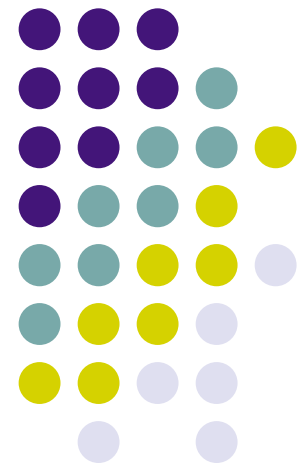


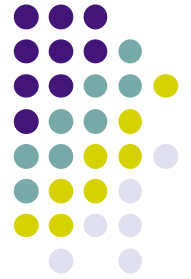
# Paradigm Shifts

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# Conjecture



Over the next generation, the university will change so much that it will no longer be recognizable in today's terms:

global universities

"meta" universities

universal access to knowledge and learning

# Conjecture



Over the next generation, the university will change so much that it will no longer be recognizable in today's terms:

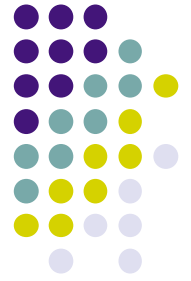
global universities

"meta" universities

universal access to knowledge and learning

Cyberinfrastructure, OpenCourseWare, Google Book Scan, Immersive Environments, Social Networking,...

# A historical example



The evolution of the University of Michigan:

1850

1900

1950

2000

2050???













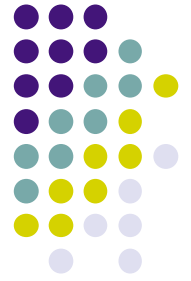
PHOTOGRAPHED BY AERIAL SURVEY CORP.







# Entirely New Paradigms

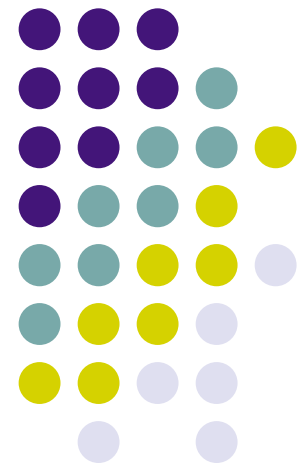


- Lifelong Learning
- Global Universities
- Meta Universities
- A 21<sup>st</sup> Century Renaissance

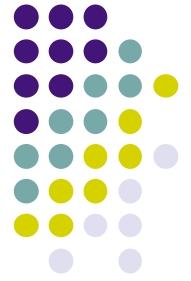


# Lifelong Learning

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# Lifelong Learning



Why? Lengthening lifespans and careers (+ 20-30 y?)  
Increasing pace of new knowledge creation  
Challenges of global, knowledge economy

The nation would accept its responsibility as a democratic society in an ever more competitive global, knowledge driven economy to **provide all of its citizens with the educational, learning, and training opportunities they need, throughout their lives, whenever, wherever, and however they need it, at high quality and affordable costs**, thereby enabling both individuals and the nation itself to prosper.



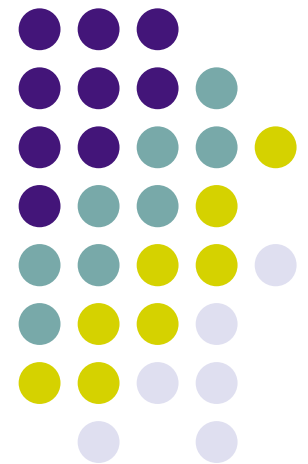
## Note:



Of course, establishing as a national goal the universal access to lifelong learning would require not only a very considerable transformation and expansion of the existing postsecondary education enterprise, but it would also **require entirely new paradigms for the conduct, organization, financing, leadership, and governance of higher education...**

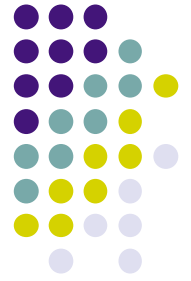
# The Global University

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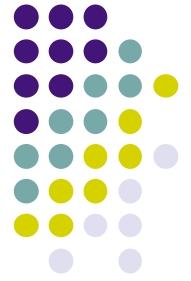
# The Global University



Both mature and developing nations are making major investments in building the knowledge infrastructure—schools, universities, research institutes, high-tech industry, cyberinfrastructure, public policies and programs—necessary to achieve prosperity and security in the knowledge economy.

In parallel with these trends, there is a strong sense that **higher education is also in the early stages of globalization, both through the rapid growth in international partnerships among universities, and through the emergence of truly global universities that intend to compete in the global marketplace for students, faculty, and resources.**

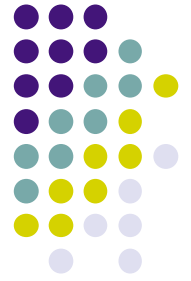
# Universities of the world... and in the world



We might even see the emergence of "universities of and in the world"—institutions that not only address the opportunities provided by a global marketplace but define their public purpose beyond institutional, regional, or national needs and to encompass global imperatives such as global sustainability, world health, wealth disparities and poverty, and international development.



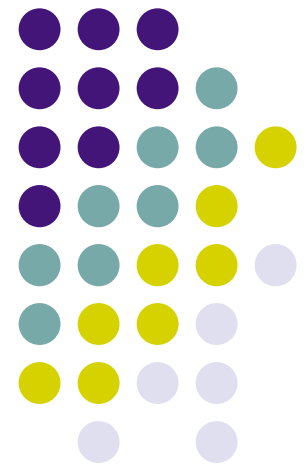
# Early efforts?



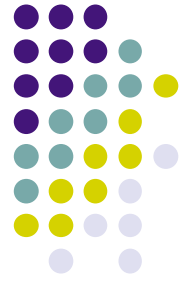
- Open University (U.K.), IMD
- For-Profits (U. Phoenix, Laureate (Sylvan), etc.)
- EU Integration (Bologna, Lisbon)
- Consortia (Universitas 21, Nagoya, Glion?)
- Established universities? (MIT? UM?)

# The Meta University

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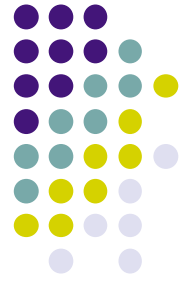


# Arden Bement, NSF Director



- We are entering a second revolution in information technology, one that may well usher in a new technological age that will dwarf, in sheer transformational scope and power, anything we have yet experienced in the current information age.
- We are already intimately familiar with the first revolution, now well under way. Information, computer, and communications technologies have transformed nearly every aspect of our lives, creating entirely new opportunities and challenges, and trailing some inevitable surprises in their wake.

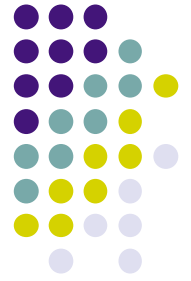
# Cyberinfrastructure



- The new concept is “**cyberinfrastructure**”, the term used to describe hardware, software, people, organizations, and policies—similar to “e-science” in Europe and ICT elsewhere.
- The engine of change for the next revolution is cyberinfrastructure, a comprehensive phenomenon that involves the creation, dissemination, preservation, and application of knowledge. It adds new dimensions that greatly increase transformational potential.



# The "virtual" university



- Not your father's virtual university!!!
- Think Second Life!
- Virtual organizations
- "A global educational and collaboration environment in a virtual world"...

# WARCRAFT®

## REIGN OF CHAOS™

### SCREENSHOT GALLERY

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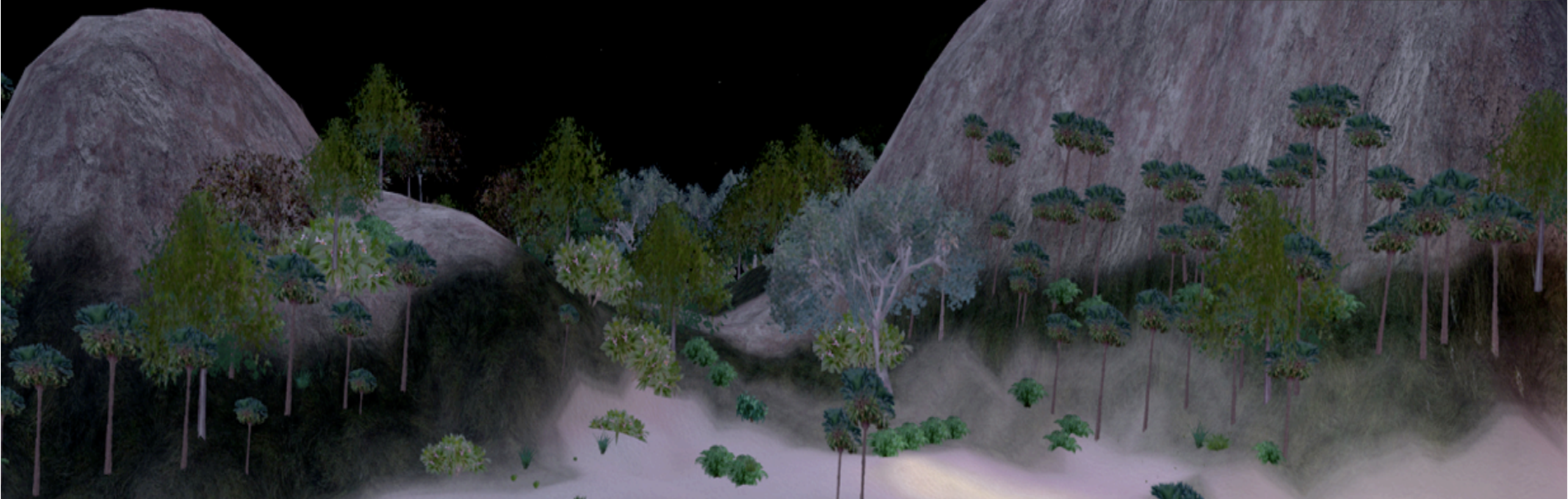
**GRID STATUS:** **ONLINE**

Second Life Time:	9:12 am PDT
Total Residents:	7,256,167
Logged In Last 60 Days:	1,768,672
Online Now:	0



**Want to Learn More About Second Life?**

- [1. Tech Support at Your Fingertips](#)
- [2. Secrets of Scripting](#)
- [3. Tools, Tutorials and Templates](#)
- [4. Organize Your Out-of-control Inventory](#)
- [5. Attend a Class going on now!](#)



**News & announcements from [blog.secondlife.com](http://blog.secondlife.com):**


<a href="#">Login Screen Error</a>	Fri 15 Jun 08:29 AM PDT
<a href="#">Errors when purchasing L\$ through LindeX</a>	Fri 15 Jun 03:23 AM PDT
<a href="#">How Secure Is Your Password?</a>	Thu 14 Jun 16:15 PM PDT
<a href="#">WindLight Update</a>	Thu 14 Jun 11:35 AM PDT

First Name:  Last Name:  Password:

Remember password

[New Account...](#) [Preferences...](#)

[Connect](#) [Quit](#)



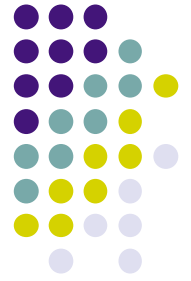
A new version of Second Life is available.  
You must download this update to use the system.  
Download to your Applications folder?

Download

Quit

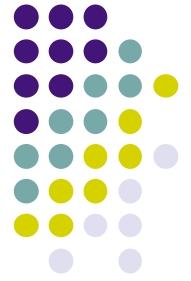


# The "Meta" University



Perhaps the most interesting activities in higher education today involve an extension of the **philosophy of open source software developing to open up opportunities for learning and scholarship to the world** by putting previously restricted knowledge and learning opportunities into the public domain and inviting others to join both in its use and development.

# Open Education Resources

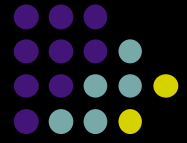


- Perhaps the most interesting activities in higher education today involve an extension of the philosophy of open source software developing to open up opportunities for learning and scholarship to the world by putting previously restricted knowledge into the public domain and inviting others to join both in its use and development.
- Open source, open content, open learning ...



# OER Examples

- OpenCourseWare Initiative (MIT, OU, ...)
- Open Knowledge Management (Sakai, Moodle, ...)
- Open Learning Initiatives (OU, CMU, ...)
- Virtual Organizations (Wikipedia...)
- OER Providers (Connexions...)
- Open Content (Google Books Library Project)
- Open Participatory Learning (Wikipedia...)



**Program Basics**

- [General Help](#)

**Partner Program**

- [Success Stories](#)
- [Quick Tour](#)
- [Partner Help](#)
- [Join Now](#)

**Author Resources**

- [Success Stories](#)
- [Author Help](#)

**Library Project**

- [Library Partners](#)
- [Library Help](#)

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**The official blog**

[Inside Google Book Search](#)

**Existing Partners**

[Log in](#) to your account.

**About Google Book Search**

- [Using Google Book Search](#)
- [PDF Downloads](#)
- [Library Catalog Search](#)

**Authors**

- [I'm an author. How do I add my books to Google Book Search?](#)
- [My book is now out of print -- can I still participate?](#)
- [Can you put a link to my site on pages from my books?](#)
- [More...](#)

**Publishers**

- [What is the Google Books Partner Program?](#)
- [I'm a book publisher. How do I include my books in Google Book Search?](#)
- [Can I view the traffic reports for my books?](#)
- [More...](#)

**Librarians**

- [What libraries are you working with?](#)
- [Do the libraries get a copy of the book?](#)
- [Can I see a copy of a contract you have with a library partner?](#)
- [More...](#)

**Search Help Center**

**Top 5 Questions**

1. [What is the Google Books Partner Program?](#)
2. [Why can't I read the entire book?](#)
3. [What libraries are you working with?](#)
4. [Can I see a copy of a contract you have with a library partner?](#)
5. [How can I link to a search for a specific author or title on Book Search?](#)

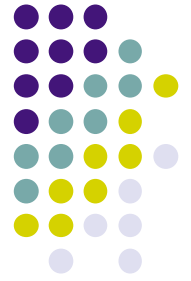
**Partner Program**

Have questions about our Partner Program? Visit our Partner [Help Center](#).

[Print entire FAQ](#)



# Google Books Library Project



- In 2004 five major libraries agreed to allow Google to scan and provide full-text search access to a substantial part of their collections.
- The "G-5" has now grown to 30 leading libraries, whose combined collections are estimated to be over half the estimated number of books in the world, in over 400 languages.
- Google scanning of Michigan's 7.8 million volume library is now in excess of 30,000 volumes per week, with completion now projected for 2011.
- Google scanning operations in Palo Alto and Cambridge are achieving comparable rates.



**About Google Book Search**

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- [Blog](#)
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**Library Project**

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- [Library Partners](#)
- [Librarian Help](#)

**Want to know more?**

Read the latest [News & Views](#)

[Add Book Search to your site](#)

**Bavarian State Library**

“With today’s announcement we are opening our library to the world and bringing the true purpose of libraries - the discovery of books and knowledge –a decisive step further in into the digital era. This is an exciting effort to help readers around the world discover and access Germany’s rich literary tradition online – whenever and wherever they want.”

–*Dr. Rolf Griebel, Director General of the Bavarian State Library*

[Learn more about the Bavarian State Library's involvement in the project](#) [in German].

**Harvard University**

“The new century presents important new opportunities for libraries, including Harvard’s, and for those individuals who use them. The collaboration between major research libraries and Google will create an important public good of benefit to students, teachers, scholars, and readers everywhere. The project harnesses the power of the Internet to allow users to identify books of interest with a precision and at a speed previously unimaginable. The user will then be guided to find books in local libraries or to purchase them from publishers and book vendors. And, for books in the public domain, there will be even broader access.”

– *Sidney Verba, Director of the Harvard University Library*

[Learn more about Harvard's involvement in the project](#).

**Ghent University Library**

“We are thrilled to open our books and our library to the world through this project. This is an exciting effort to help readers - no matter where they are - discover and access part of Belgium and Europe’s rich literary tradition and culture. In addition, we are about to start a multi-year project to renovate our library building, and while our library’s doors will be closed, its books will remain open to students and academics through Google Book Search.”

– *Sylvia Van Peteghem, Chief Librarian, Ghent University Library*

[Learn more about Ghent University Library's involvement in the project](#) [in Dutch]

**The National Library of Catalonia**

“It once was the case that only those who could visit our library were able to ‘visit’ our books. Now, anyone interested in the vast number of titles our library houses will be able to find and access them online—perhaps just discover them by chance via a simple search of the Google Book Search index. This is a tremendous step forward for enabling readers all around the world to discover and access the rich history of Catalanian, Castilian, and Latin American literature.”

– *Dolors Lamarca, Director of the National Library of Barcelona*

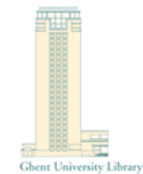
[Learn more about The National Library of Catalonia's involvement in the project](#) [in Catalan].

**The New York Public Library**

“The New York Public Library Research Libraries were struck by the convergence of Google’s mission with their own. We see the digitization project as a transformational moment in the access to information and wanted not only to learn from it but also to influence it. Our response at present is a conservative one, with a limited number of volumes in excellent condition, in selected languages and in the public domain. With appropriate evaluation of this limited participation, we look forward to a more expansive collaboration in the future.”

– *David Ferriero, Andrew W. Mellon Director and Chief Executive of the Research Libraries, The New York Public Library*

[Learn more about The New York Public Library's involvement in the project](#).



## Oxford University

“The Bodleian Library’s mission, from its founding in 1602, has been based on Sir Thomas Bodley’s vision of a library serving the worldwide ‘Republic of Letters’, with the Library’s collections open to all who have need to use them. To this day over 60% of readers who use and work in the Bodleian Library have no direct affiliation with the University of Oxford. The Google Library Project in Oxford testifies to our ongoing commitment to enable and facilitate access to our content for the scholarly community and beyond. The initiative will carry forward Sir Thomas Bodley’s vision and the ethos of the Bodleian Library into the digital age, allowing readers from around the world to access the Library’s collections over the World Wide Web.”

– Ronald Milne, Acting Director of Oxford University Library & Bodley’s Librarian

[Learn more about Oxford’s involvement in the project.](#)



## Princeton University

“Generations of Princeton librarians have devoted themselves to building a remarkable collection of books in thousands of subjects and dozens of languages. Having the portion of that collection not covered by copyright available online will make it easier for Princeton students and faculty to do research, and joining the Google partnership allows us to share our collection with researchers worldwide, a step very much in keeping with the University’s unofficial motto of Princeton in the nation’s service and in the service of all nations.”

– Karin Trainer, Princeton University Librarian

[Learn more about Princeton University Library’s involvement in the project.](#)



## Stanford University

“Stanford has been digitizing texts for years now to make them more accessible and searchable, but with books, as opposed to journals, such efforts have been severely limited in scope for both technical and financial reasons. The Google arrangement catapults our effective digital output from the boutique scale to the truly industrial. Through this program and others like it, Stanford intends to promote learning and stimulate innovation.”

– Michael A. Keller, University Librarian

[Learn more about Stanford’s involvement in the project.](#)



## University of California

“By unlocking the wealth of information maintained within our libraries and exposing it to the latest that search technologies have to offer, the University of California is continuing its work to harness technology and our library collections in support of research, learning, patient care, and cultural engagement. In this new world, people will make connections between information and ideas that were hitherto inaccessible, driving the pace of innovation in all areas of life – academic, economic, and civic – and enhancing the use of the world’s great libraries.

With digital copies of our library holdings, we will also provide a safeguard for the countless thousands of authors, publishers, and readers who would be devastated by catastrophic loss occasioned, for example, by natural disaster. Anyone who doubts the impact that such disaster can have on our cultural memory need look no further than the devastation wrought by Hurricane Katrina on our sister libraries in the Gulf States.

As an institution that has built these vast collections as a public good and in the public trust, joining the Google library partnership was the right thing to do.”

– Daniel Greenstein, Associate Vice Provost for Scholarly Information and University Librarian

[Learn more about University of California’s involvement in the project.](#)



## University Complutense of Madrid

“Out-of-copyright books previously only available to people with access to the University Complutense of Madrid’s Library, or the money to travel, will now be accessible to everyone with an Internet connection, wherever they live. We are quite literally opening our library to the world. The opportunities for education are phenomenal and we are delighted to be working with Google on this project.”

– Carlos Berzosa, Chancellor

[Learn more about Complutense University of Madrid’s involvement in the project](#) [in Spanish].





## University Library of Lausanne

“Out of copyright books previously only available to people with access to Lausanne’s university library, will now be accessible to everyone with an Internet connection, wherever they live. We are quite literally opening our library to the world. The opportunities for education are phenomenal and we are delighted to be working with Google on this project”.

-Hubert A. Villard, Director of the Cantonal and University Library of Lausanne.

[Learn more about the University Library of Lausanne’s involvement in the project](#) [in French].



## University of Michigan

“The project with Google is core to our mission as a great public university to advance knowledge — on campus and beyond. By joining this partnership that makes our library holdings searchable through Google, UM serves as an agent in an initiative that radically increases the availability of information to the public. The University of Michigan embraces this project as a means to make information available as broadly and conveniently as possible. Moreover, the UM Library embarked on this ground-breaking partnership for a number of very compelling reasons:

- We believe that, beyond providing basic access to library collections, this activity is critically transformative, enabling the University Library to build on and reconceive vital library services for the new millennium.
- This work will create new ways for users to search and access library content, opening up our collections to our own users and to users throughout the world.
- Although we have engaged in large-scale, preservation-based conversion of materials in the Library’s collection for several years, and have been a leader in digital preservation efforts among research libraries, we know that only through partnerships of this sort can conversion of this scale be achieved. Our program is strong, and we have been able to digitize approximately 5,000 volumes/year; nevertheless, at this rate, it would take us more than a thousand years to digitize our entire collection.”

– John P. Wilkin, Associate University Librarian

[Learn more about University of Michigan’s involvement in the project.](#)



## University of Texas at Austin

“University libraries in our society are entrusted with the critical mission of collecting and providing access to information spanning the entire range of human knowledge. Our libraries are also responsible for effectively preserving this knowledge and ensuring access to it over vast periods of time. At the University of Texas at Austin, we hold a deep commitment to each of these objectives and believe that participating in this venture will help ensure our ability to meet those commitments far into the future.”

– Fred Heath, Vice Provost and Director of Libraries

[Learn more about University of Texas at Austin’s involvement in the project.](#)



## University of Virginia

“The U.Va. Library was a pioneer in digitizing public domain materials. We started with printed texts in 1992, and faculty and students quickly discovered that long-forgotten and out-of-print texts could reach new audiences and spark new scholarship. We have often talked about libraries without walls, but now we are even closer to realizing that vision, thanks to this partnership.”

– Karin Wittenborg, University Librarian, University of Virginia

[Learn more about University of Virginia’s involvement in the project.](#)



## University of Wisconsin - Madison

“The combined library collections of the University of Wisconsin- Madison Libraries and the Wisconsin Historical Society Library comprise one of the largest collections of documents and historical materials in the United States. Through this landmark partnership with Google, Wisconsin is taking a leading role in preserving public domain works for future generations and making the Library’s resources widely available for education and research. This effort truly exemplifies the vision of The Wisconsin Idea – the notion that the boundaries of the university are limitless. The Wisconsin libraries have been following in this tradition. The Google digitization efforts will enable the libraries to expand access to public domain materials that have heretofore only been accessible in the libraries. Much of this material is rare and one-of-a-kind, providing a rich, open source of information for educational, research and general public use.”

– Edward Van Gemert, Interim Director, UW-Madison Libraries

[Learn more about UW-Madison’s involvement in the project.](#)

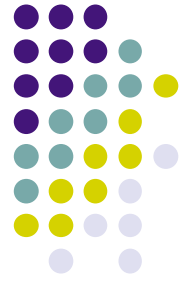




# Copyright issues?

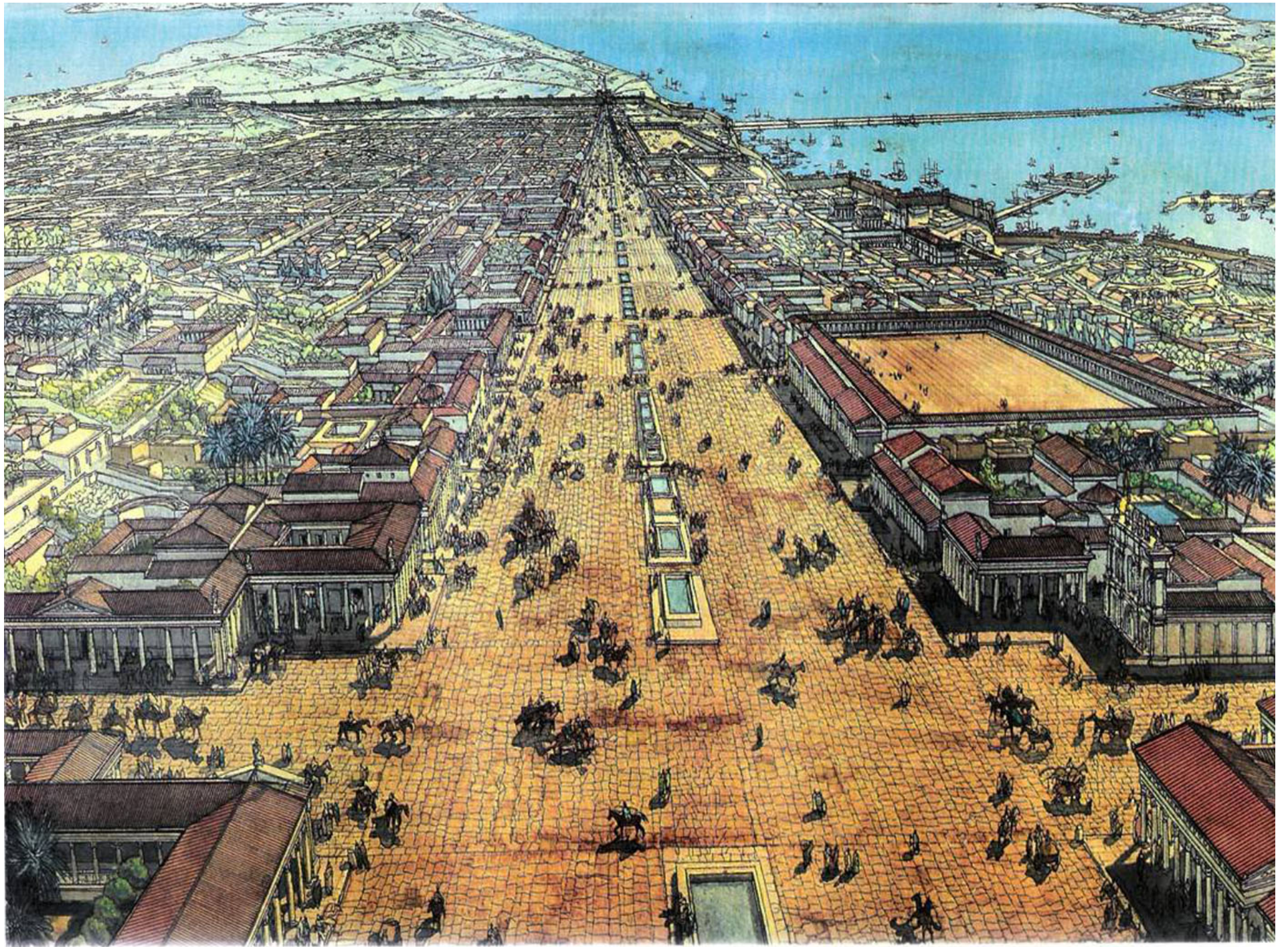
- While Google is providing full-text search access to all scanned materials, access to copyrighted material is restricted to "snippets", accompanied by links to acquisition through purchase or library loans.
- Materials in the public domain are being made available in full-text format, either onscreen or through pdf downloads.
- Still uncertain is the treatment of "orphan" materials, where neither the author or publisher currently exists. (There is an ongoing effort to clarify "fair use" law to allow full-text access to this orphan material.)

# Kevin Kelly, NY Times - 2006



- Kelly recalls the age old dream of having in one place all knowledge, past and present. All books, all documents, all conceptual works, in all languages.
- He noted that the closest we ever came was the great library at Alexandria, constructed around 300 B.C., which once held between 30 and 70 percent of all books in existence then. Yet this dream was quickly overwhelmed by the explosion of civilization and knowledge throughout the world and became an impossibility.







# Until now...



- "When Google announced in December 2004 that it would digitally scan the books of five major research libraries to make their contents searchable, the promise of a universal library was resurrected.
- Might the long-heralded great library of all knowledge really be within our grasp. We can provide all the works of humankind to all the people of the world. It will be an achievement remembered for all time, like putting a man on the moon."
- And unlike the libraries of old, which were restricted to the elite, this library would be truly democratic, offering every book to every person."









# The "meta" university

- Open source, open content, open learning, and other “open” technologies, along with cyberinfrastructure, the term used to describe the software, hardware, people, organizations, and policies characterizing digital technology, become the scaffolding on which to build truly global universities—what Chuck Vest terms the “meta” university.
- Cyberinfrastructure provides the technology and the open paradigms use it to distribute knowledge and learning opportunities to the world.



# The Meta University

- Will enable -- not replace -- residential campuses
- Will bring cost efficiencies to institutions through shared development;
- Will be adaptable -- not prescriptive;
- Will serve both teachers and learners;
- Will speed the propagation of high-quality education and scholarship;
- Will build capacity for economic development;
- Will build bridges across cultures and political boundaries; and
- Will be particularly important to the developing world.



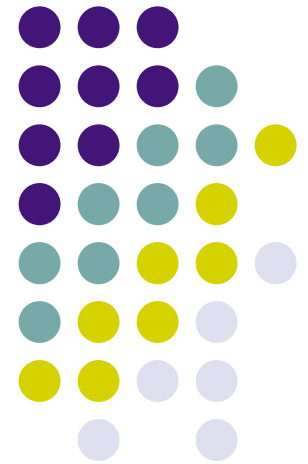


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# A 21<sup>st</sup> Century Renaissance

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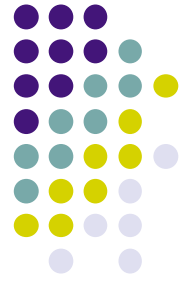


# Put it all together...

- Open source knowledge and learning software...
- Open content distribution through library digitization...
- Open participatory, collaborative learning...
- Ubiquitous connectivity
- ...All built on a substrate of cyberinfrastructure evolving at a rate of 100 to 1,000 times a decade...

\*Note: Today, over 3.5 billion people have cell-phone connectivity and over 1.2 million have broadband connectivity!

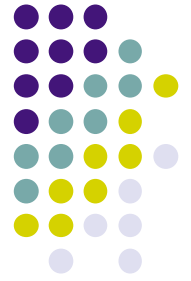
# Imagine a world...



- Imagine a time in the near future where anyone with even a modest Internet connection has access to all of the recorded knowledge of human history along with ubiquitous learning opportunities.
- Imagine further the linking together of a substantial part of the world's population with limitless access to knowledge and learning opportunities enabled by rapidly evolving cyberinfrastructure increasing a thousand-fold in power every decade.



# Perhaps...



- Perhaps this could trigger the emergence of a **new form of collective human intelligence**, as billions of world citizens interact together, unconstrained by today's monopolies on knowledge or learning opportunities.
- **Perhaps this, then, is the most exciting vision for the future of the university**—no longer constrained by space, time, monopoly, or archaic laws—but rather unleashed by cyberinfrastructure to empower the emergence of a new global civilization of humankind.



