WORLD DIGITAL MATHEMATICS LIBRARY

Capturing the world's scholarly mathematical literature

A presentation to the
Gordon and Betty Moore Foundation
August 19, 2004

What will WDML do?

- The World Digital Math Library will bring the enduring mathematical legacy to researchers worldwide.
- This basic mathematical knowledge is key to progress in all science and technology.
- Nobody has the kind of access that will be possible, for all, through the WDML.

How will WDML do it?

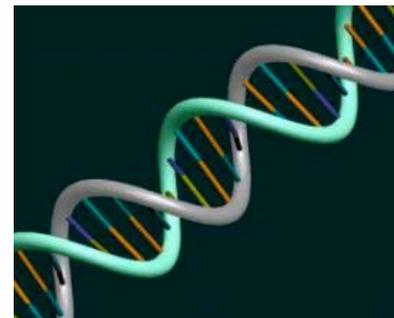By creating partnerships among scholars, libraries, and publishers (and sustaining these in future)

The Mathematical Legacy

○ New science depends critically on old mathematics

- 50% of current references are to pre-1990 papers
- 25% to pre-1980

○ The literature is the mathematician's genome database

New Science from Legacy Mathematics

- *Modern string theory* depends on algebraic geometry from 19th century
- Cryptography behind *secure transactions* depends on number theory (50-200 years old)
- *Medical imaging* (tomography) possible because of mathematics done in early 20th century


string

D-brane

space-time
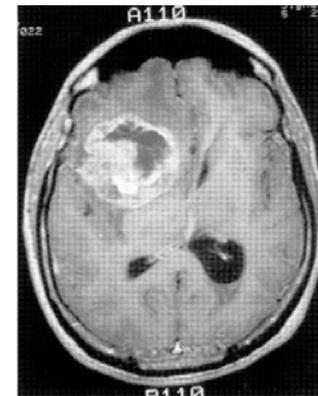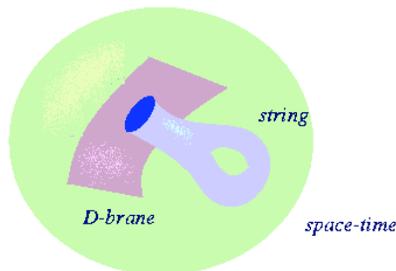
Who will be the users?

- In the past 10 years, reviewing journals have treated papers from about 250,000 distinct authors in the mathematical sciences

- Currently only a privileged elite have access to the actual material; with the WDML, we move toward universal access

- Infrastructure supporting science of the world to come

Importance of older math literature

Analysis of 500,000 citations in recent papers
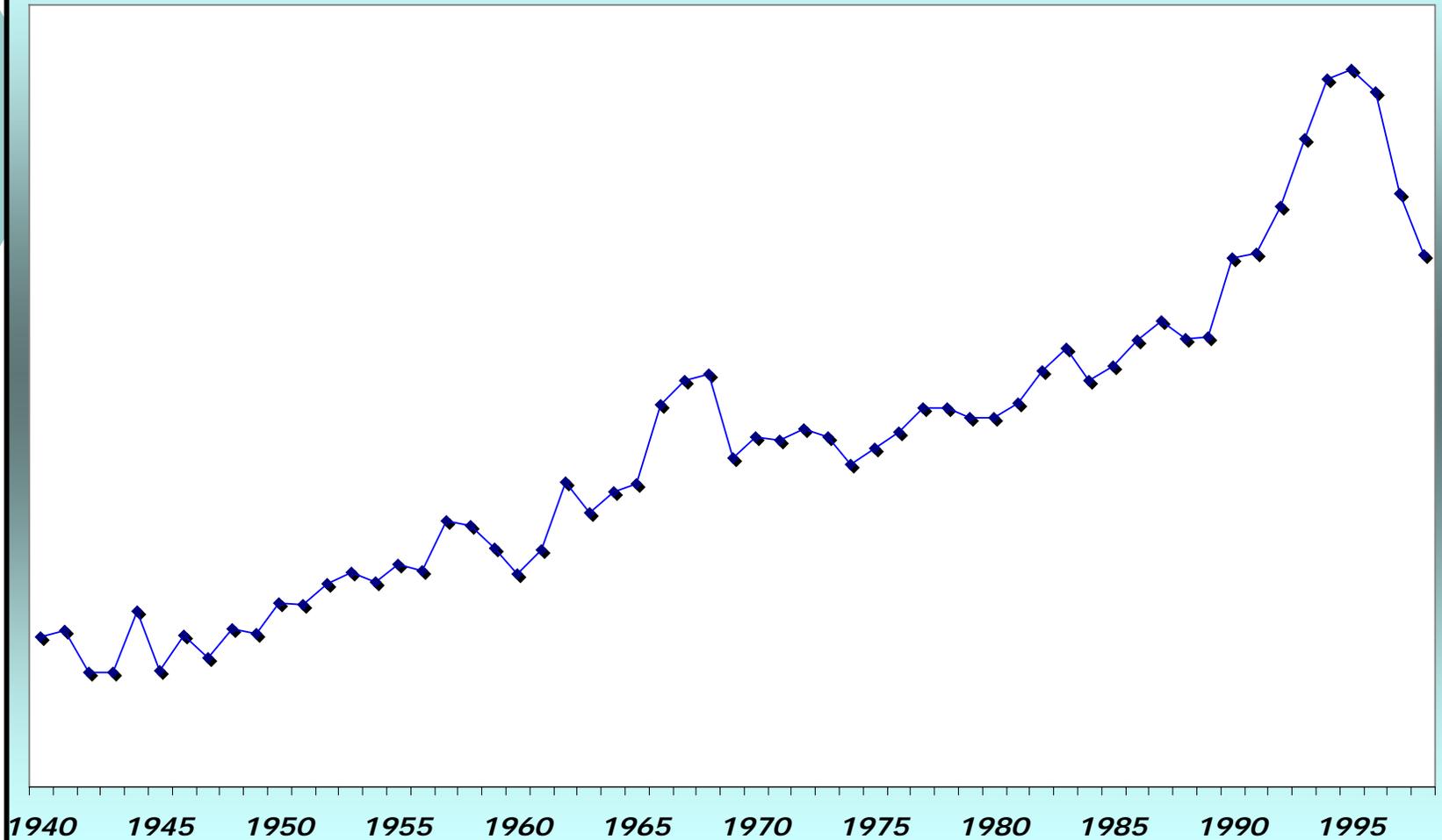
*Proportion of citations referring to a given year, normalized by number of papers published that year

WDML Model

- The product:
  - Digitize journals
  - OCR for searching
  - Links in references
- Return material to publishers and libraries, for addition to current collections
- The Proposition: added value for them; free access for the public

What about open access?

- WDML complements efforts at open access to current literature

- Provides free access to legacy material
- Encourages publishers to make literature freely available with moving wall

Before we get down to further details…

Scope and Cost

- 75M pages of legacy material
- $75M estimated total cost of the WDML
- $25M estimated cost of a start-up phase (five year project)
  - Coordinated by MSRI ... to catalyze the world-wide movement.
  - Proposals from publishers, societies, libraries to digitize collections
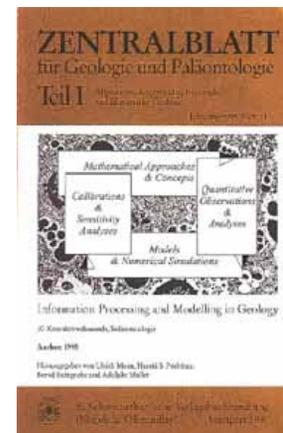
Standards

- Much progress already made by NSF-funded planning grant

- Ongoing work guided by International Mathematical Union (IMU), through Committee on Electronic Information
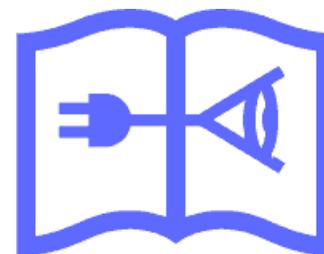
User Access

- ○   Mathematics is fortunate – it already has two well-used web portals:
- ○ **Zentralblatt MATH**
- ○ **MathSciNet**
- ○ Integrate new data into these (standards already created)

Archiving

- California Digital Library and other members of the Digital Library Federation are working on digital preservation -- and are keenly interested in WDML

Will-Harris House Press

Many Issues

- ○ Content – which material
- ○ Format –precise standards
- ○ Metadata –specifying a DTD
- ○ Copyright – approaching the owners
- ○ Long-term archiving –costs
- ○ Interoperability –connect different systems
- ○ Internationality –prevent harmful rivalry
- ○ Compatibility –interface with other disciplines
- ○ Sustainability –adding new literature

- ○ ***Many problems have been solved***

This is a transforming project

- Clickability will change the way research is done
- WDML has potential for huge impact over many disciplines
- The project is compelling … it will draw in worldwide financial support

Summary

- ○ Make mankind's mathematical legacy available in clickable form
- ○ Gradually reform math publishing
- ○ Provide model for other science publishing
- ○ Create the library of the future using evolving technology

- ○ Formerly a dream
    -- now in reach