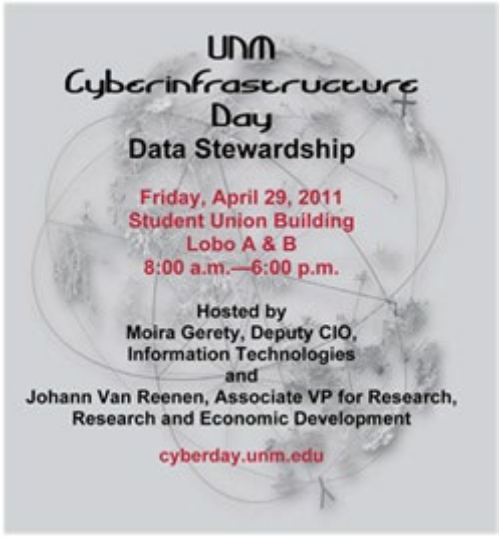
From Supercomputers to 3D Game Programming: The Impact of CyberInfrastructure on our Youth

Kris Stewart
CyberInfrastructure Day Apr2011
Data Stewardship
University of New Mexico

http://cyberday.unm.edu/



https://www.stewart.sdsu.edu/PPT/Stewart_CI-UNM_29apr2011_74-upd.pdf

What do model Railroads have to do with CyberInfrastructure?

The previous image of Kris was taken at Walt's Barn in Griffith Park, Los Angeles
Walt = Walt Disney

Stewart has been a fan of Disney since "forever"
(which was a long time ago)

As Marine Corps brat, Stewart was born at Camp Pendleton
http://www.cpp.usmc.mil/ Zip:92055
coastal San Diego north county – every other tour of duty was Pendleton

Camp Pendleton night at Disneyland, when stationed there, and a visit on each duty change, along with "visit the relatives".

Walt Disney
(05Dec1901 – 15Dec1966

Recent Walt / Kris interactions:

11Nov2011 – niece Leigh Birthday And Flag Retreat daily ceremony, Main Street Disneyland

Disney Family Museum, Presidio Park San Francisco (a record of Walt always pushing the Technology envelope)

Cruise ships – Stewart 60th birthday on Disney Wonder through Panama Canal (Disney first to include children in cruising, just like the parks)

Walt's Barn [CPRR] – Griffith Park – 1956 founding member of LA Live Steamers

How does the fiber map relate to us today?

(Qwest's High Speed Fiber located on the Railroad Right of Way)

http://www.stewart.sdsu.edu/infolab/timeline_tech.html

Timeline of Technology (and Stewart's life)

Upd: Jan. 2007/Org: June 2000, SDSU

Thank you for the motivation to reflect on my personal history of life

Date	Technology	Event	Popular Culture	Comments
A **Big Picture** of timelines			World History: HyperHistory Online navigates through 3,000 years of World History	The Info Scout from the University of Wisconsin is useful to me.
February 14, 1946	ENIAC (U. Pennsylvania)			1997 the Association for Computing Machinery (ACM) celebrates its 50 year anniversary, closely tied to the first computer. ACM is the International Professional Society of computer science.
January 10, 1951		Wendy Christine Beard is born		My father (Lt. Col. W.O. Beard) was at Chosin Reservoir, Korea. The attention paid to this **Forgotten War** a few years ago reminded me that my 50th birthday came and went.
July 1955		Disneyland Opens in Anaheim		
Spring 1969	ARPAnet is born (UCLA)		Centeniel of Golden Spike Transcontinental Railroad Ref: Irving Stone's "Men to Match my Mountains" (Doubleday, 1956)	Kris Beard is Vista High Graduate, on to UCSD to major in Math
1978	Kris builds Z80 Microcomputer Kit Email: qb30087@calstate.bitnet (CSU Cyber)	SDSU Masters Project	"Pirates of Silicon Valley" TNT Movie describes this era. Perhaps we will **critically** watch next week.	Numerical Analysis in BASIC, available online from SCRUNCH available from GAMS/NIST
1979	NASA Space Craft (Voyager 1 Encounter) Internet access to email			Stewart joins Mathematical Software team at Jet Propulsion Lab, Pasadena, with MS in Computer Science
1981	Math Software with Cleve Moler, University New Mexico (witness to MATLAB birth)			Stewart starts work on the PhD at the University of New Mexico, Albuquerque
1984	Stewart returns to SDSU as Asst. Prof. in Numerical Analysis		Apple Ads (look at 1984 Movie shown during the U.S. Superbowl)	Stewart works to include computing in numerical analysis curriculum at SDSU
1993	NSF funds STEP at the San Diego Supercomputer Center (1993-1997) www.sdsc.edu/GatherScatter/gsfall94/gsfall_a8.html Supercomputer Teacher Enhancement Program STEP [GatherScatter Fall94]			Stewart introduces high school science teachers to computational science through workshops at SDSC.
Spring 1994	Stewart's Web Page first faculty home page at SDSU			STEP teachers jumped onto the use of the WWW
June 2000	Map the Human Genone June 25, 2000 announcement from White House	Cure for MS? Annette Funicello and I sure hope so.	Chronology/Microcomputers 1995-2001 copyright [watch browser's "location" field] Chronology/Microcomputers 1995-2002	Author (Who?) Who made available? (Where?) Copyright (When?)

Kris' Faculty Background

(Kris Stewart, CS Professor, San Diego State University, California State University)

- Numerical Analyst* led to
- Supercomputing and Undergraduate Education (SUE**) led to
- Supercomputing Teacher Enhancement Program (STEP***) led to
- Education Center on Computational Science & Engineering (ECCSE) part of NPACI/EOT-PACI (1997)
- ECCSE joins Engaging People in Cyberinfrastructure (EPIC) led to 3d Game Programming course at SDSU 2005
- CS100 GE programming for non-major – Fall 2011

* MS/CS SDSU 1979 (built IMSAI/Z80 kit computer), JPL 1981, **PhD UNM 1987**, SDSU 1984
** SDSC (1991); UCES (DoEnergy 1994)
*** Smithsonian Research Collection (1996)

NSF Celebrates 50 years 23March2009

www.nsf.gov/news/special_reports/nsf-net/

1960s

Note:
4 computers
Speed 4000 baud

1970s

1978, K Stewart builds z80/Imsai kit computer (fl pt) for numerical software

188 computers
4800 baud

1980s

1985 NSF Supercomputer Centers

159,000 computers
1,400,000 baud

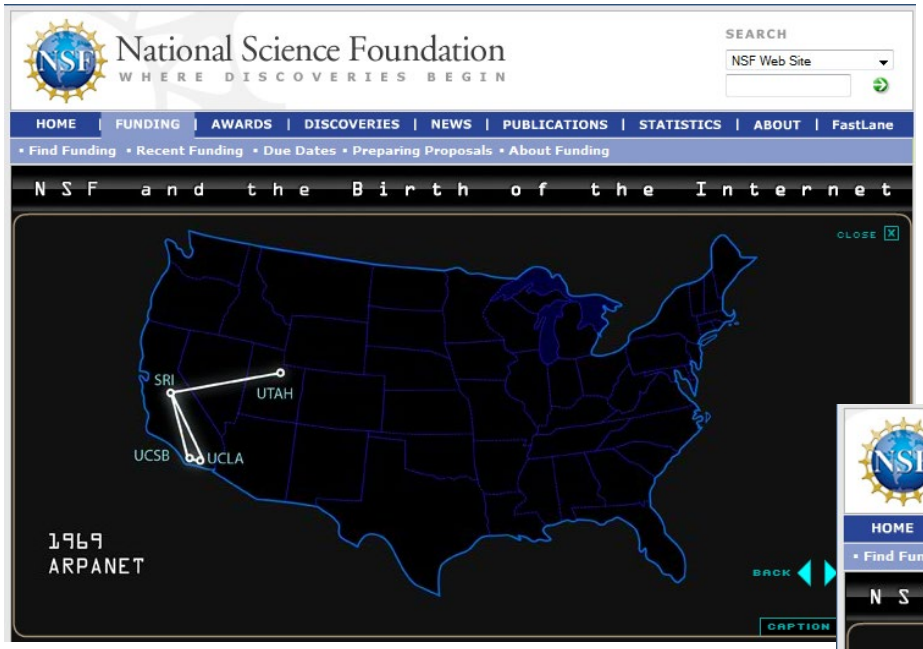
1990s

248,000,000 computers
10,000,000 baud

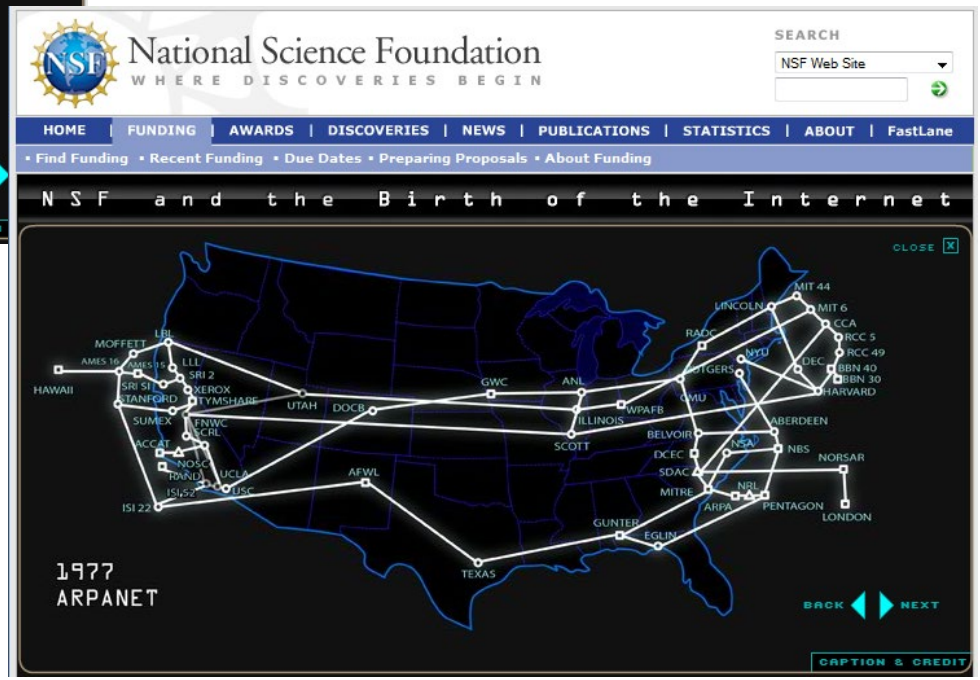
2000s

1.2 G computers
20,000,000,000 baud

Evolution of Network-1

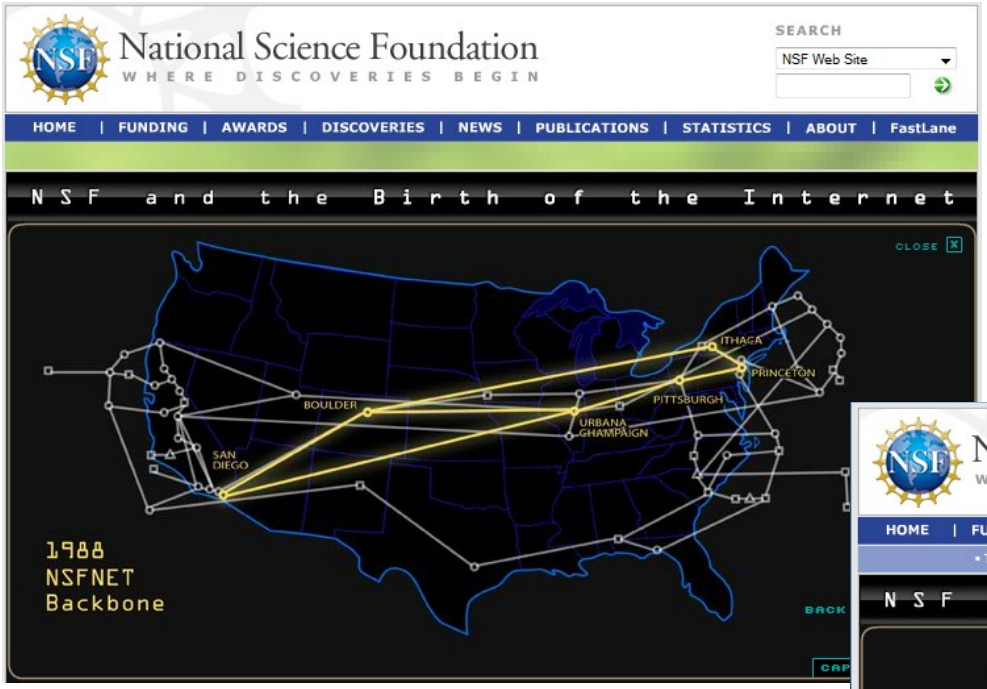


ARPANET 1969

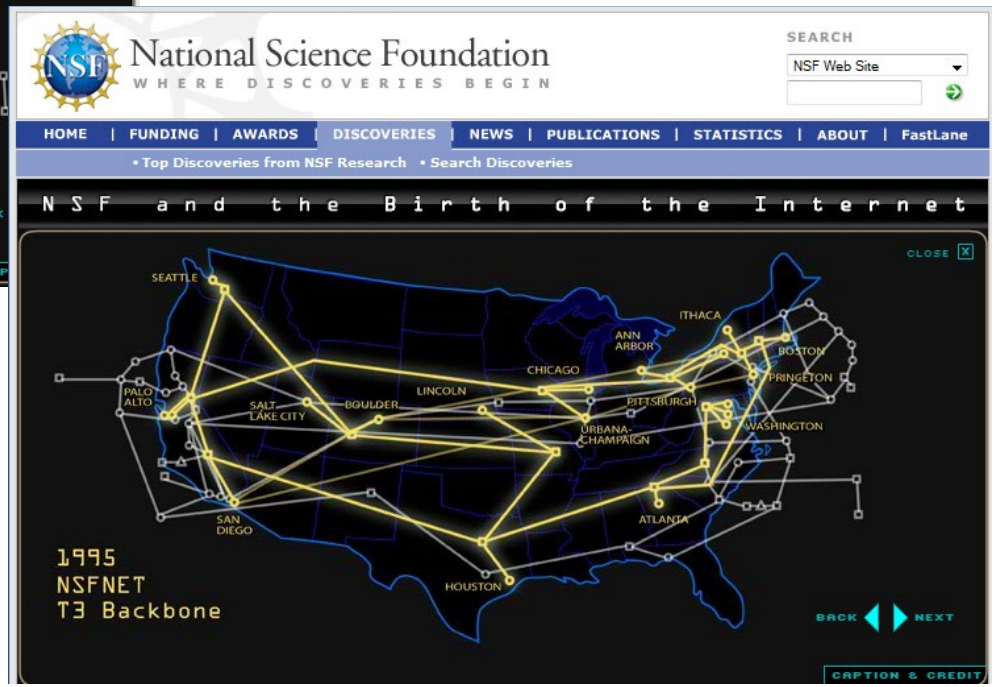


NSFNET 1977

Evolution of Network-2

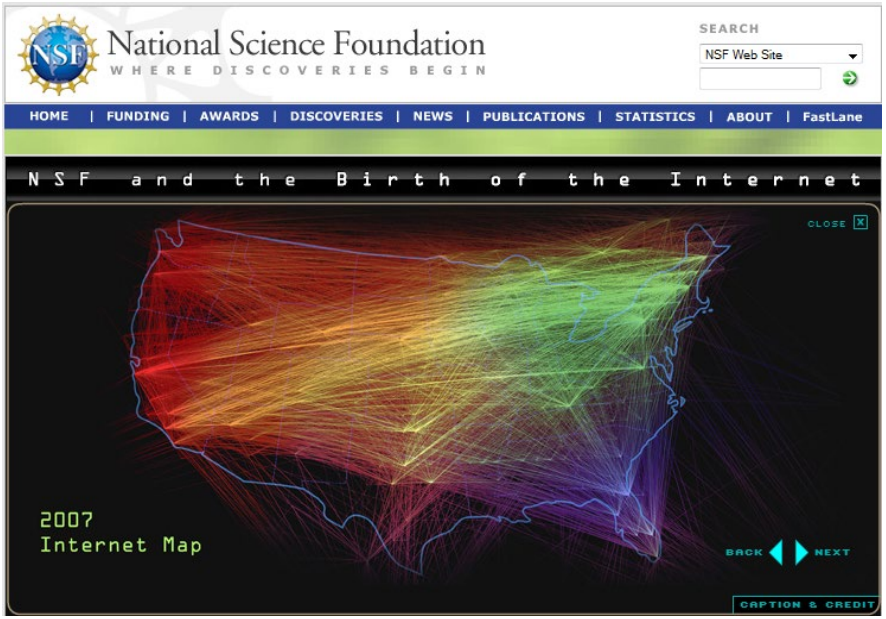


1988 NSFNET Backbone
Supercomputer Centers hub



1995 NSFNET T3 Backbone

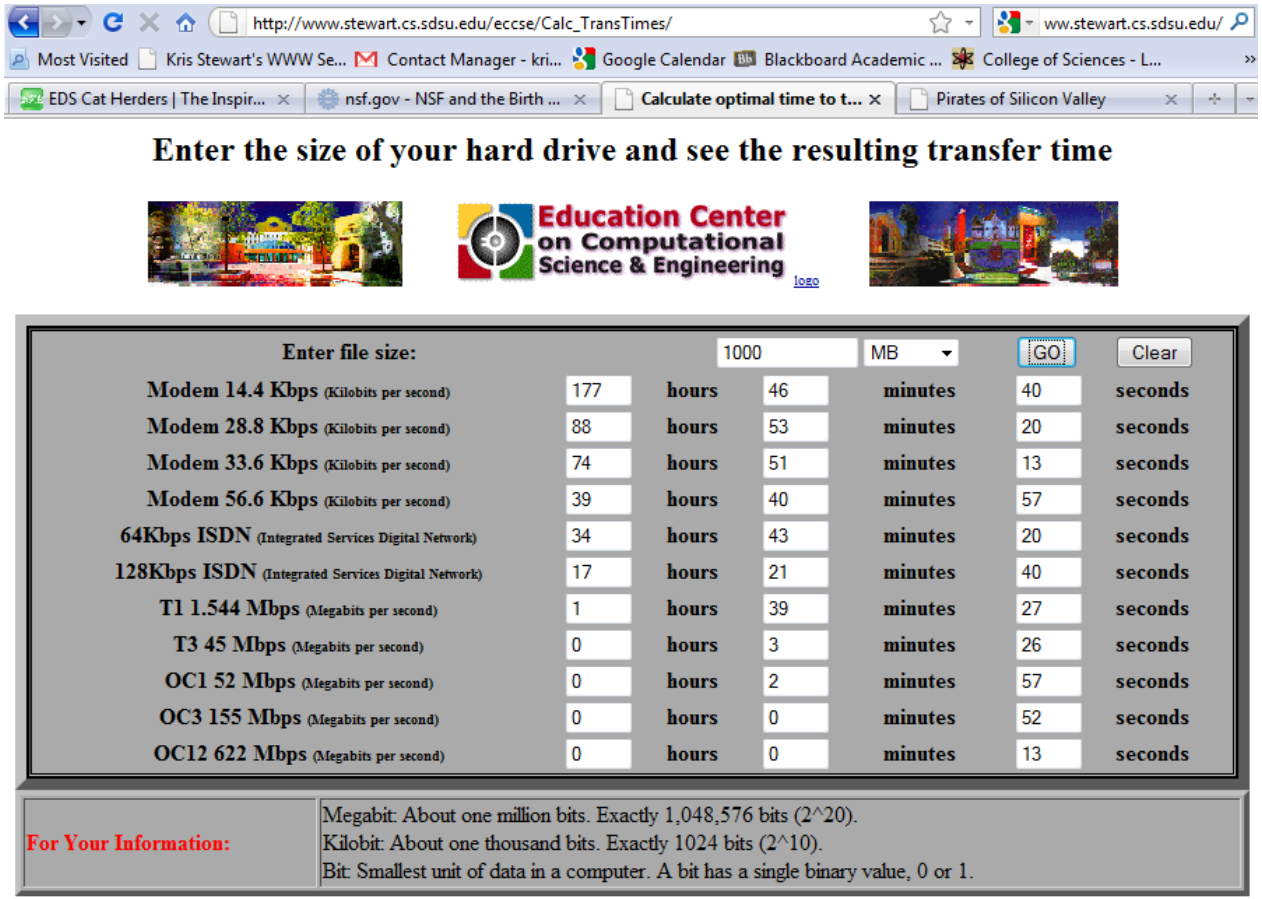
Evolution of Internet-3



2007 Internet Map of US

Calculate Transmit Time for your 1GB ThumbDrive vs. Network Speed

https://www.stewart.sdsu.edu/eccse/Calc_TransTimes/



Over time, it's been great to watch technology change

- Processor speeds increasing & multicore
- Memory speed increasing
- Cost decreasing
- Computer Screen resolution and fidelity
- GPUs as well as CPUs
- Mobile computing convenient and powerful

What an exciting time "the kids" can have

Stewart Background / Acronyms

- 1973 BA Math UCSD (unsuccessfully UCB PhD attempt Differential Geometry ‘74)
- 1976-79 MS Computer Science SDSU (Imsai 8080/Z80 microcomputer kit, separate floating point processor)
- 1979-81 Jet Propulsion Lab, Pasadena Ca
- 1981-87 UNM PhD Applied Math/CS
- 1984 hired SDSU Numerical Analyst faculty
- 1993-96 Supercomputer Teacher Enhancement Program (SD High Schools / SDSC resources) after SDSU tenure
- 1995 HPC at SDSU with SDSC resources NSF grant
- 1997-2006 NPACI (HPC at CSU with SDSC/net resources) SDSU promotion (nontraditional faculty)
- 2005 Engaging People in CyberInfrastructure (EPIC) using Game Engines as Curriculum Tool

UCSD=U.California, San Diego; SDSU=San Diego State U.; JPL = Jet Propulsion Lab of NASA; UNM=U.NewMexico; HPC=High Performance Computing; SDSC=San Diego Supercomputer Center; NPACI=National Partnership for Advanced Computational Infrastructure; EPIC=Engaging People in CyberInfrastructure

Curriculum Development

- SUE (Supercomputing and Undergraduate Education) workshop for CSU faculty 1990-93
- STEP (Supercomputer Teacher Enhancement Program) workshops High School Teacher Teams to promote Computational Science 1993-96
- NPACI (National Partnership for Advanced Computational Science Infrastructure) 1997-2005
- KUCSEC (Keck Undergrad Computational Science Education Consortium) 2002-2006
- EPIC (Engaging People in Cyberinfrastructure) Game Engines in University Undegrad Curriculum 2005-07
- http://www.netlib.org/na-digest-html/ full circle back to 1987 (thanks to Jack Dongarra) great for HPC
- CS100 General Ed Principles of Computing using Alice, Fall 2011 Current students were born digital – Stewart is Digital Immigrant with a Green card from UNM

Key Points in video for Modern Computer History

- 1984 Superbowl commercial announcing Apple Macintosh http://en.wikipedia.org/wiki/1984_(advertisement) Dir: Ridley Scott
- Pirates of Silicon Valley [TV movie] http://en.wikipedia.org/wiki/Pirates_of_Silicon_Valley useful to establish early days and who stole what from whom; Xerox PARC <-> iSteve <-> Windows?
- The Machine That Changed the World [TMTCTW] BBC & PBS http://waxy.org/2008/06/the_machine_that_changed_the_world/ Jan1992 US PBS
- Triumph of the Nerds PBS Bob Cringely http://www.pbs.org/nerds/ June 1996 US PBS (no longer airing – can find YouTube)
- Nerds 2.0.1 Bob Cringely, PBS http://www.stewart.sdsu.edu/cs440/nerds_2_0_1.html (my YouTube collection) or http://www.pbs.org/opb/nerds2.0.1/
- CatHerders 2000 Superbowl commercial https://www.youtube.com/watch?v=m_MaJDK3VNE

Superbowl Commercials from Tech Companies (over time)

My choices are:
Apple Macintosh premier, directed by Ridley Scott), 1984
EDS Cat Herders 2000 and
Bridgestone Tires Beaver carma salute 2011

Computerworld choices:
Xerox: "Monks" (1976)
Apple: "1984" (1984)
Intel: "Play That Funky Music" (1997)
CompuServe: "Not Busy" (1997)
Lotus: "Capitalism" (1997)
Iomega: "Bermuda Triangle" (1998)
Network Associates: "Missile Silo" (1998)
EDS: "Cat Herders" (2000)
Computer Associates: "Amnesia" (2002)
Garmin: "Napoleon" (2008)

http://www.computerworld.com/s/article/print/9152078/Top_10_Super_Bowl_tech_ads?taxonomyName=Hardware&taxonomyId=12

My Favorite 2011 Superbowl Ad

http://www.youtube.com/watch?v=EBUcG7xZB-g
Copy/paste into browser / Bridgestone beaver

http://youtu.be/7Rw-JUuUrZg
Carma - salute

Online Resources - a moving target

- What criteria to use to evaluate?
  Who What Where Why When? (date, author, biases, focus, intended audience, how $-supported …)
- Trust Anything from ACM (Association for Computing Machinery)
- Research and Documentation in the Electronic Age – Diana Hacker
  http://dianahacker.com/resdoc/
- Scout Report Results. Solutions. Knowledge.
  Since 1994, the Internet Scout Project has focused on research and development projects that provide better tools and services for finding, filtering and delivering online information and metadata.
  http://scout.wisc.edu/

Students and Professions need to question and keep log of web resources

- Research and Documentation in the Electronic Age – Diana Hacker
  http://dianahacker.com/resdoc/
- Campus Infrastructure – SDSU Reference Librarians provide guidance:
  Evaluating Sources of Info at SDSU:
  http://infodome.sdsu.edu/research/evaluate/evaluate.shtml

  What resources do you have in your school/lab?
  How much support for you (teacher/researcher, your students, users?
- Cyberinfrastructure requires an investment

My Favorite online resources

- Scout Report (weekly email and archives)
- ACM Tech News (3 times/wk & archives)
- WayBack Machine
- Library subscription to technical journals
- Wikipedia – how to use effectively. Point out to students its View History [alt-h]

Student Research:

Resources found on web can be included, if acknowledged correctly

- Avoid Plagerism charges (cheating)
- Respect Copyright and other individuals Intellectual Property (IP)
- It is the “right thing to do” (cultural differences)

As you move from Supercomputing … What interests me?

Increasing enrollment in Computer Science

Responsible Internet Usage

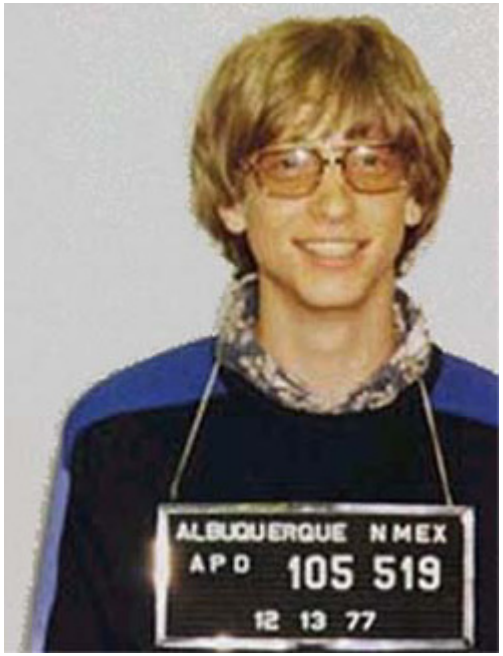
Programming and Computer Games

My Inspirations (Randy Pausch, John Seely Brown, Jeanne Twenge have each provided me with insights along with MANY more)

How CyberInfrastructure Impacts/Engages our Youth

Take away for students, and audience

- Students born digital and shrug off "history lesson" on how new, innovative, exciting, **intrusive** … connectivity has become
- Internet is dynamic – keep a log (or web page record, find what works for you since resource may move – HtTrack and YouTube Downloader)
- Internet never goes away, so watch out for what you post – Bill Gates mug shot from Albuquerque PD



CSTA and NSF promote CS 100 at the University and AP exam for high school students

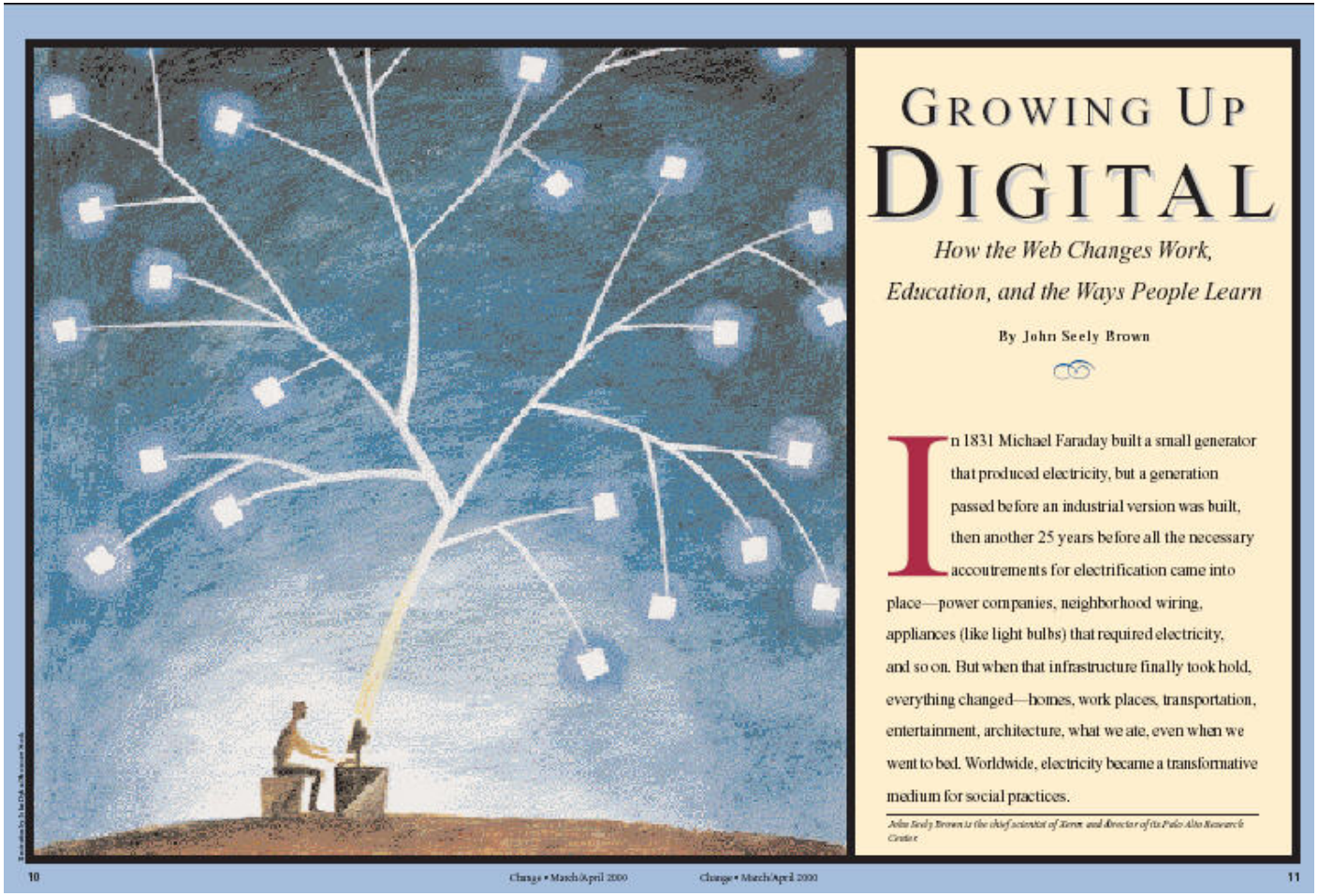
Fall 2011 – Stewart teaches course at SDSU for first time

Stayed tuned!

www.stewart.sdsu.edu

Outside Wisdom on our Students

John Seely Brown – 17Jan05 @ SDSU



GROWING UP

DIGITAL

How the Web Changes Work, Education, and the Ways People Learn

By John Seely Brown

In 1831 Michael Faraday built a small generator that produced electricity, but a generation passed before an industrial version was built, then another 25 years before all the necessary accoutrements for electrification came into place—power companies, neighborhood wiring, appliances (like light bulbs) that required electricity, and so on. But when that infrastructure finally took hold, everything changed—homes, work places, transportation, entertainment, architecture, what we ate, even when we went to bed. Worldwide, electricity became a transformative medium for social practices.

John Seely Brown is the chief scientist of Xerox and director of its Palo Alto Research Center.

JSB
www.johnseelybrown.com

- Having credentials that a computer science geek respects (Chief Scientist, Director Xerox PARC)
- Having publications that the education community validates (he joined the HBR debate on “IT matters to Higher Ed”* in letter to editor)

***HBR May 2003 IT Doesn’t Matter – Nicholas G. Carr**
***Does IT Matter to Higher Education?**
– Jack McCredie, Educause Review Nov02

Apply JSB Insights to CS Game Programming

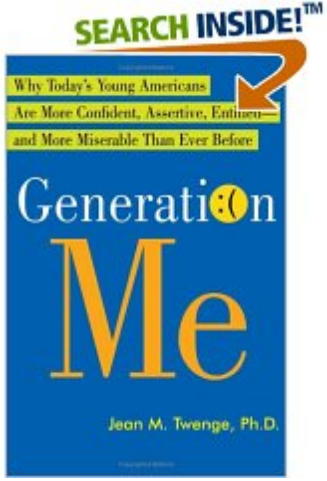
- Students have grown up digital; faculty are analog. I am becoming confortable with saying, “I am a digital immigrant”. (fought it long time)
- Capitalize on creativity by honoring the venacular of today’s students (multimedia-literate)
- Communicate complexity simply (a great skill)
- MIT’s architecture studio – all work in public (development and critique) – in context
- Learning to learn “in situ” is key

Gamer Groups Spr 2006

Great Classroom (AH1112) – Varying Engagement

One girl

Generation ME



- Why Today's Young Americans are more Confident, Assertive and more Miserable than ever before

- Jean M. Twenge, PhD, (Psychology Dept SDSU) colleague

Gen Me -Twenge argues

- Children of the Baby Boomers (post WW2/pre Vietnam generation who discovered *self)*
- Gen Me raised to have high self-esteem [surveys show feel their lives controlled by outside forces, yielding apathy and cynicism]
- USA: Equality revolution over past 4 decades (1965 Selma march) for minorities, women, gays and lesbians means Gen Me members were taught equality. Still more to do. [Internet in 1965?]
- GenMe feel entitled, but no strong sense of duty
- GenMe less likely to believe in moral absolutes.

ED CENTER ON COMPUTATIONAL SCIENCE & ENGINEERING ENGAGES PEOPLE IN CYBERINFRASTRUCTURE

DR. KRIS STEWART, DIRECTOR

For over eight years, the Education Center on Computational Science & Engineering (ECCSE) promoted the use of high performance computing and its support systems at San Diego State University. The ECCSE originally formed in 1997 as a partnership activity with the San Diego Supercomputer Center's National Partnership for Advanced Computational Science Infrastructure (NPACI) grant from the National Science Foundation (NSF). When NPACI ended in 2004, we seized the opportunity for a new partner with Boston University and its efforts to support science education. We received NSF funding as part of the Engaging People in CyberInfrastructure (EPIC) grant, which is one of the first funded projects from the NSF Office of CyberInfrastructure (OCI).
http://www.nsf.gov/awardsearch/showAward.do?AwardNumber=0520146

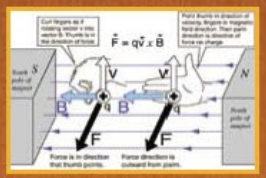
For our participation we proposed researching how to use the current game engines as a platform to develop education modules to support high school science instruction. We collaborated with two science teachers from Hoover High School, a part of the SDSU Education Collaboratory. Mr. Robert North teaches chemistry and Mr. Hal Cox physics. Both teachers were asked to identify a concept from their curriculum, along with its corresponding California State Standard, that they felt would be aided by a three-dimensional, computer-generated interaction module. We also explored the wide world of computer game engines and chose the Torque Game Engine (TGE) from GarageGames.com based on its broad user community, its effectiveness as a development platform on the personal computer, and its attractive cost of $100 for an Independent Developer License. We also had a partnership with the Visualization Team at the San Diego Supercomputer Center, who used the Torque Game Engine to develop modules to explore science.

Our development team at SDSU included a professor of computer science, Kris Stewart, staff resources specialist, Kirsten Barber, and two computer science majors as programmers, John Nguyen and Skylar Hayes. Our first project was to visualize a simple molecule to demonstrate the power of the nuclear force, a required topic from the California State Chemistry Standard. Nuclear processes are those in which an atomic nucleus changes, including radioactive decay of naturally occurring and human-made isotopes, nuclear fission, and nuclear fusion. As a basis for understanding this concept, students know protons and neutrons in the nucleus are held together by nuclear forces that overcome the electromagnetic repulsion between the protons.
http://www.cde.ca.gov/be/st/ss/scchemistry.asp

NAL SCIENCE & ENGINEERING FRASTRUCTURE

After establishing what would be beneficial for Mr. North's students, our student programmers began developing a module for a "Virtual Field Trip to the Lithium Battery." After several iterations with Mr. North, the computer model was refined. The Ed Center team accompanied Mr. North during his presentation regarding our partnership at the August 2005 Chemistry Teacher In-Service workshop for San Diego City Schools.

Mr. North used this module in the computer labs at Hoover High School for his students to learn about nuclear force.



Next we worked Mr. Hal Cox to find an appropriate 3-D model to support concepts his students had difficulty with in physics. Electric and magnetic phenomena, the required topic Mr. Cox selected, are related and have many practical applications. As a basis for understanding this concept, students know the magnitude of the force on a moving particle (with charge q) in a magnetic field is qvB sin(a), where a is the angle between v and B (v and B are the magnitudes of vectors v and B, respectively), and students use the right-hand rule to find the direction of this force.
http://www.cde.ca.gov/be/st/ss/scphysics.asp

Our preliminary modules are available for download to an IBM PC computing platform as a zip-file from Virtual Field Trip to a Lithium Battery:
http://visservices.sdsc.edu/projects/explore/LitBattery.php

Hosted by the Visualization Services Group at the San Diego Supercomputer Center.

TORQUE GAME ENGINE

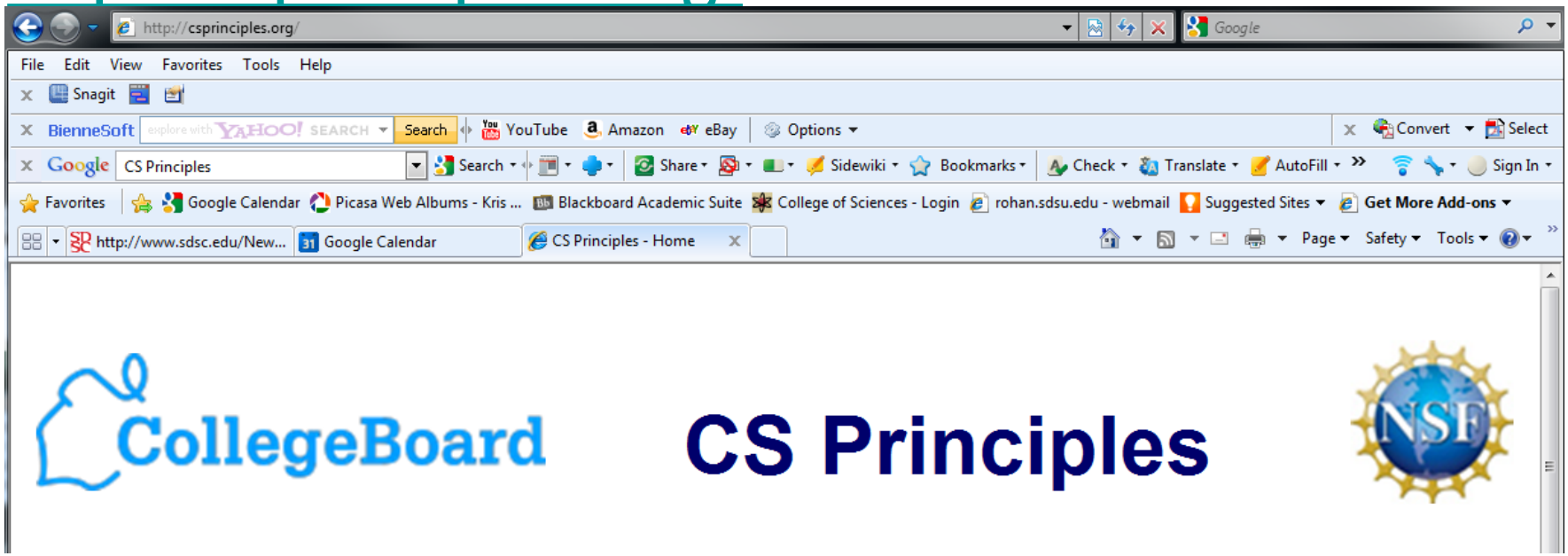
References

- **SUE** http://portal.acm.org/citation.cfm?id=224209 SC95 Proceedings
- **STEP** http://www.stewart.sdsu.edu/SC97/ (Stewart archive from SC97 CD)
- **NPACI** http://www.sdsc.edu/pub/envision/v14.1/edcenter.html
- **KUCSEC** http://www.stewart.sdsu.edu/KUCSEK/(Stewart online archive)
- **EPIC** http://portal.acm.org/citation.cfm?id=1516586 (3D game programming as service learning for CS majors)
- **CyberBridge** **http://www.scivee.tv/node/19189** (3:20 of my pitch to schools)
- **CSTA** http://www.csta.acm.org (Computer Science Teacher Assn)
- **Wayback Machine** (Bullwinkle and Rocky) http://www.stewart.sdsu.edu/step/wayback_machine.html
- **Scout Report** http://scout.wisc.edu/
- **ACM Tech News** http://technews.acm.org
- **Alice** **http://alice.org/**

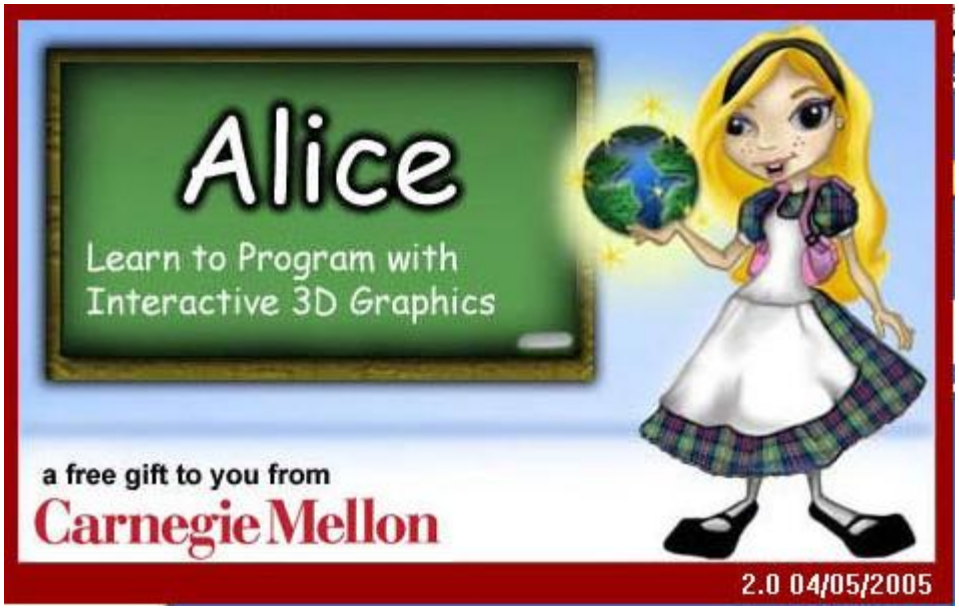
My References (illustrated)

CS Principles – CS100 for university and AP for the high school and background for middle school … and the public.

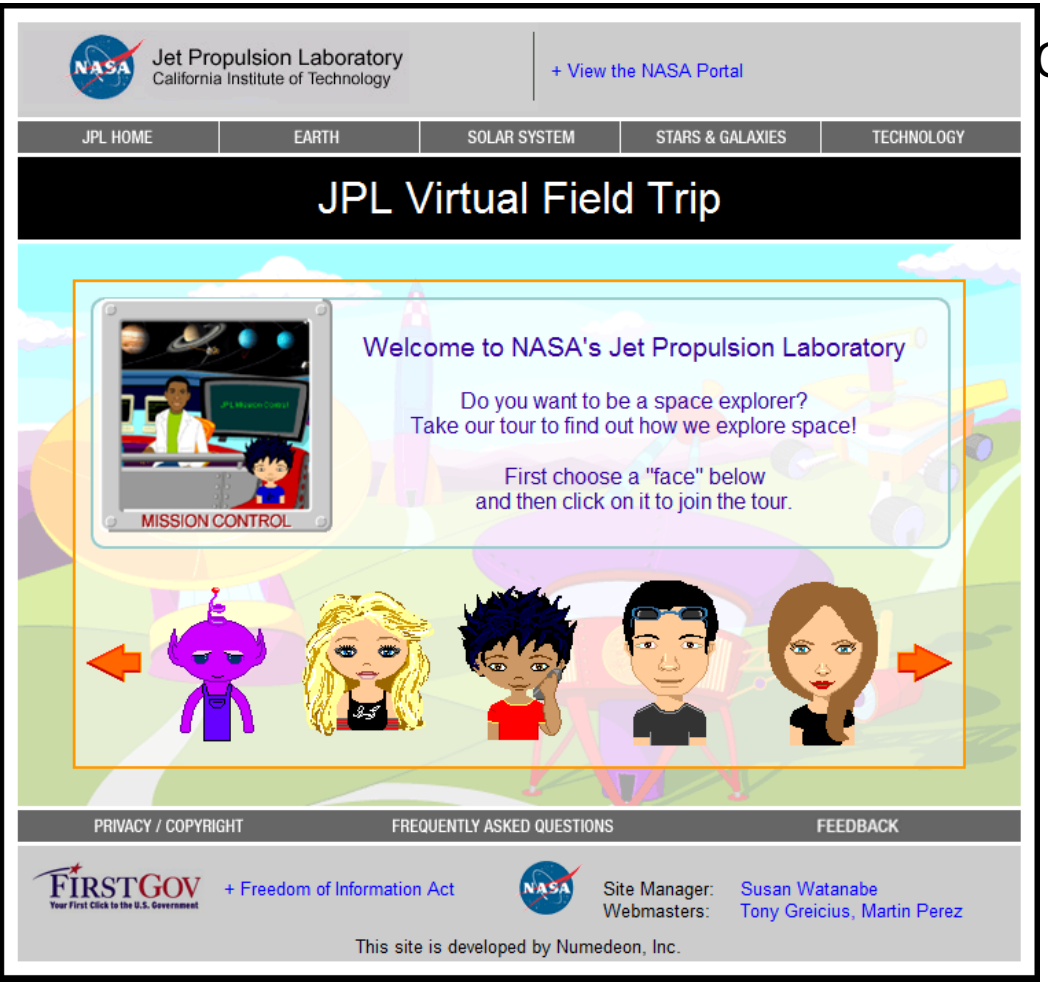
http://csprinciples.org/



http://alice.org/



Programming for Middle- and High-school

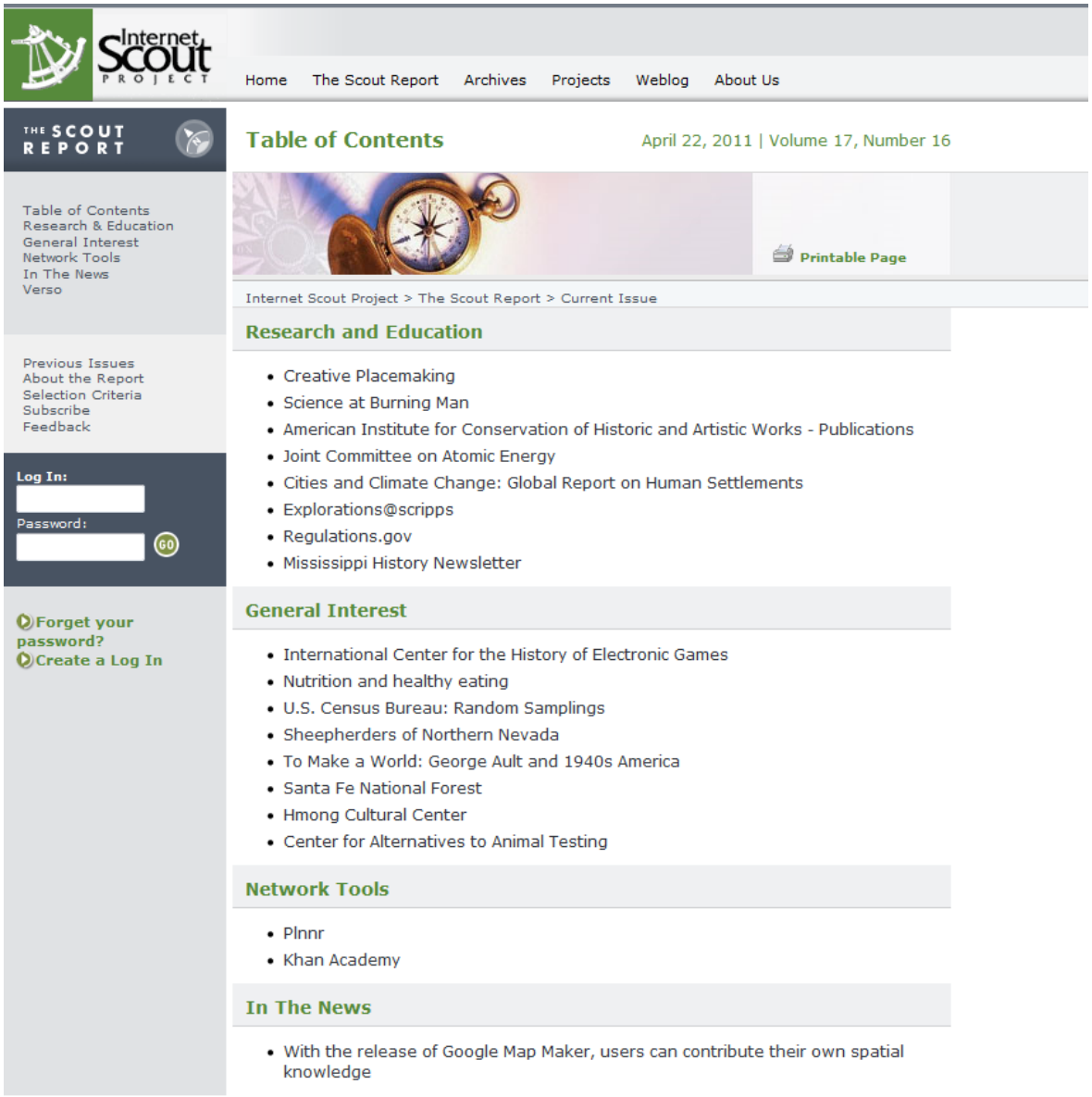


Computer Science Teachers Association

http://www.csta.acm.org

Computer Science Education Week (CSEdWeek)
U.S. Congress [Grace Hopper Birthday week each year 05Dec]

http://scout.wisc.edu/Reports/ScoutReport/



http://www.stewart.cs.sdsu.edu/step/wayback_machine.html

ferry victoria bc to washington

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Favorites Sugg... Get ... Coll... Goog... Goog... Blac... roha... CS 5... Kris... Pica...

10aug2007_re... BC Ferries - Br... Mr. Peabo... http://cohofe...

Page Safety Tools

Mr. Peabody and his boy Sherman
WayBack Machine by Kris Stewart

Upd: 29May2010

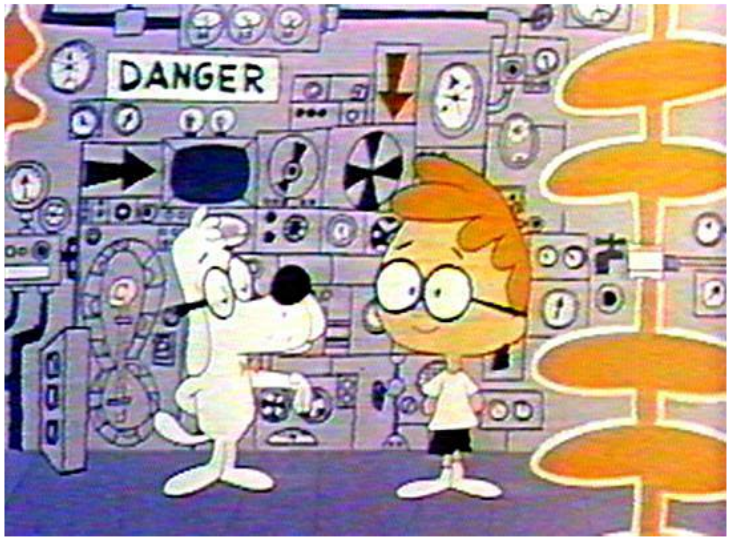
The www.archive.org/, WayBack Machine

The WayBack Machine, is an Internet archive that keeps track of "the internet" in its entirety, by year. By entering a URL, you may find web page that you remember "used to be there" but is "unfound" now.

en.wikipedia.org/wiki/The_Rocky_and_Bullwinkle_Show [wikipedia]

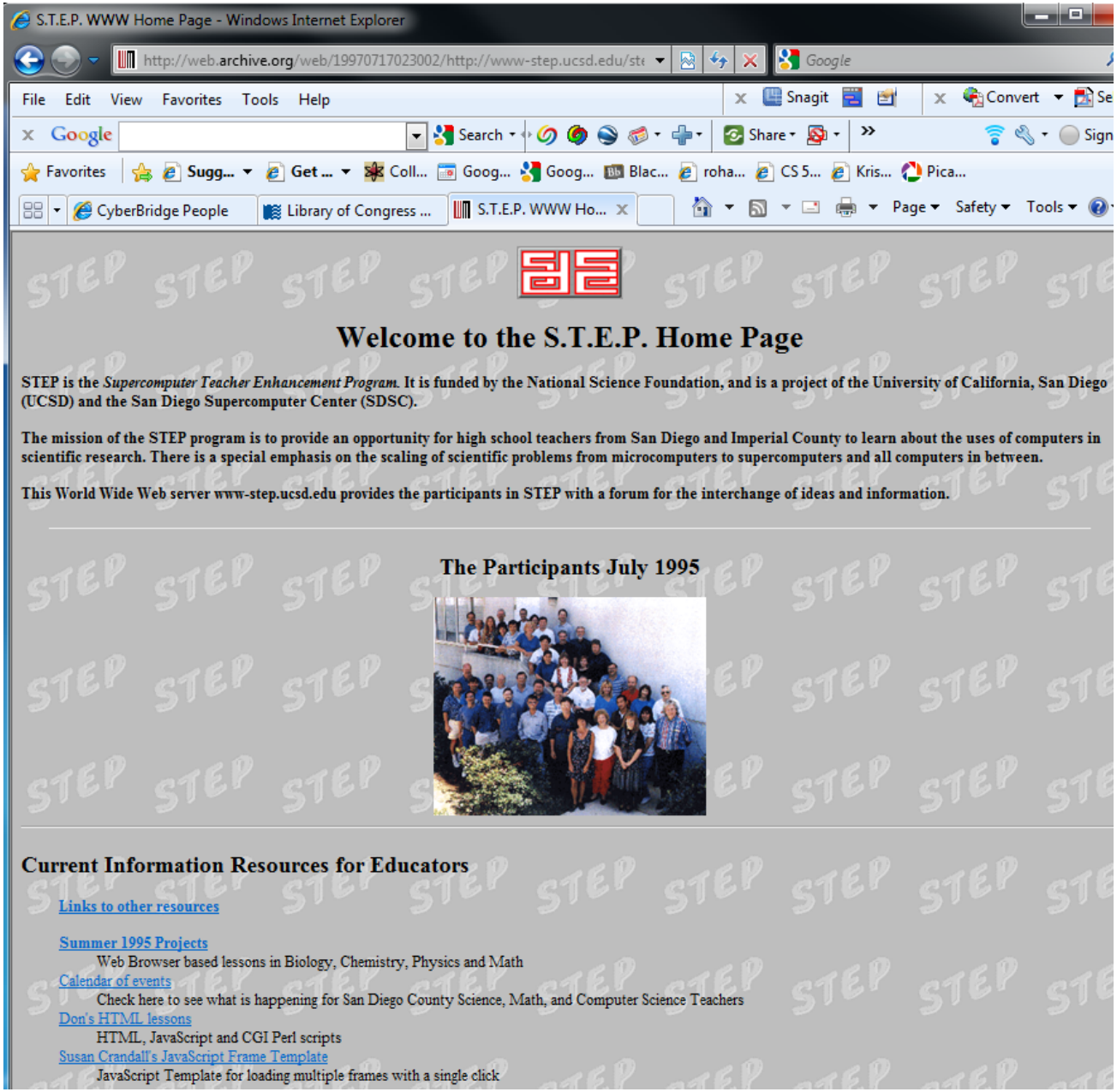
Kris Stewart (formerly Wendy Beard) is a big fan of the cartoon Rocky and Bullwinkle. I always liked Bullwinkle best, Rocky was just too goody-two-shoes for me. Second best was Dudley Do Right of the Mounties. I guess I was destined to marry a Canadian, eh?

en.wikipedia.org/wiki/Mister_Peabody was created by Ted Key.



Mr. Peabody and his boy Sherman in front of the WayBack Machine preparing for another **Peabody's Improbably History** adventure.

Note: URL indicates the Wayback Machine



http://web.archive.org/web/19970717023118/www-step.ucsd.edu/step/

STEP Participants

Ana Alvarez
Counselor at Hoover High School
Don Anderson
UCSD faculty, STEP Principal Investigator
Bobbie Ball
Chemistry Teacher at Bonita Vista High School
Steve Bartram
Marine Science Teacher atRancho Buena Vista High School
Diana Bentley
Biology Teacher at Mira Mesa High School
Peter Burrell
Math Teacher at Scripps Ranch High School
John Cavanaugh
Physics and Chemistry Teacher at San Pasqual High School
Hal Cox
Physics & Chemistry Teacher at Hoover High School
STEP Lead Teacher
Susan Crandall
Biology Teacher at Escondido High School
Olin Elliott
Math teacher at Moutain Empirre High School
STEP Lead Teacher
Mark Falvo
Math, Chemistry & Physics Teacher at Morse High School
Lynne Gordon
Biology Teacher at San Diego High School
Dave Harlow
Computer Teacher at Gompers Secondary School
STEP Lead Teacher
Barton Hays
Biology and Marine Science Teacher at Morse High School
Henry Herms
Earth Science Teacher at LaCosta Canyon High School
John Hoang
Math Teacher at Hoover High School
Jay Klopfenstein
Biology Teacher at Valley Junior High
Susan Lafo
Chemistry Teacher at Mountain Empire High School
Jeffery Mandrake
Science Teacher at Gompers Secondary School
Jay Maness
Chemistry Teacher at Southwest High School
Joe Murray
Physics and Physical Science Teacher at Oceanside High School.
Robert North
Chemistry Teacher at Hoover High School
Andres Parra
Math and Environmental Science Teacher at Mar Vista High School
Isabel Pereira
Mathematics teacher at Denbigh High School.
Paul Pucci
Math and Computer Applications Teacher at Scripps Ranch High School
Chesley Ross
Biology Teacher at Escondido High School
Cheri Rossi
Biology Teacher at Morse High School
Michael Sixtus
Chemistry Teacher at Mar Vista High School
Larry Steinbrecher
Physics Teacher at Mira Mesa High School
Kris Stewart
Associate Professor of Mathematical Sciences at San Diego State University
STEP Curriculum Coordinator
Home Page on SDCC14 at UCSD
Tim Towler
Biology Teacher at San Diego High School
STEP Lead Teacher
Home Page on SDCC14 at UCSD
Tien Trieu
Math Teacher at Hoover High School
Phill Vanderschaegen
Biology Teacher at San Pasquel High School
Steve Wavra
Biology Teacher at Southwest High School
Anna Wilder-O'Neil
Chemistry Teacher at LaCosta Canyon High School
Karen Woodworth
Chemistry teacher at Ramona High School
Roger Wynn
Science Teacher at Mountain Empire Junior High
Bob Zakoski
Chemistry and Computer Science Teacher at San Dieguito High School and UCSD
STEP Lead Teacher
Paul Zeigler
Physics Teacher at Carlsbad High School.

Last Updated July 19, 1996 by Tim Towler

How the Ed Center on CS & Eng used 3D Game Programming as Service Learning

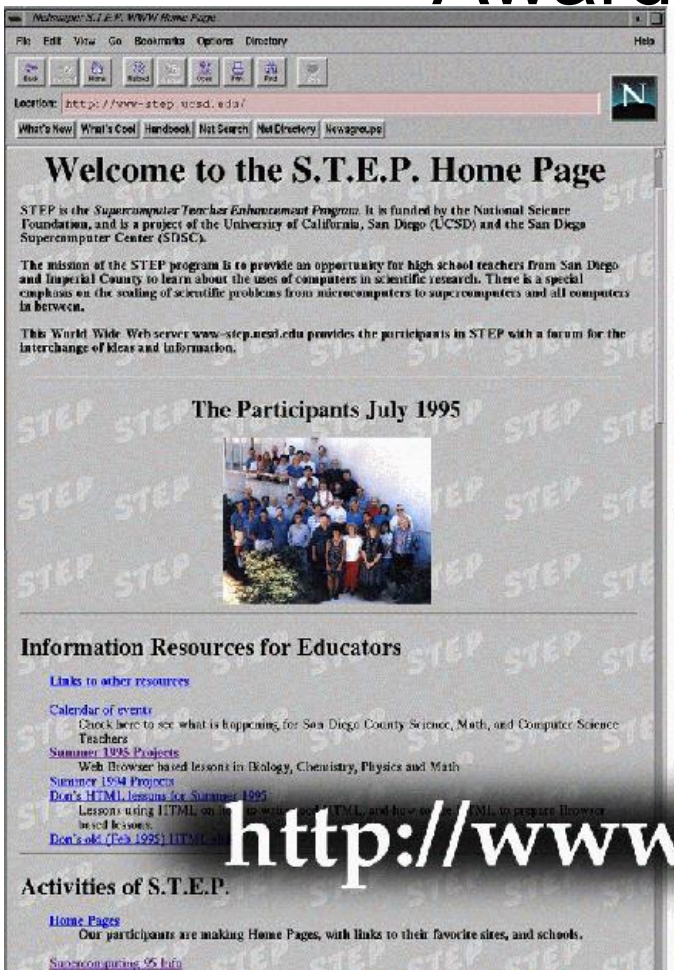
- Hoover High School collaborators, Mr. Hal Cox (physics) and Mr. Robert North (chemistry)
- Both former STEP teachers

  Supercomputer Teacher Enhancement Program (1993-1996) teams of teachers from same school

  – Key point was the adoption of Web Browser in school curriculum in 1994

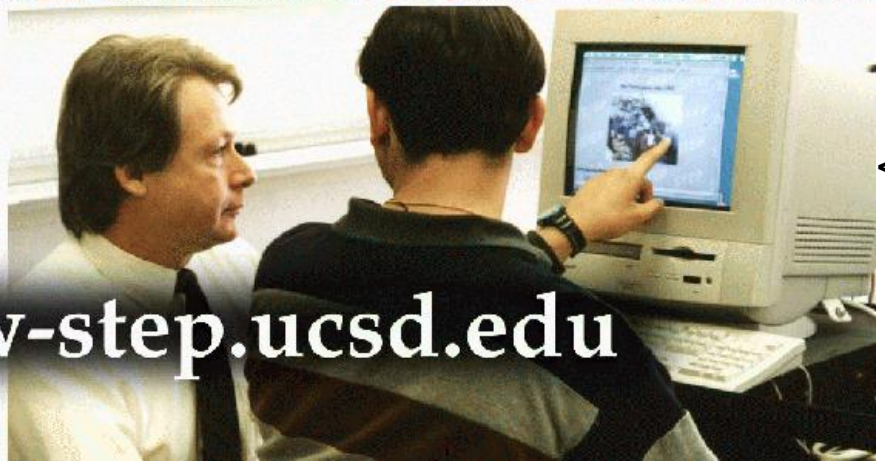
  – Support from local infrastructure for network/computers in the classroom

1996 ComputerWorld/Smithsonian InfoTech Award for STEP



<Robert

<Hal



<Robert

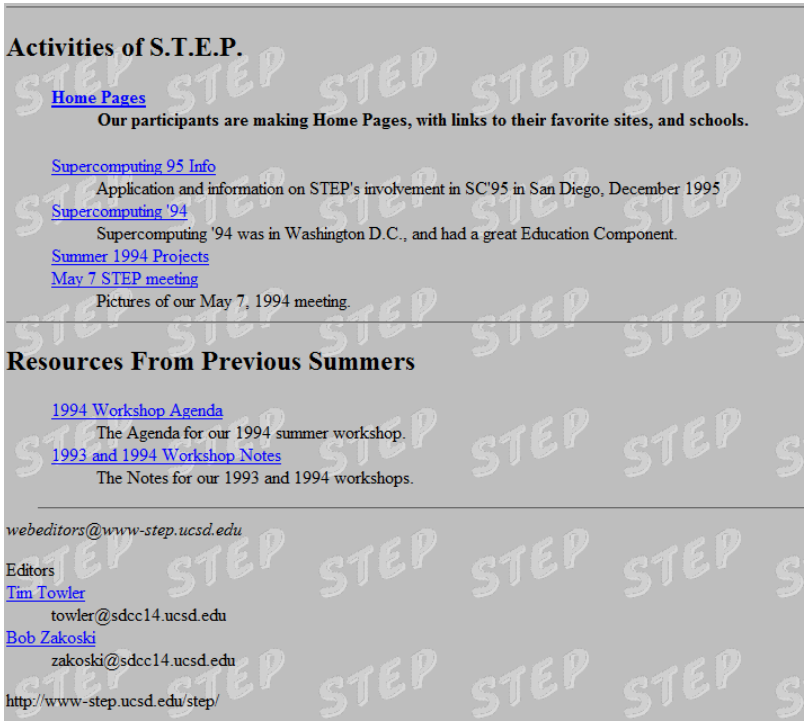
http://www-step.ucsd.edu

Web Page Development Adopted Quickly

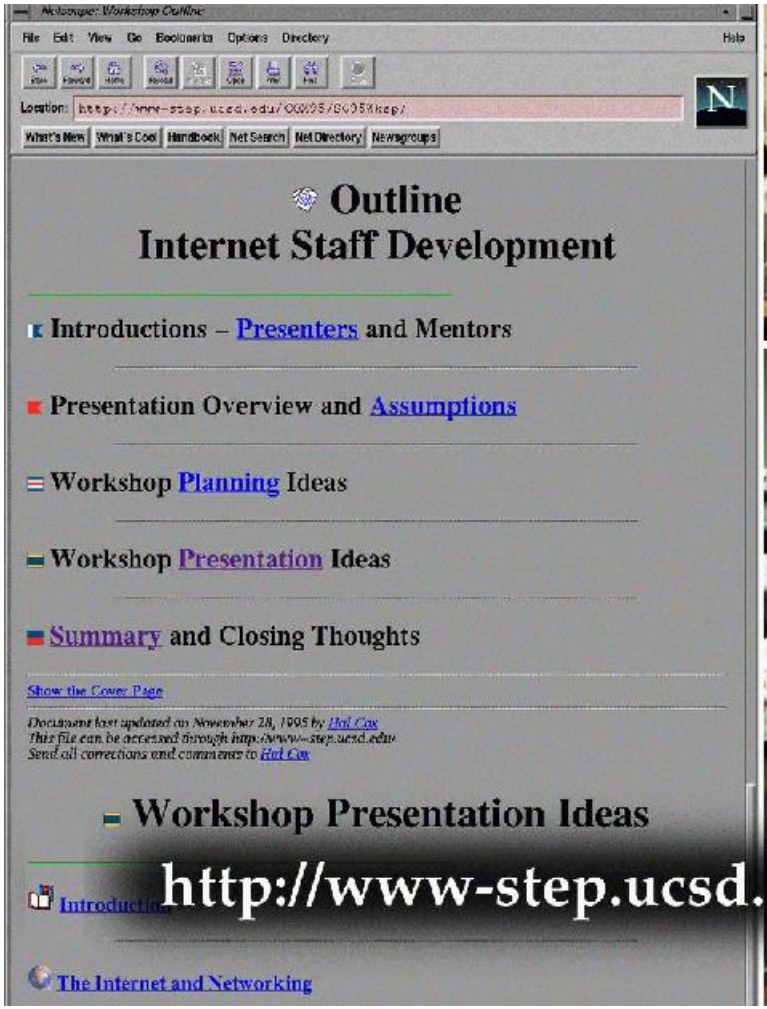
(wouldn't you prefer to have this young man on campus in the computer lab, rather than …)

Do you have old links?

http://replay.web.archive.org/19970717023002/http://www-step.ucsd.edu/step/



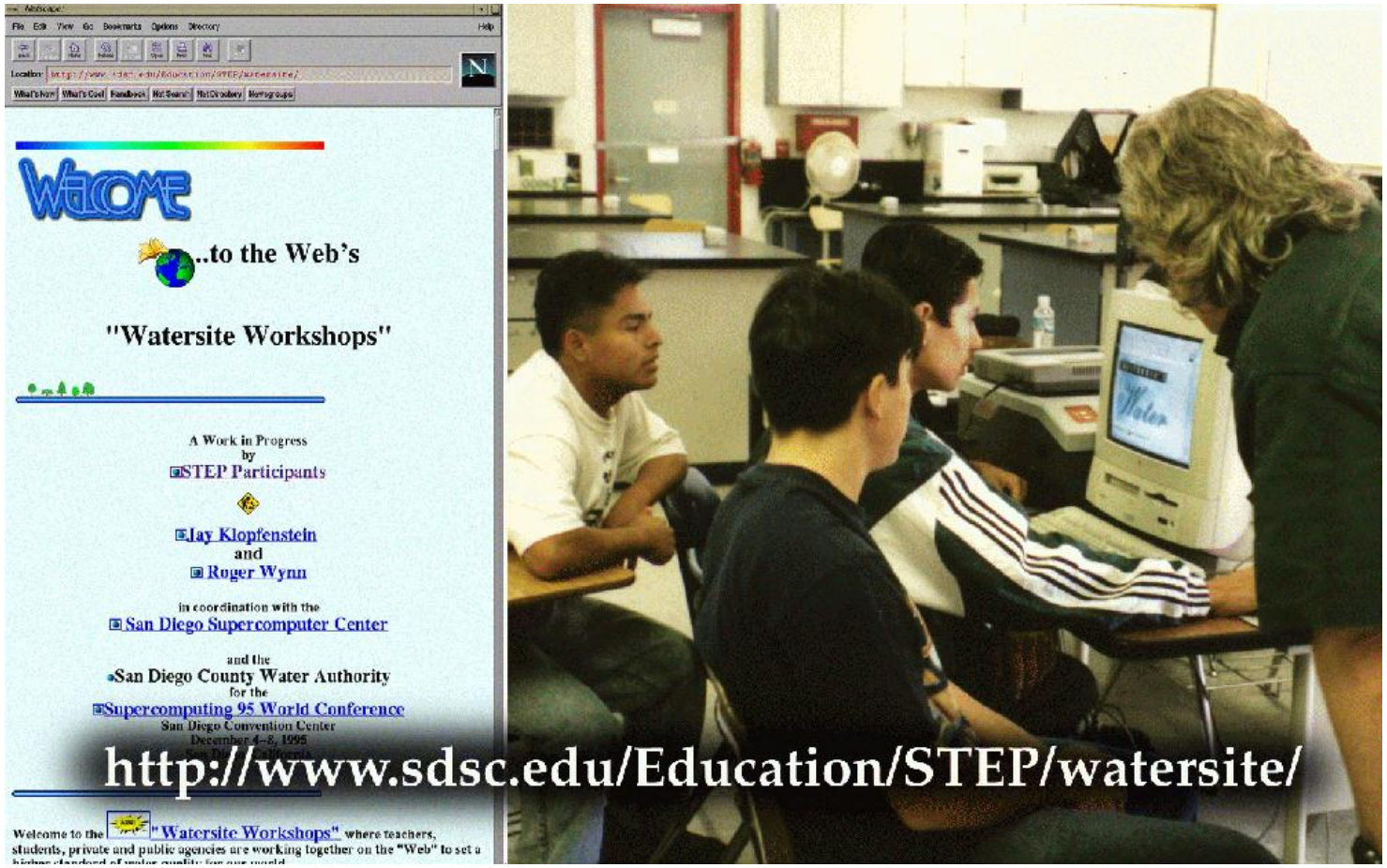
STEP Lead Teachers (Hal Cox)



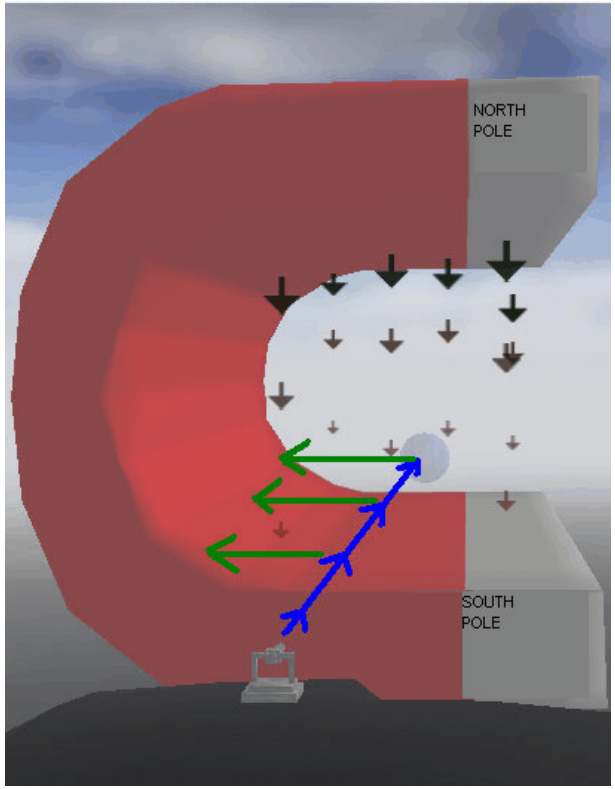
http://www-step.ucsd.edu/COX95/SC95Wksp/

Computing Power a Decade Ago

(look familiar to you, or were you born digital?)



ECCSE collaboration with SDSC's Steve Cutchin using Torque



Score increases. Also magnet rotates after each successful "hit", challenging the player to make the appropriate correction for the magnetic force effect.

Try out their "Assignment Antarctica" and model archives

EPIC Grant: Visualize Education

as service learning

My students described their project to Mr. North:
"It's a First Person Shooter…"
Robert's face goes white
Afterwards discuss term FPS with students.
Though standard term in game industry, have you heard of Columbine?
http://en.wikipedia.org/wiki/Columbine_High_School_massacre

Put yourself in shoes of clients – see from their point of view – First Person Point of View

California State Standard Exam Topic

5n: Electric and Magnetic Phenomena

Electric and magnetic phenomena are related and have many practical applications. As a basis for understanding this concept: *n Students know* the magnitude of the force on a moving particle (with charge q) in a magnetic field is qvB sin(a), where a is the angle between v and B (v and B are the magnitudes of vectors v and B, respectively), and students use the right-hand rule to find the direction of this force.
[http://www.cde.ca.gov/be/st/ss/scphysics.asp]

Luxo, Jr. Pixar

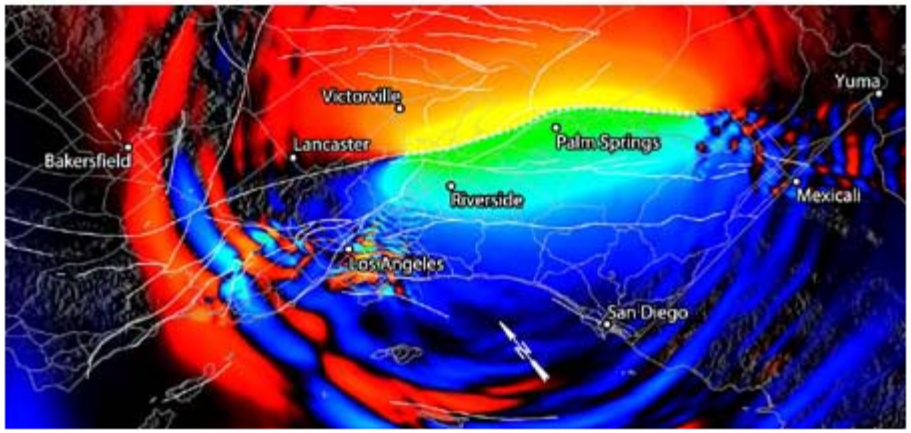
http://youtu.be/qGxoui3IFS0

SDSC Visservices returned from SigGraph98 with these shorts – amazing emotion

SDSC Simulation of SoCal Earthquake
(Terashake)

01.23.06
TeraShake 2: Simulating Earthquakes for Science and Society

SDSC Helps SCEC Simulate Magnitude 7.7 Earthquake on San Andreas Fault



Instantaneous movement in the fault-parallel x direction, 110 seconds after the start of the northwest-moving rupture on the San Andreas Fault near the Salton Sea. Note the continued shaking in the sediment-filled Los Angeles basin well after the initial earthquake waves have passed. Simulation: SCEC scientists Kim Olsen, Steven Day, SDSU et al; Yifeng Cui et al, SDSC/UCSD. Visualization: Amit Chourasia, SDSC/UCSD.

http://www.sdsc.edu/News%20Items/PR0123061.html

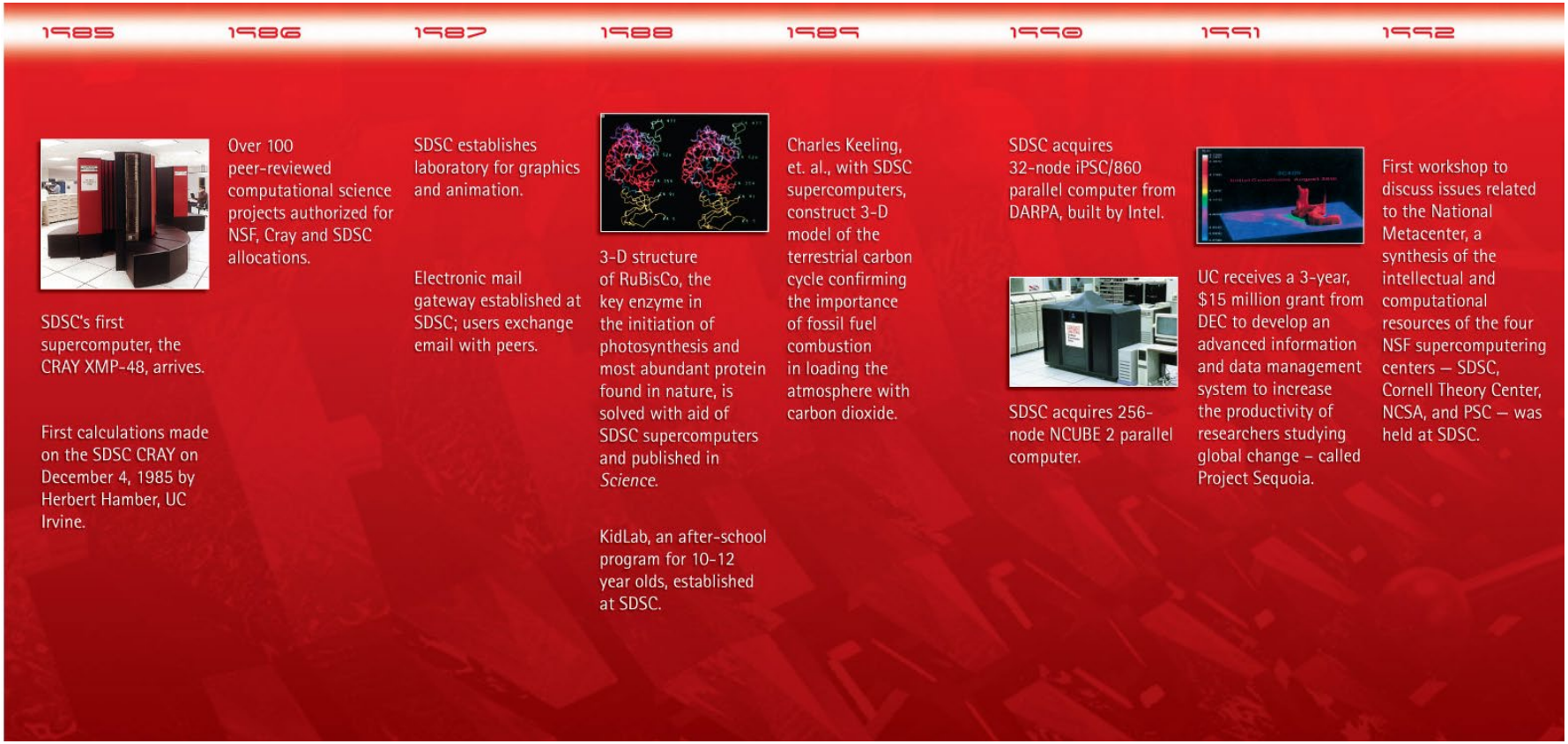
http://visservices.sdsc.edu/projects/scec/terashake/movies/Terashake2.1-volume.Vy-800.map.wmv

SDSC 25 yr timeline 1985-1992 – 1of8

(brought 20 free flyers for UNM CyberDay 2011 attendees)

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 yr timeline 1985-1992 -1bof8



www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 yr timeline 1993-99 – 2of8

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 year timeline 1993-99– 2bof8

1993

CRAY C90 supercomputer arrives at SDSC; officially installed during November press briefing.

1994

NIH approves $3.286M to SDSC to fund the National Biomedical Computation Resource (NBCR).

Thinking Machines CM-2 arrives at SDSC to support UCSD education and research.

1995

For the first time, SDSC harnesses the power of a new very high-speed network (vBNS) by distributing portions of a computation across high-performance computers located on the east and west coasts.

Chris Mihos and Lars Hernquist of UC Santa Cruz collaborate with computer artists at NCSA, using computational resources at SDSC CRAY C90, to create high-resolution images of a galaxy encounter for IMAX cosmic voyage, which debuts at the Smithsonian National Air and Space Museum in D.C.

1996

A model of the nicotinic acetylcholine receptor is developed by Igor Tsigelny, Naoya Sugiyama and Palmer Taylor at UCSD/SDSC, in collaboration with Steven Sine at the Mayo Foundation; enzyme is a target for addictive activity from nicotine.

CRAY T3E supercomputer installed at SDSC.

1997

SDSC publishes "Women in Science," featuring bios of women who had a career in, or made significant contributions, to a scientific discipline.

1998

The Storage Research Broker (SRB) 1.1 is released as "middleware" to hold together data cache sites from NPACI, led by SDSC. The SRB software is built on work led by SDSC's Reagan Moore; Chaitan Baru, Michael Wan, Arcot Rajasekar and Wayne Schroeder are members of the original team that developed SRB.

With large-scale computer simulations run at SDSC, researchers led by J. Andrew McCammon at UCSD show how one of the fastest enzymes in the world, acetylcholinesterase, does its work; results are published in the *Proceedings of the National Academy of Sciences.*

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 year timeline – 3 of 8

Animated visualizations made possible for the first time by SDSC's Galactic MPIRE volume-rendering software and *Blue Horizon* are displayed in the all new Hayden Planetarium of the American Natural History Museum on New Year's Eve.

IBM's *Blue Horizon* is delivered to SDSC as the most powerful computer available to the US academic community – capable of 1 trillion FLOPS.

Using sophisticated "backscatter analysis", CAIDA researchers track the progress of a worm dubbed Code-Red Worm, which infected hundreds of thousands of Web servers around the world.

SDSC organzies the first San Diego TEACHERTECH, designed to allow San Diego K-12 teachers to explore and examine different multimedia and web applications for use in the classroom.

Fran Berman becomes director of SDSC.

"The Search for Life: Are We Alone?" – a new space show at the Hayden Planetarium in New York – premiers to rave reviews. SDSC plays a key role in creating a realistic animation showing the birth of our solar system

PRAGMA (Pacific Rim Applications and Grid Middleware Assembly), launched during a workshop at SDSC and funded by NSF, shows how relationships and expertise developed to tackle computational research could also help thousands of SARS patients in Taiwan.

Mike Norman, and colleagues at Center for Astrophysics and Space Sciences at UCSD, run the world's largest and most complex scientific simulation of the evolution of the universe ever performed.

SDSC's High Performance Storage System (HPSS) reaches the milestone of one petabyte of stored data.

Data experts at SDSC collaborate with American Red Cross to help locate missing loved ones in the wake of Hurricane Katrina; results in "Safe and Well" website.

CENIC announces that the first production 10 Gigabit Ethernet campus connection in the U.S. has been installed from UCSD.

SDSC launches DataCentral, the first program of its kind to support large community data collections and databases.

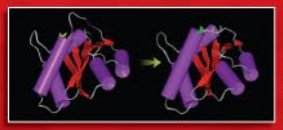
2000 2001 2002 2003 2004 2005

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 year timeline – 3b of 8

1999

The HPC Systems group completes the first installation of a user file system that is greater than one terabyte in capacity.



Molecular dynamics simulations, led by J. Andrew McCammon at UCSD, show how to attack a third enzyme target integrase, a crucial enzyme used by HIV to replicate; research led to the development of Isentress, an anti-AIDS drug marketed by Merck.

2000

A map showing possible paths an email message might take in the Internet, created by the skitter tool developed at CAIDA at SDSC, makes the cover of *Nature*.

SDSC-developed storage and visualization technologies – integrated into a National Library of Medicine project – create one of the largest-ever medical image databases.

NSF awards $2.3 million, three-year grant to UCSD to create, demonstrate, and evaluate a non-commercial prototype, high-performance wide-area wireless network for research and education (HPWREN)—a multi-institutional collaboration led by Hans-Werner Braun at SDSC and Frank Vernon at SIO.

2001

NSF establishes TeraGrid to support world-class scientific discovery and education through a grid-based cyberinfrastructure; SDSC is one of the founding sites.

A team led by Vincent Crespi at Penn State used computer simulations and resources at SDSC to discover carbon fibers with mechanical strength comparable to a diamond – strong and stiff carbon tubes called nanotubes.

2002

The first analysis of the potential impacts of climate change for an entire country, Mexico, is reported in a paper published in *Nature* by a team that included researches from SDSC.

2003

The TeraGrid enters production with two clusters installed at SDSC: IBM/Intel IA-64 TeraGrid Phase 1 Cluster and IBM/Intel IA-64 TeraGrid Phase 2 Cluster.

2004

Scientists led by UCSD's J. Andrew McCammon use molecular simulations and SDSC resources to identify a potential mechanism underlying the drug resistance of the worst mutant HIV strain; in same work, the researchers identify a separate region of protease enzyme that might serve as new drug target.

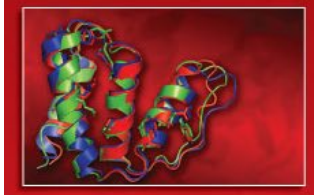
SDSC is the first academic institution in the world to install the new IBM eServer Blue Gene Solution computing system.

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 year timeline – 4 of 8

2006

NARA and SDSC, with concurrence from NSF, sign a landmark MOU that provides an avenue for preserving valuable digital data collections; first time NARA establishes an affiliated relationship for preserving digital data with an academic institution.



Researchers at SDSC – working with colleagues at the University of Washington – achieve the largest-ever protein structure prediction and complete the simulation in less than three hours.

2007

UCSD/SDSC researchers zero in on causes of Parkinson's disease, Alzheimer's disease, and other neurological disorders with a computer model featured on cover of the *Federation of European Biochemical Societies Journal (FEBS)*.

SDSC releases version 0.5 of iRODS, the open-source Integrated Rule-Oriented Data System, which represents a new approach to digital data management.

2008

The source of spider silk's strength, as strong as steel, is simulated by MIT scientists in collaboration with applications scientist Ross Walker at SDSC, on SDSC's IBM Blue Gene/L supercomputer.

A team led by Laura Carrington at SDSC successfully completes a record-setting, petascale-level simulation of the earth's inner structure; a finalist for Gordon Bell Prize.

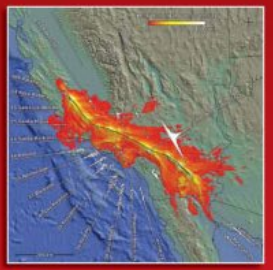
2009

SDSC awarded 5-year, $20 million grant from NSF to build *Gordon*, a powerful supercomputer featuring "flash memory" and "supernodes" to solve critical data-intensive science problems.

SDSC unveils *Dash*, a "flash-memory-based" supercomputer to accelerate solutions for data-intensive science problems.

2010

The CIPRES portal, used to help researchers track evolutionary relations among species, becomes the most heavily used portal in the TeraGrid, accounting for 20% of active TeraGrid users during the first quarter of 2010.



Researchers at SDSC, SDSU and UCSD create the largest-ever simulation of a Magnitude 8 earthquake, primarily along the southern section of the San Andreas fault.

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

SDSC 25 year timeline – 4b of 8

2005

SDSC receives $2.2M award from NIH to provide Next Generation Biology Workbench, building on the work of the "Workshop" concept developed by Shankar Subramaniam at UCSD/SDSC.

Astrophysicist Richard Klein from UC Berkeley and others use simulations run at SDSC to explode one of two competing theories about how stars form inside immense clouds of interstellar gas; results published in *Nature*.

2006

Firefighters facing fast-spreading wildfires urgently request cyberinfrastructure resources from HPWREN to help combat the "Horse Fire" in Cleveland National Forest.

The most true-to-life computer simulation ever made of our sun's corona – created by researchers at Science Applications International Corp., with the help of SDSC resources – successfully predicted its actual appearance during the total solar eclipse of March 29.

2007

A team of researchers from NCAR, SDSC, LLNL and IBM Watson, led by Allan Snavely at SDSC, set U.S. records for size, performance, and fidelity of computer weather simulations, modeling the kind of "virtual weather" that society depends on for accurate weather forecasts; a finalist for Gordon Bell Prize.

Science is coming to the YouTube generation with the advent of "SciVee," a collaboration between the NSF and SDSC, under the direction of Phil Bourne, UCSD/SDSC.

2008

SDSC dedicates a new, energy-efficient building extension as a key resource for UC San Diego and beyond.

CAIDA researchers Dmitri Krioukov and kc Claffy, along with Marián Boguñá (Universitat de Barcelona), reveal in *Nature Physics* a previously unknown mathematical model called "hidden metric space" that may explain the "small world phenomenon," offering a potentially more efficient way to pass messages on the Internet.

2009

SDSC officially launches the *Triton Resource*, an integrated data-intensive computing system primarily designed to support UCSD and UC.

SDSC completes a comprehensive upgrade to its tape-based archival storage capacity, increasing its total to 36 petabytes, the largest digital storage capacity of any academic center in the world.

2010

Mike Norman named SDSC director.

SDSC launches a volunteer internship program for high school students – Research Experience for High School Students (REHS) – to help them gain experience in a particular area of computational research.

SDSC installs *Trestles*, a 100-Tflop/s computer funded by NSF and designed to increase productivity for a broad spectrum of users.

www.sdsc.edu/Gallery/images/vs_timeline_hi.jpg

Informed Citizenry

http://www.humanmedia.org/catalog/player/playsingle.php?f=excerpts/151_informed_republic_1.mp3

Large set of curricula at related site

http://www.icivics.org/

Addresses journalism vs. "local TV news" as a source of information and the "fall of newspapers"

Sid Karin

- Member, National Science Foundation Technical Advisory Group for Supercomputer Centers, 1984-1985
- Founder/Director SDSC, 1985-1995 (?)
  Stewart SDSC Steering committee member had front row seat
- Founder/Director NPACI, 1996-2001
  Distinguish SDSC through data stewardship for National Partnership for Advanced Computational Infrastructure response to NSF's PACI solicitation

Reagan Moore, SRB and LoC

NPACI partners

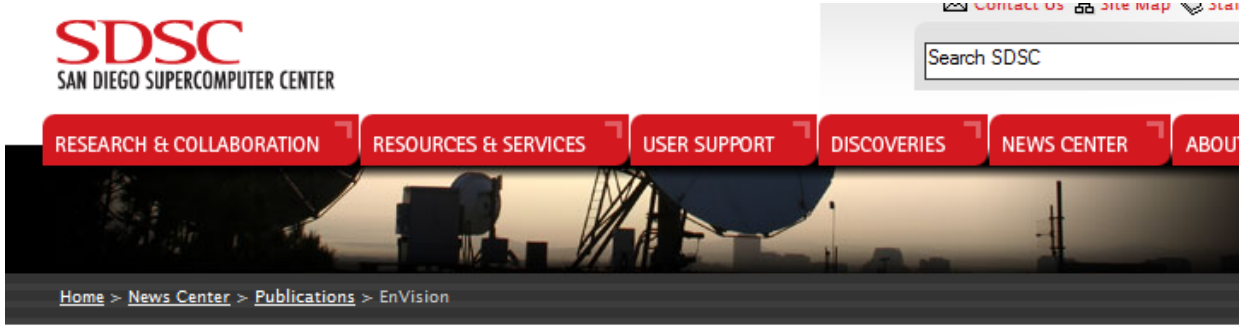
NPACI PARTNERS

University of California, San Diego/
San Diego Supercomputer Center
California Institute of Technology
University of Texas, Austin
University of Michigan
University of California, Berkeley
University of California, Santa Barbara
University of Southern California/Information
Sciences Institute
University of Virginia
Baylor College of Medicine
California State University/San Diego State
University
University of California, Davis
University of California, Irvine
University of California, Los Angeles
The Johns Hopkins University
University of Maryland
Montana State University
University of New Mexico/Long-Term Ecological
Research Network
New York University
Ohio State University
Oregon State University
Rice University
Rutgers, The State University of New Jersey

Salk Institute for Biological Studies
The Scripps Research Institute
Stanford University
University of Tennessee
Washington University
University of Wisconsin, Madison
Center for Advanced Research in Biotechnology
Jet Propulsion Laboratory
Kitt Peak National Observatory
Lawrence Berkeley National Laboratory/National
Energy Research Scientific Computing Center
Lawrence Livermore National Laboratory
Los Alamos National Laboratory
University of Massachusetts
Pacific Northwest National
Laboratory/Environmental Molecular Sciences
Laboratory
University of Pennsylvania
BioComputing Unit, Centro Nacional de
Biotecnología, Madrid, Spain
Parallel Computing Center, Royal Institute of
Technology, Stockholm, Sweden
University of Queensland, Brisbane, Queensland,
Australia
Research Institute for the Management of Archives
and Libraries, University of Urbino, Italy

Sid Karin

Importance of Science Literacy in a Computing World



FROM THE DIRECTOR | Contents | Next

The Importance of Science Literacy in a Computing World

BY
Sid Karin, NPACI Director

The rapid growth of the Internet, the appearance of computers in our cars, homes, and phones, and the convergence of telephone, television, and computing networks are leading up to an environment that I have called the "computing continuum." The emerging continuum, including what's being called the computational grid, affects everyone, whether you have a computer at home or not, by accelerating the dissemination of information at speeds never before possible. This rising tide of information and the increasing presence of technology throughout our society makes scientific and computational literacy more critical than ever for the long-term interests of society.

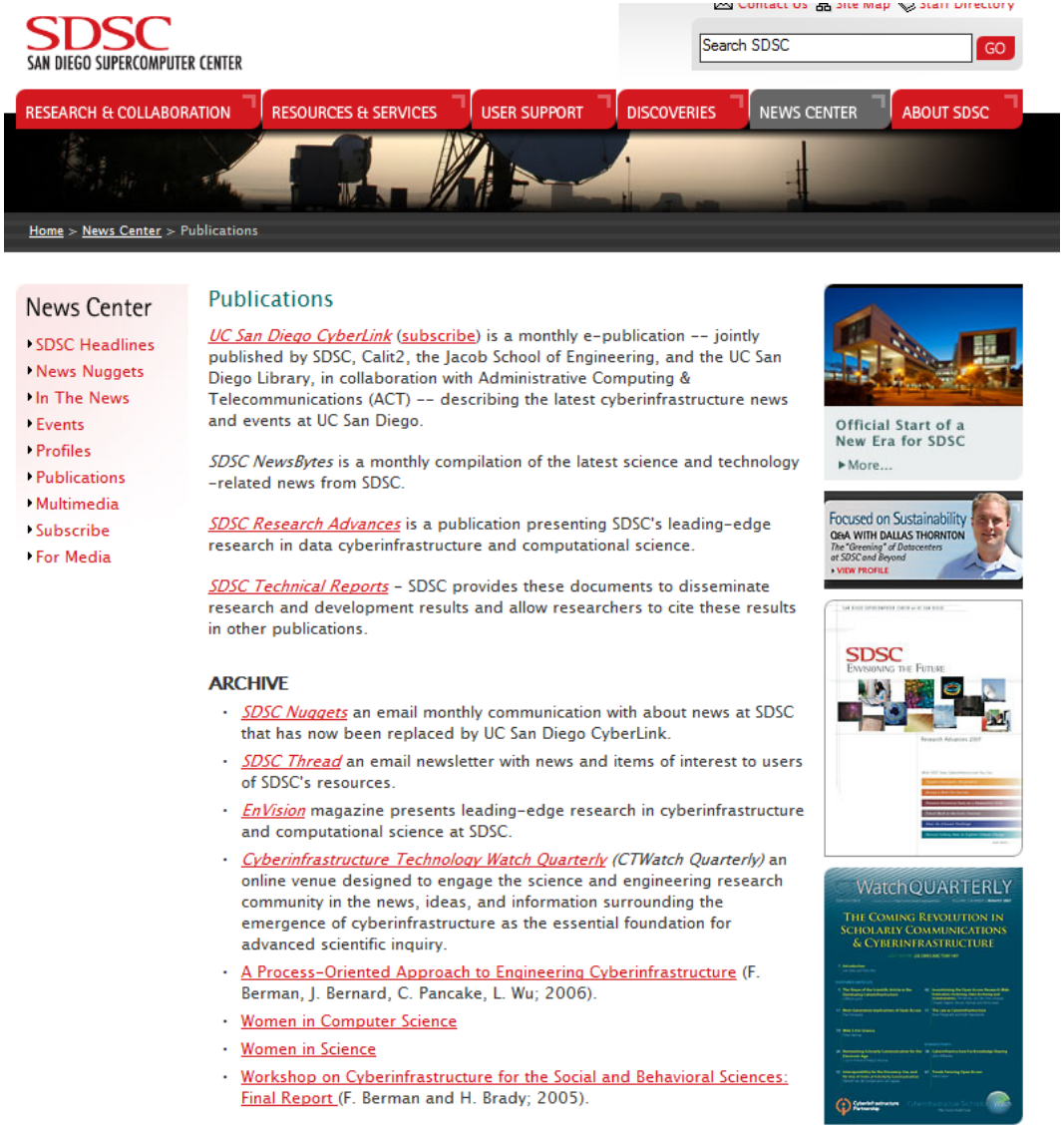
CRITICAL THINKING SHAPING TOMORROW'S WORLD

The National Science Board's Science and Engineering Indicators 1998 report emphasizes the contradictions in American society related to scientific literacy. On the one hand, nearly 80 percent of the public agreed that the federal government should support basic research. On the other hand, only one in five Americans consider themselves very well informed on those issues. Furthermore, according to the report, only one-quarter of Americans understand the nature of scientific inquiry well enough to make informed judgments about scientific results reported in the media.

http://www.sdsc.edu/pub/envision/v15.2/director.html

SDSC Archives online

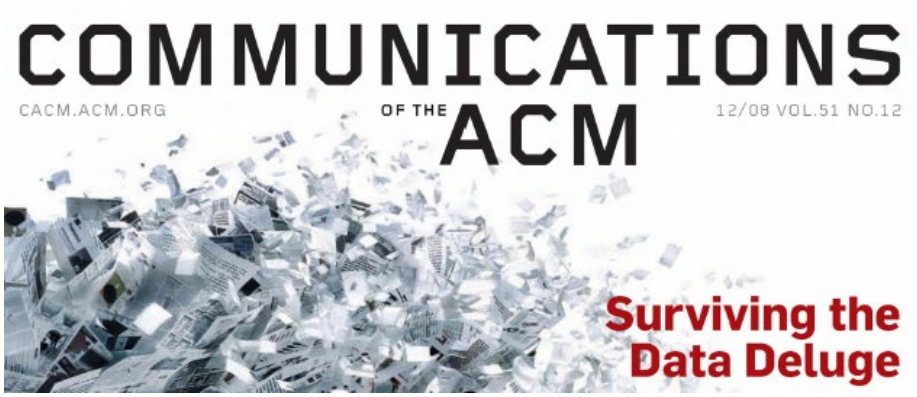
http://www.sdsc.edu/news/Publications.html



Interesting, dynamic overview

Fran Berman, SDSC Director

2001-2009, thoughts on Data Stewardship

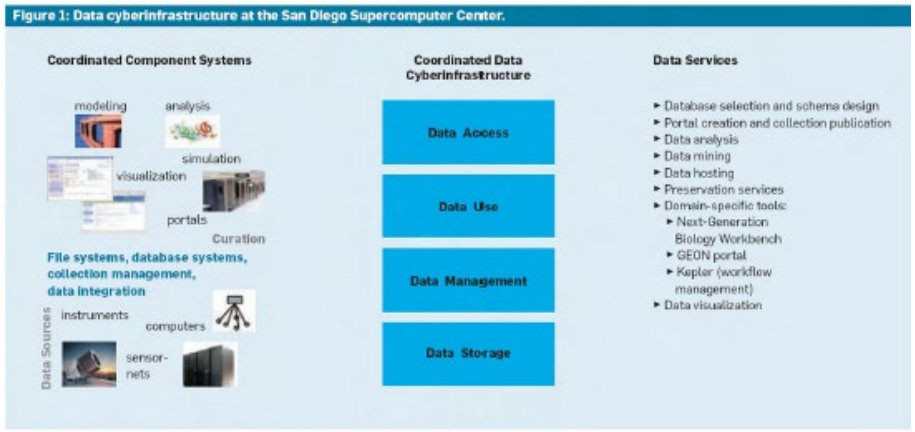


DOI:10.1145/1409360.1409376

Tools for surviving a data deluge to ensure your data will be there when you need it.

BY FRANCINE BERMAN

Got Data? A Guide to Data Preservation in the Information Age



Fran Berman

Now at RPI http://www.cs.rpi.edu/~bermaf/

Digital Data Terms and Conditions

The following definitions are derived from a number of sources, including the American Library Association (www.lita.org/ala/), National Information Assurance Glossary (www.cnss.gov/), and Joint Information Systems Committee Digital Information Briefing Paper (www.jisc.ac.uk):

APPRAISAL
Evaluation and selection of digital material for long-term curation and preservation, documented policies, guidance, and legal requirements may require that it be done securely;

AUTHENTICATION
Security measure designed to establish the validity of a transmission, message, or originator or a means of verifying an individual's authority to receive specific categories of information;

CURATION
Digital curation, broadly interpreted, is about maintaining and adding value to a trusted body of digital information for current and future use. It builds on the underlying concepts of digital preservation while emphasizing opportunities for added value and knowledge through annotation and continuing resource management;

DIGITAL RIGHTS MANAGEMENT
The use of technologies to control how digital content is used and reused;

INGEST
Controlled or secure transfer of material to an archive, repository, data center, or other custodial environment in adherence to documented guidance, policies, or legal requirements;

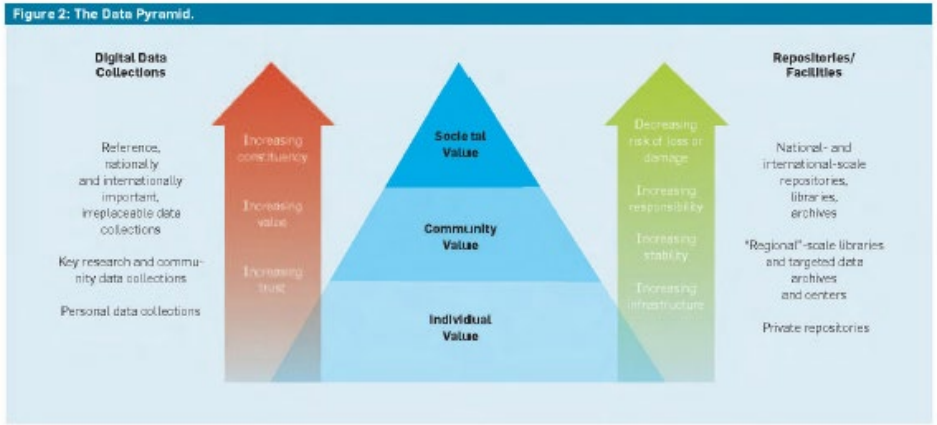
INTEGRITY
The condition when data is unchanged from its source and has not been accidently or maliciously modified, altered, or destroyed;

METADATA
Documentation relating to data content, structure, provenance (history), and context (such as experimental parameters and environmental conditions). Standards for metadata provide a basis for widespread community data sharing; and

PRESERVATION ACTION
Actions undertaken to ensure the long-term viability and availability of the authoritative nature of digital material. Preservation actions should ensure the material remains authentic, reliable, and usable while its integrity is maintained; such actions include validation, assigning preservation metadata, assigning representation information, and ensuring acceptable data structures and file formats.

Rensselaer

why not change the world? SM



Earthquake Simulation

Mike Norman

Astrophysicist (NCSA then UCSD)/current SDSC Director

- Modeling universe back to Big Bang

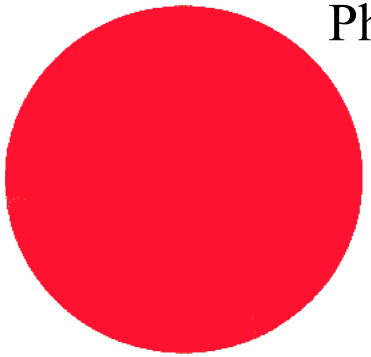
Running on Empty:

Failure to Teach K–12 Computer Science in the Digital Age

- http://www.acm.org/runningonempty/fullreport.pdf
- The Computer Science Teachers Association
- Genesis of CS100 for Fall2012
- CACM April 2011 – Bobby Schnabel "Educating Computing's Next Generation

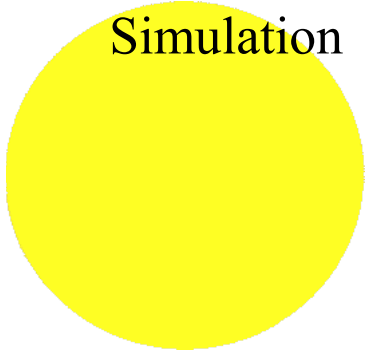
What is Computational Science?

Science Discipline
Physics, Chemistry, Biology, etc.



Computer Science
Hardware/Software

Applied Mathematics
Numerical Analysis, Modeling, Simulation



What is Computational Science?

-