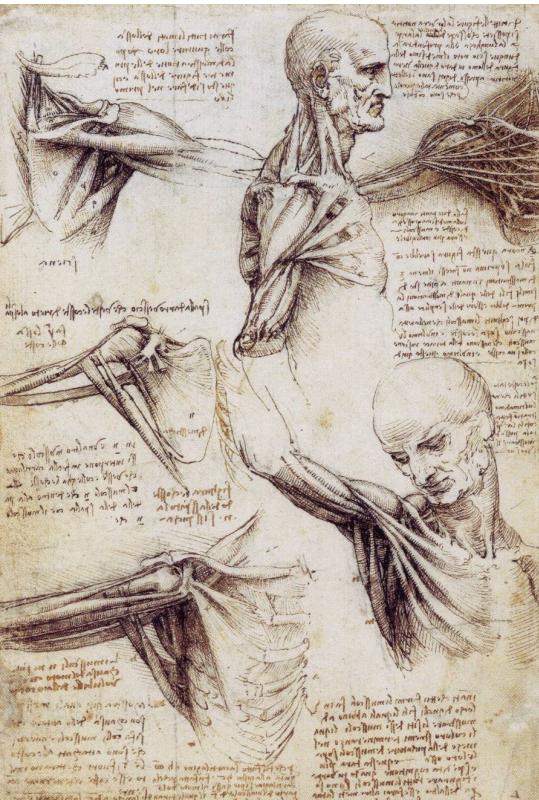
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 - **Scientific visualization**
 - Security visualization
 - Software visualization
 - **Visualization** (computer graphics)
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 - Guided imagery

Scientific Visualization

- Earliest examples of 3D scientific visualization



Drawings of Leonardo da Vinci (1508-1510)



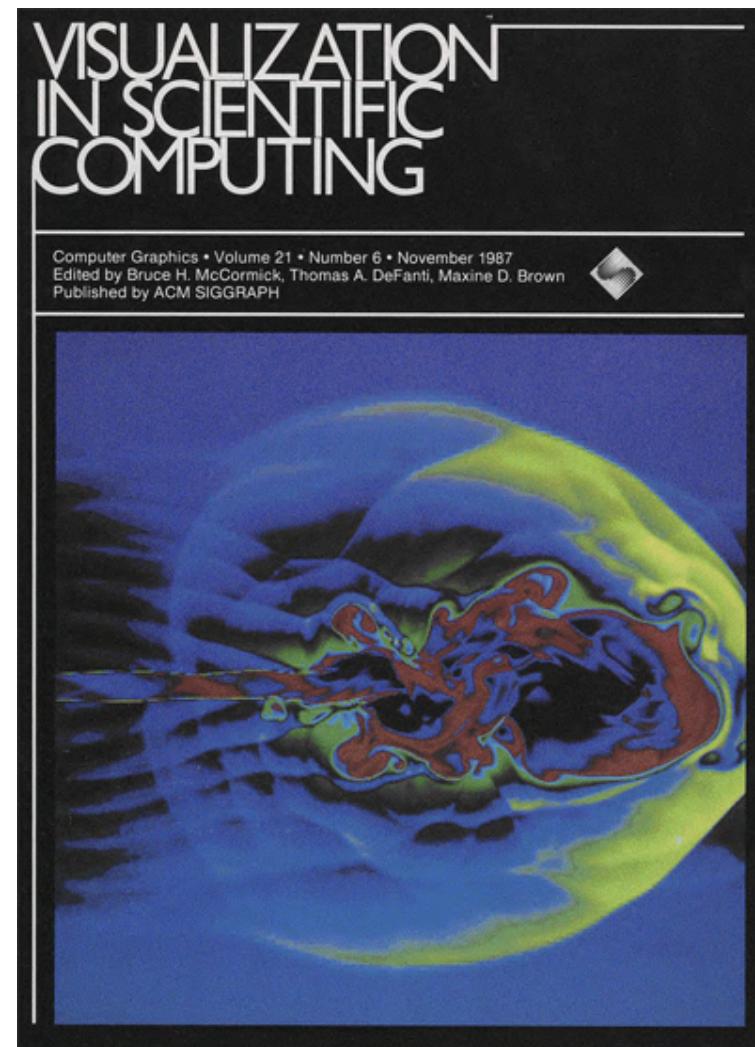
Maxwell's thermodynamic surface (1874)

Scientific Visualization

- Google ...

ViSC Report

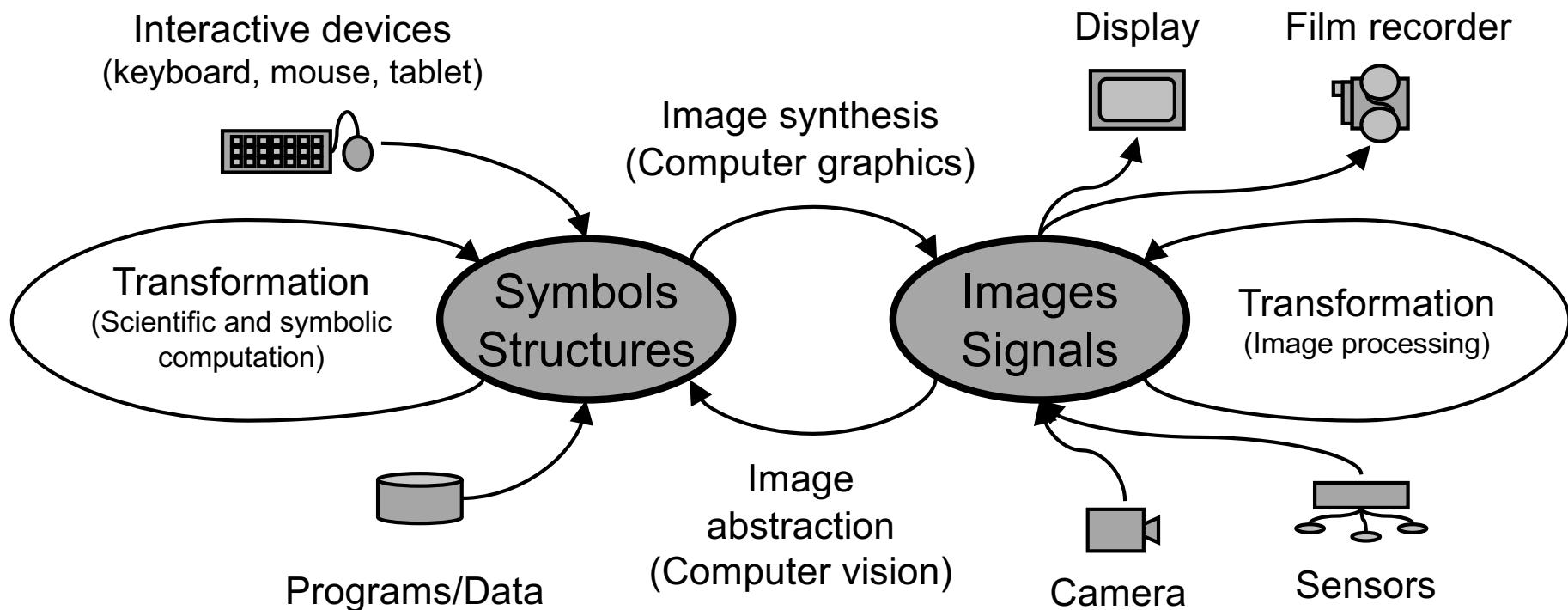
- Published by ACM SIGGRAPH in 1987
 - Applying graphics and image processing techniques to computational science
 - Definition, domain and recommendations of visualization
 - Starting point of scientific visualization



[B. McCormick, et al., 1987]

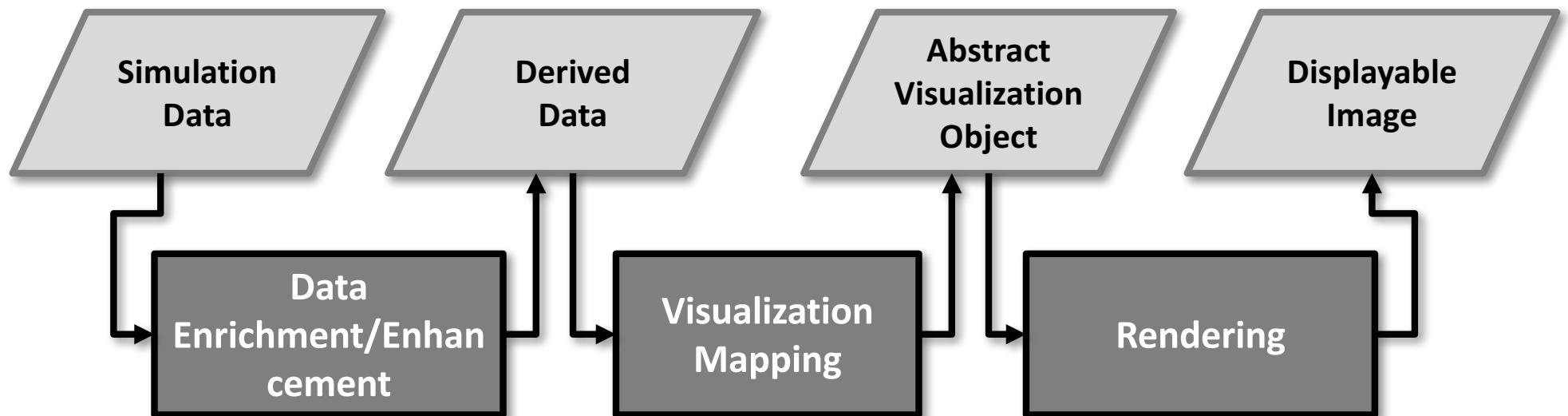
Definition of Visualization

- “*Visualization is a method of computing*”
 - It transforms the symbolic into the geometric, enabling researchers to observe their simulations and computations. Visualization offers a method for seeing the unseen. It enriches the process of scientific discovery and fosters profound and unexpected insights.

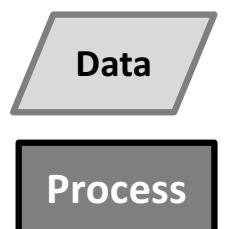


Visualization Idioms

- Visualization process model



Habber-McNabb dataflow model [Habber et al., 1990]



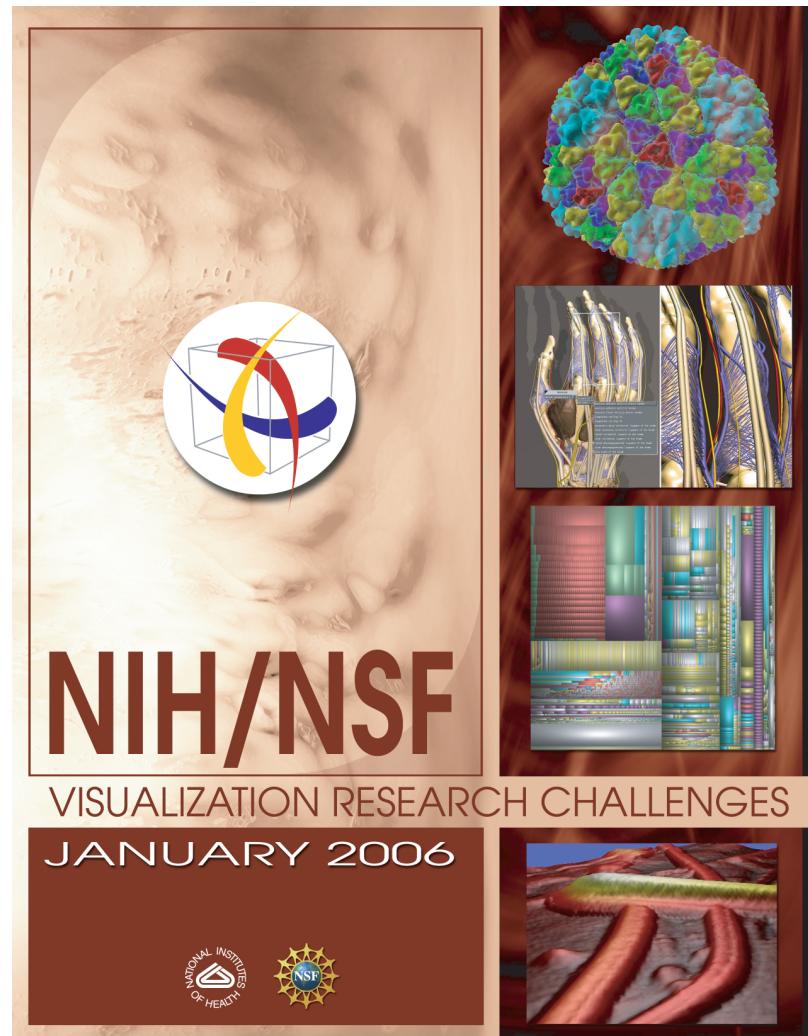
Framework of Visualization Apps.

- Visual Information-Seeking Mantra
 - First overview, zoom and filter, then details-on-demand
 - First overview, zoom and filter, then details-on-demand



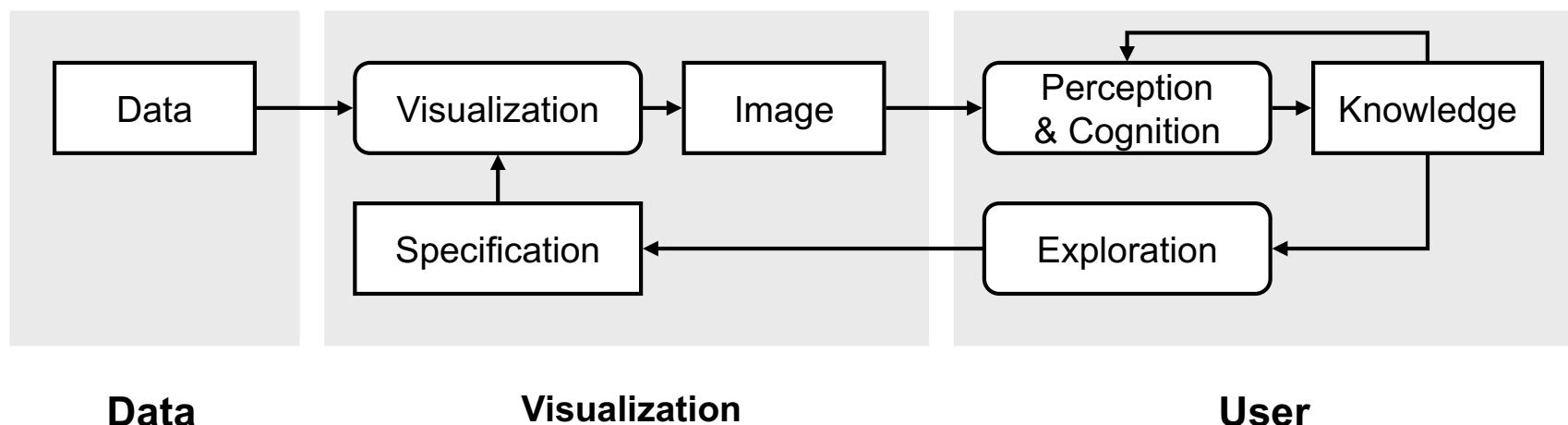
VRC Report

- Published by NIH/NSF in 2007
 - Follow up to ViSC Report published in 1987 (nearly 20 years ago)
 - Potential impact of visualization on areas of importance
 - Findings and recommendations for the future
 - Users of visualization research, and researchers and practitioners in visualization



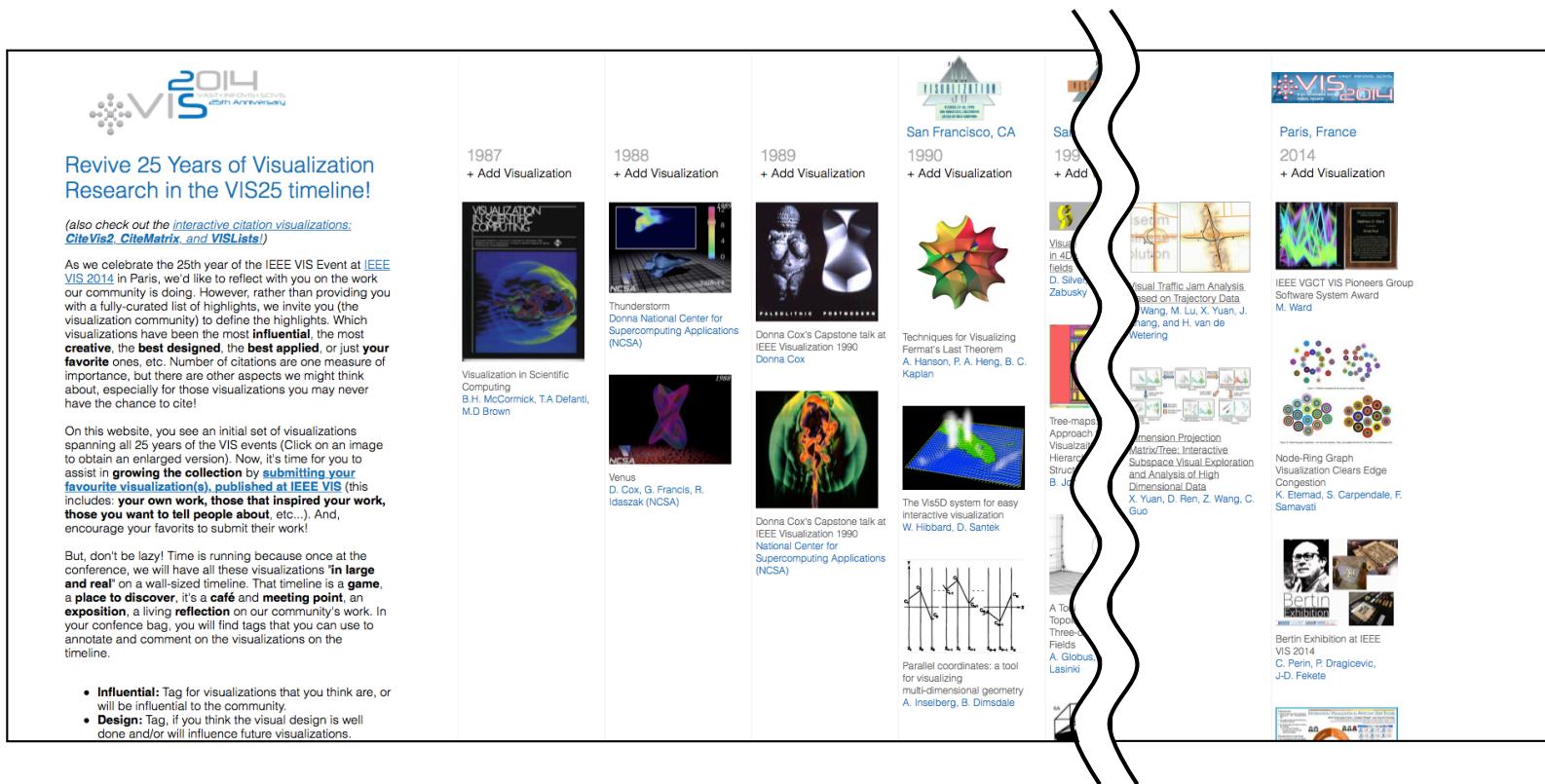
Visualization Discovery Process

- Visualization system
 - Human in the loop by extending human capabilities
- Discovery process
 - Raw data is transformed into knowledge



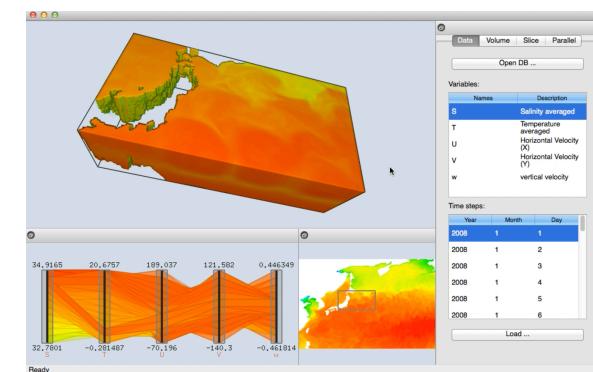
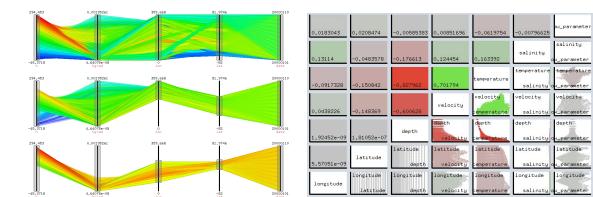
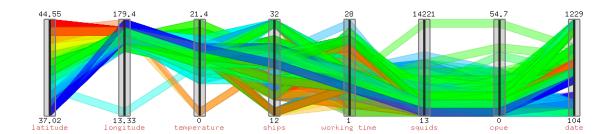
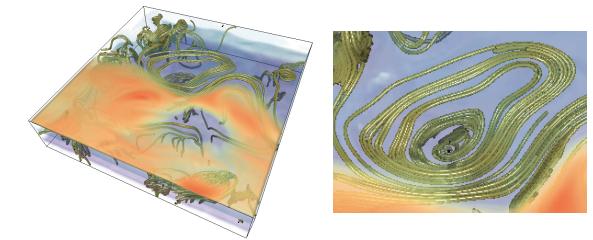
VIS25 Timeline

- Revive 25 years of visualization research
 - <http://www.aviz.fr/~bbach/vis25timeline/>



Visualization Research

- Scientific Visualization
 - Visualization of 3D phenomena (meteorological, medical, biological, etc.)
- Information Visualization
 - Visual representations of abstract data include numerical and non-numerical data.
- Visual Analytics
 - Science of analytical reasoning facilitated by interactive visual interfaces

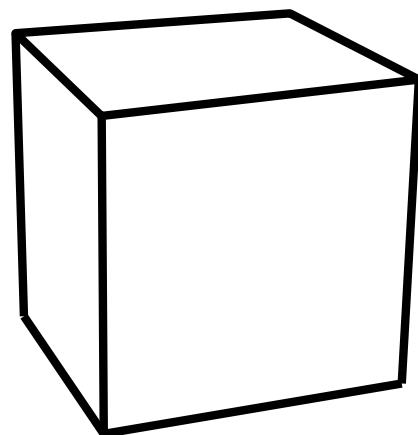


Computer Graphics and Visualization

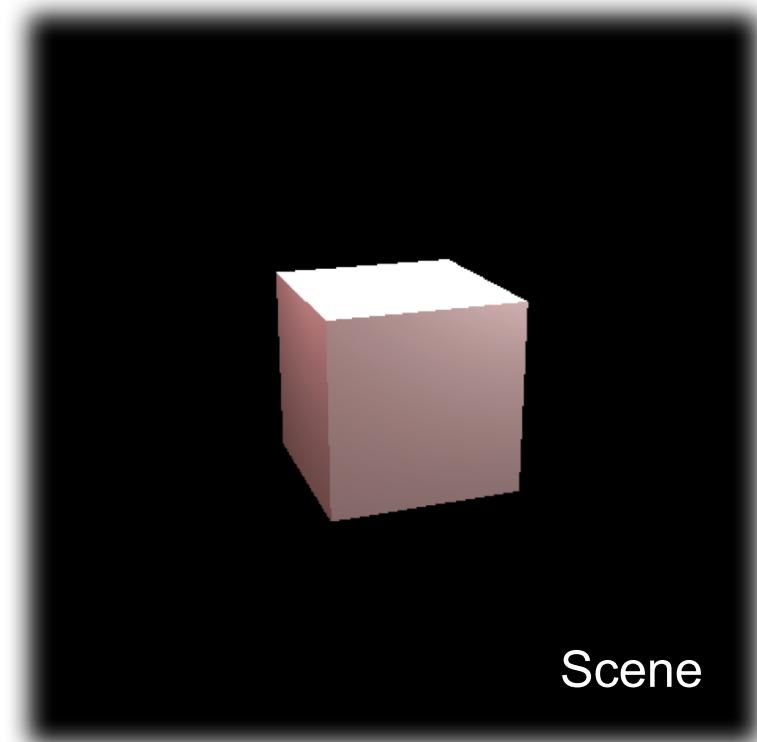
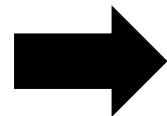
- Computer graphics
 - Use a 3D representation of geometric data that is stored in the computer for the purposes of performing calculations and rendering 2D images.
- Visualization
 - Computer graphics has been used to study scientific problems.
 - Used for analytical reasoning.

Rendering

- Rendering is the final process of generating an image from 2D or 3D models.



3D model



Scene

Polling

- Take the poll
 - Student ID Number
 - Name