

Science in 5 Dimensions

Chris Greer

National Coordination Office

Networking and Information Technology Research and Development

February 17, 2008



Email: greer@nitrd.gov

**Science is global and thrives in a world
that is not limited to 4-dimensions**

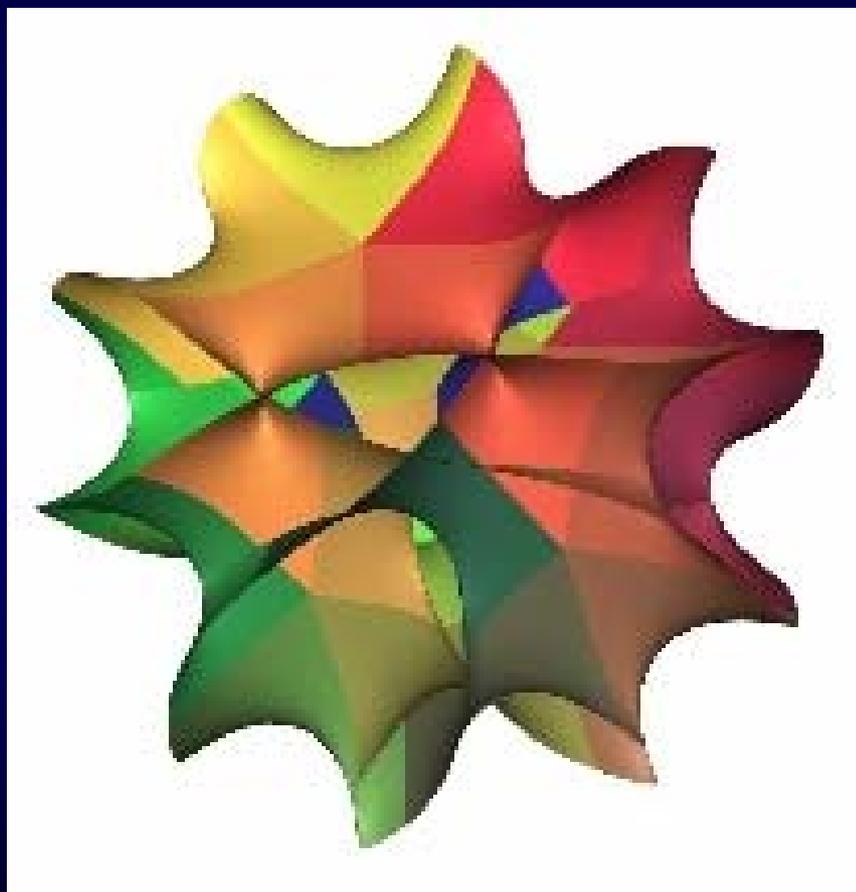


Image: Andrew J. Hanson
www.cs.indiana.edu/~hanson/

NATIONAL BESTSELLER



The World Is Flat

A BRIEF HISTORY OF
THE TWENTY-FIRST CENTURY

Thomas L. Friedman

A Flat World



A Spiky World

THE WORLD IN NUMBERS

The World Is Spiky

Globalization has changed the economic playing field, but hasn't leveled it

A POPULATION

Urban areas house half of all the world's people, and continue to grow in both rich and poor countries.

The world, according to the title of the *New York Times* columnist Thomas Friedman's book, is flat. Thanks to advances in technology, the global playing field has been leveled, the prizes are there for the taking, and everyone's a player—no matter where on the surface of the earth he or she may reside. "In a flat world," Friedman writes, "you can innovate without having to emigrate."

Friedman is not alone in this belief: for the better part of the past century economists have been writing about the leveling effects of technology. From the invention of the telephone, the automobile, and the airplane to the

surprisingly few regions truly matter in today's global economy. What's more, the tallest peaks—the cities and

of the world's population. Five megacities currently have more than 20 million inhabitants each. Twenty-four

PEAKS, HILLS, AND VALLEYS

When looked at through the lens of economic production, many cities with large populations are diminished and some nearly vanish. Three sorts of places make up the modern economic landscape. First are the cities that generate innovations. These are the tallest peaks; they have the capacity to attract global talent and create new products and industries. They are few in number and difficult to replicate. Second are the economic "hills"—places that manufacture the world's established goods, take its costs, and support its innovation engines. These hills can rise and fall quickly; they are prosperous but insecure. Some, like Dublin and Seoul, are growing into innovative, wealthy peaks; others are declining, eroded by high labor costs and a lack of enduring competitive advantage. Finally there are the vast valleys—places with little connection to the global economy and few immediate prospects.

B LIGHT EMISSIONS

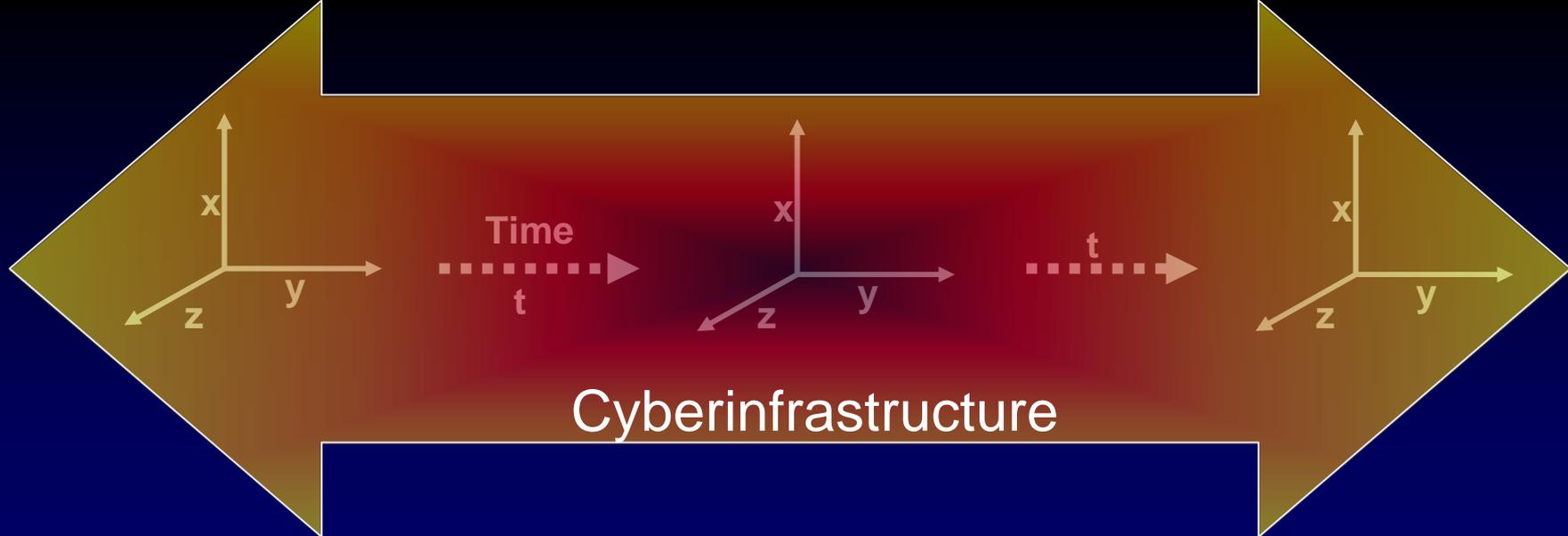
Economic activity—roughly estimated here using light-emissions data—is remarkably concentrated. Many cities, despite their large populations, barely register.

Population and economic activity are both spiky, but it's innovation—the engine of economic growth—that is most concentrated. The World Intellectual Property Organization recorded about 300,000 patents from resident inventors in more than a hundred nations in 2002 (the most recent year for which statistics are available). Nearly two thirds of them went to American and Japanese inventors. Eighty-five percent went to the residents of just five countries (Japan, the United States, South Korea, Germany, and Russia).

States as a whole and Japan. New York's economy alone is about the size of Russia's or Brazil's, and Chicago's is on a par with Sweden's. Together New York, Los Angeles, Chicago, and Boston have a bigger economy than all of China. If U.S. metropolitan areas were countries, they'd make up forty-seven of the big-

broad, flat world accounted for just five percent of all innovations patented in the United States. In 2003 India generated 341 U.S. patents and China 297. The University of California alone generated more than either country. IBM accounted for five times as many as the two combined.

This is not to say that Indians and Chinese are not innovative. On the contrary, AnnaLee Saxenian, of the University of California at Berkeley, has shown that Indian and Chinese entrepreneurs founded or co-founded roughly 30 percent of all Silicon Valley startups in the late 1990s. But these fundamentally creative people had to travel to Silicon Valley and be absorbed into its innovative ecosystem before their ideas became economi-



Computational
capacity and
capability



Connectivity
for access and
interaction



Information for
innovation and
discovery



Connectivity



Synthesis

**Human
Accessible**



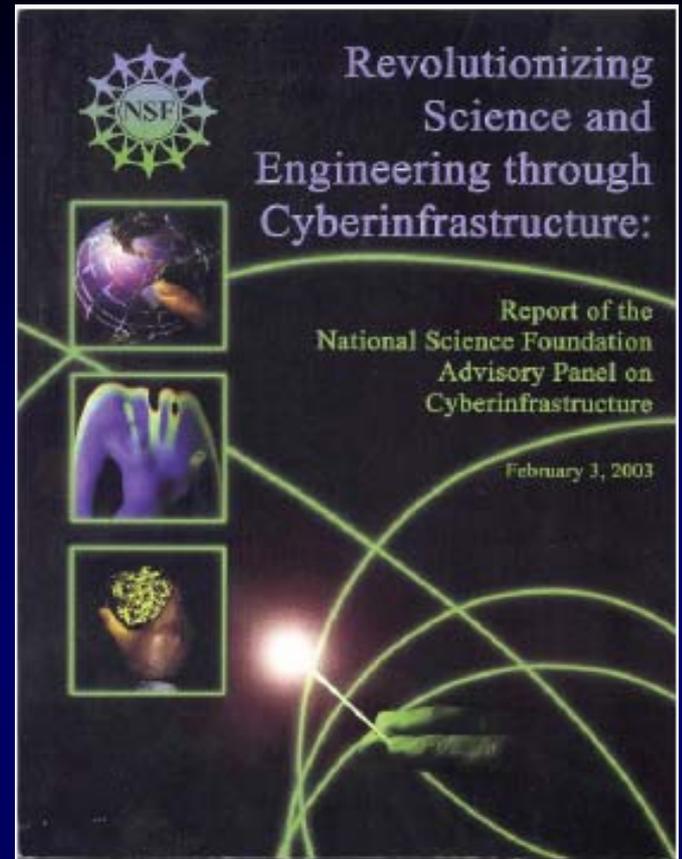
**Machine
Accessible**

Text

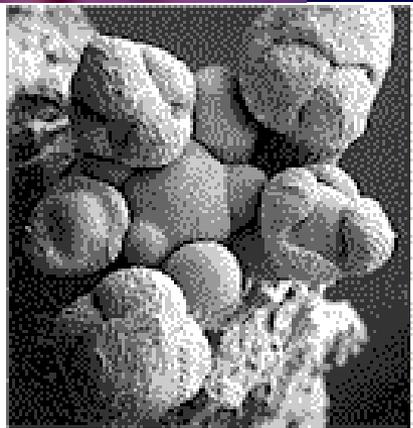
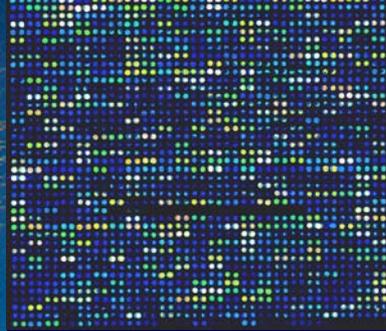


Context

New types of scientific organizations [that] serve individuals, teams and organizations in ways that revolutionize ...



... what they can do, how they do it, and who participates.



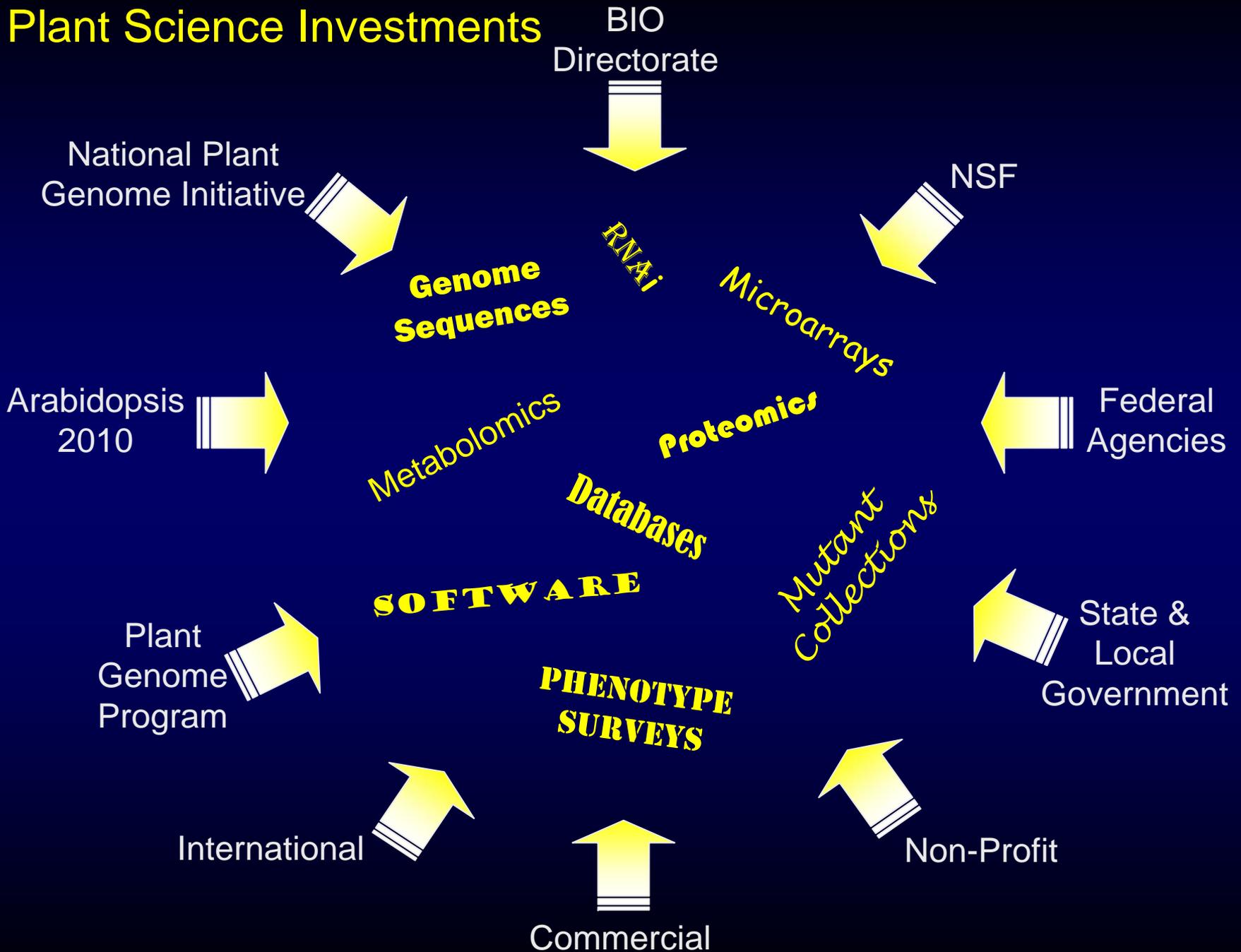
Plant Science Cyberinfrastructure Collaborative

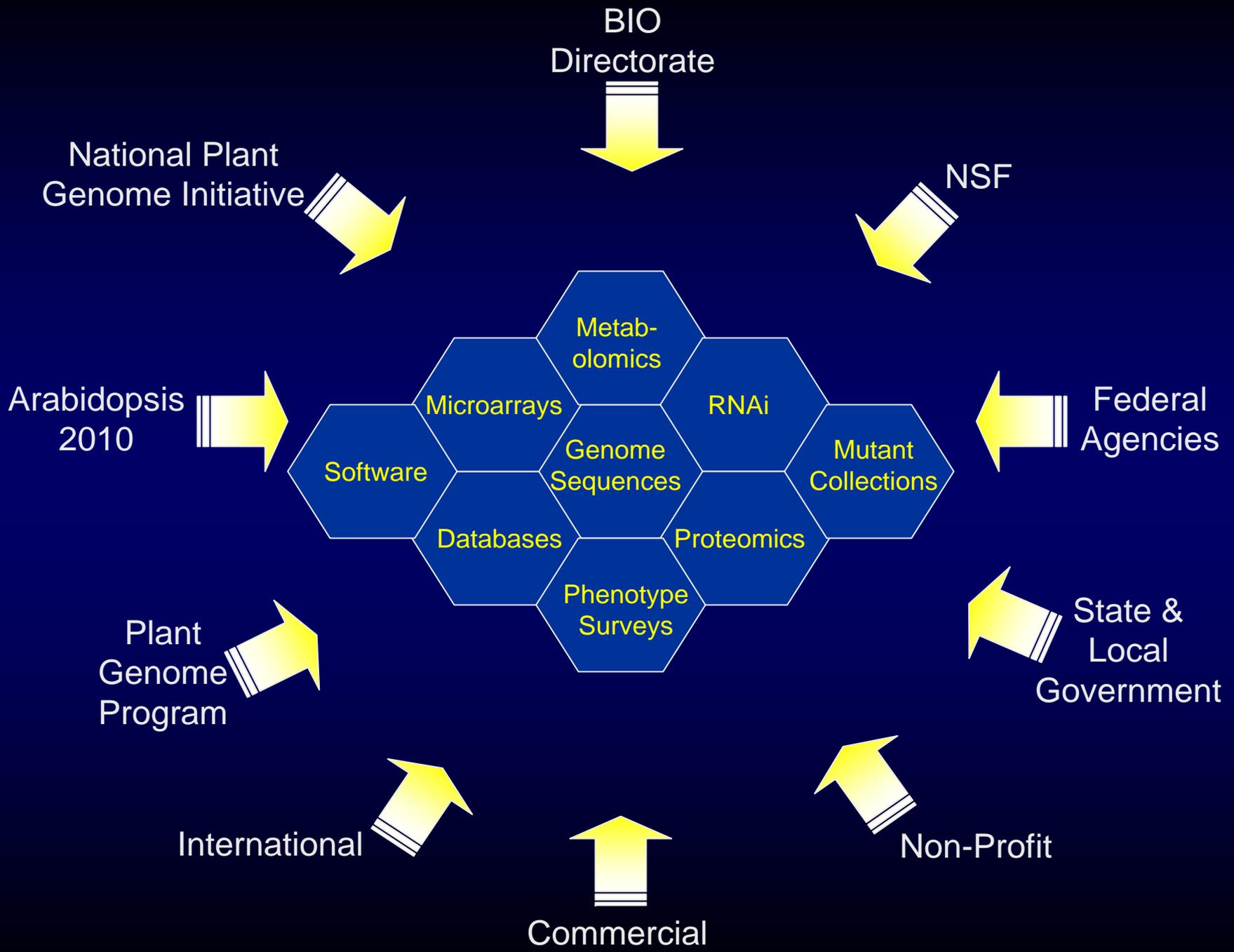


PSCIC
NSF 06-594



Plant Science Investments





Cyberinfrastructure for the Biological Sciences: Plant Science Cyberinfrastructure Collaborative (PSCIC)

Program Solicitation

NSF 06-594



National Science Foundation

Directorate for Biological Sciences
Emerging Frontiers

Preliminary Proposal Due Date(s) *(required)*:

November 30, 2006

Full Proposal Target Date(s):

April 16, 2007

By Invitation Only

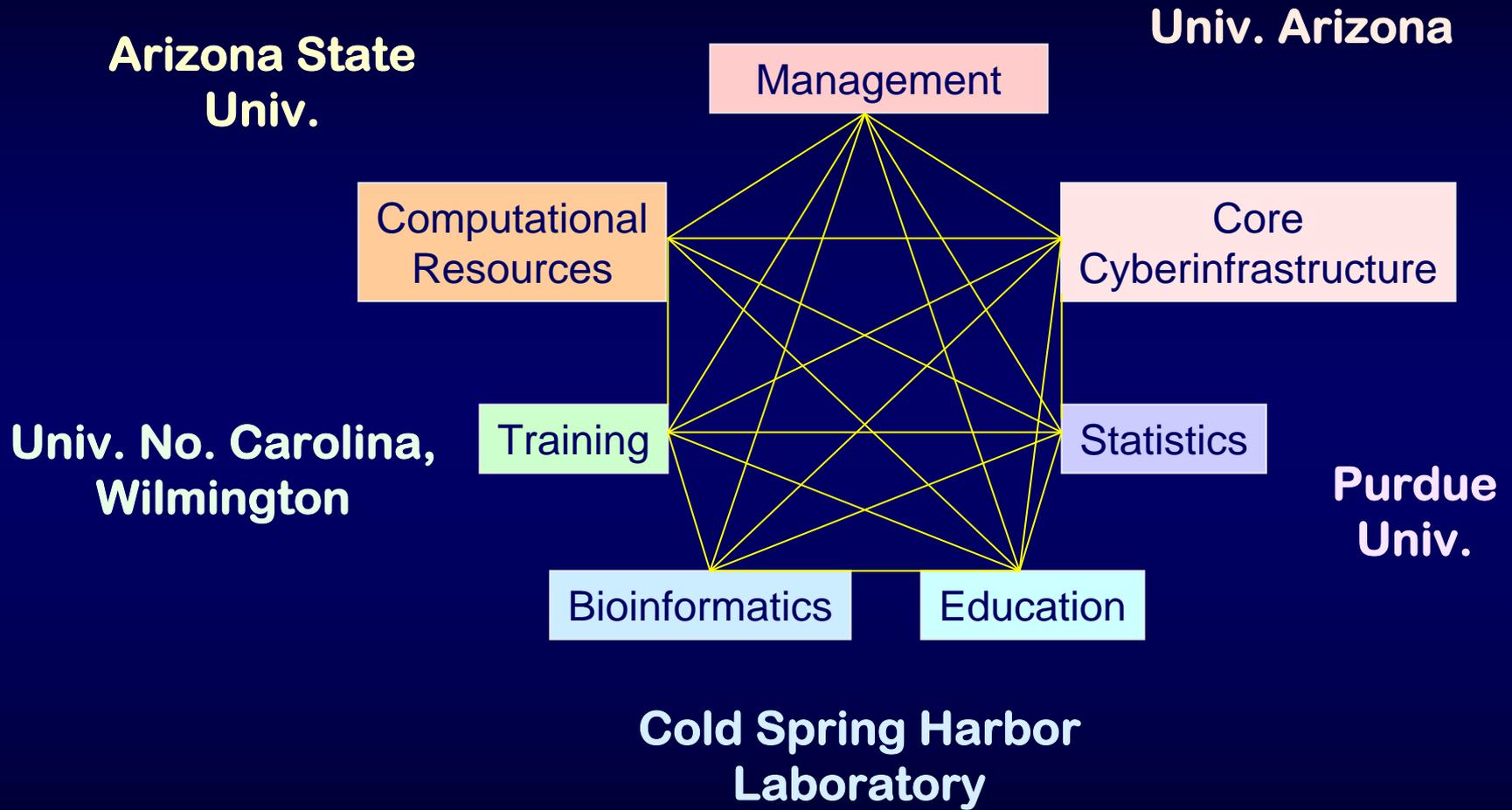
REVISION NOTES

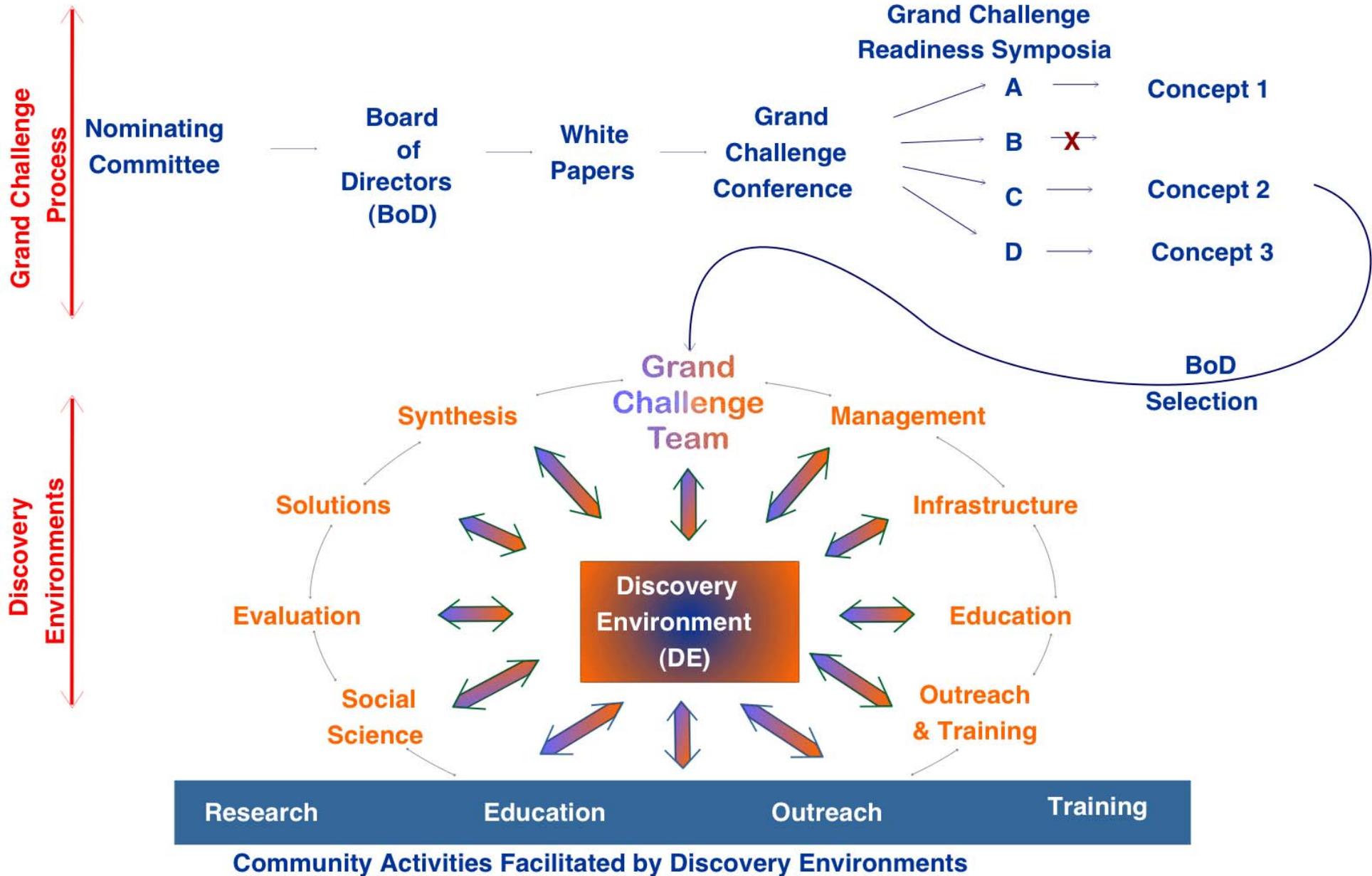
In furtherance of the President's Management Agenda, in Fiscal Year 2006, NSF has identified programs that will offer proposers the option to utilize Grants.gov to prepare and submit proposals, or will require that proposers utilize Grants.gov to prepare and submit proposals. Grants.gov provides a single Government-wide portal for finding and applying for Federal grants online.

In response to this program solicitation, proposers may opt to submit proposals via Grants.gov or via the NSF FastLane system.

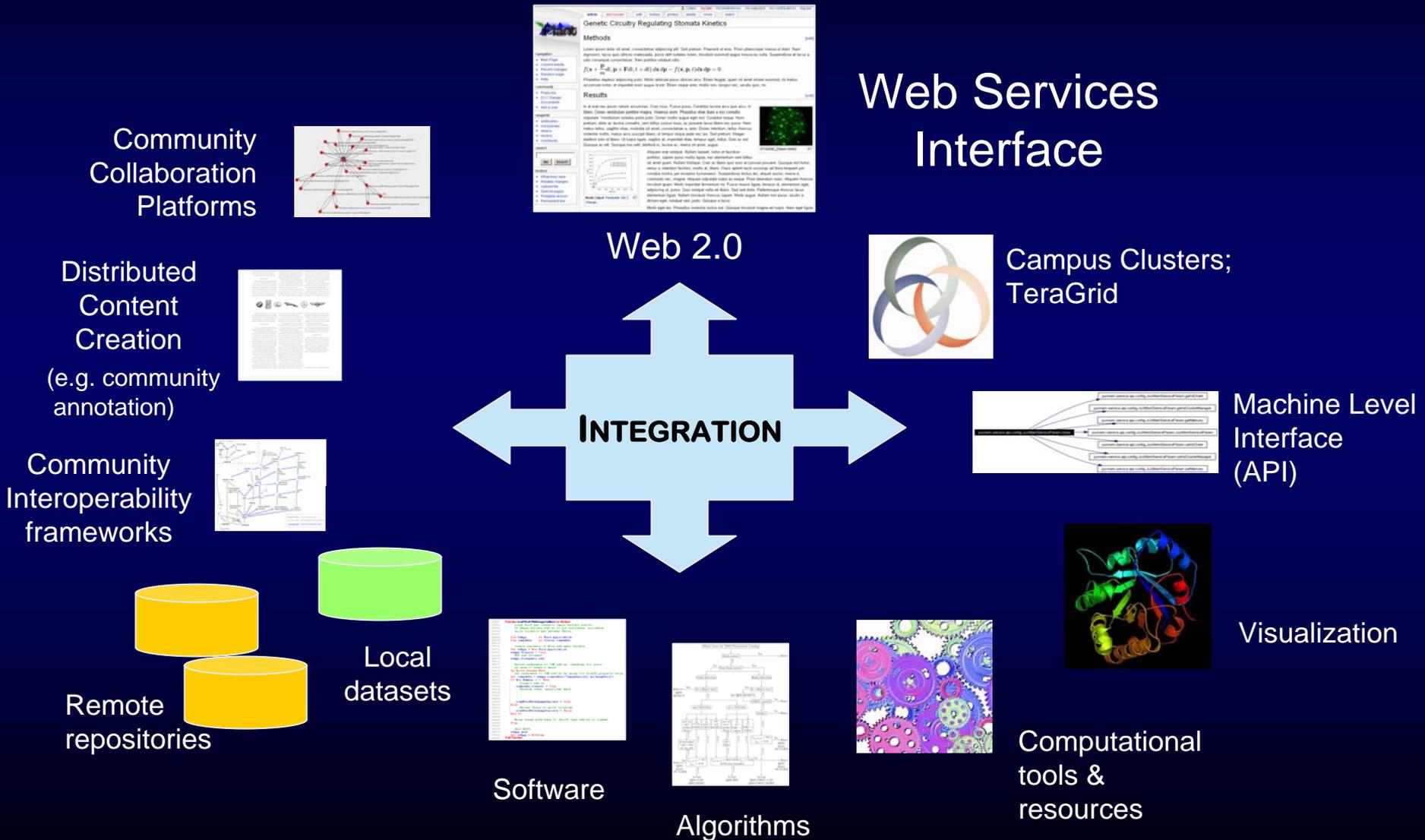
A prospective Principal Investigator meeting will be held in August 2006 at NSF. For details, contact Dr. Chris Greer, Program Director, Directorate for Biological Sciences, email: cgreer@nsf.gov; telephone: (703) 292-8470.

iPlant Project Organization



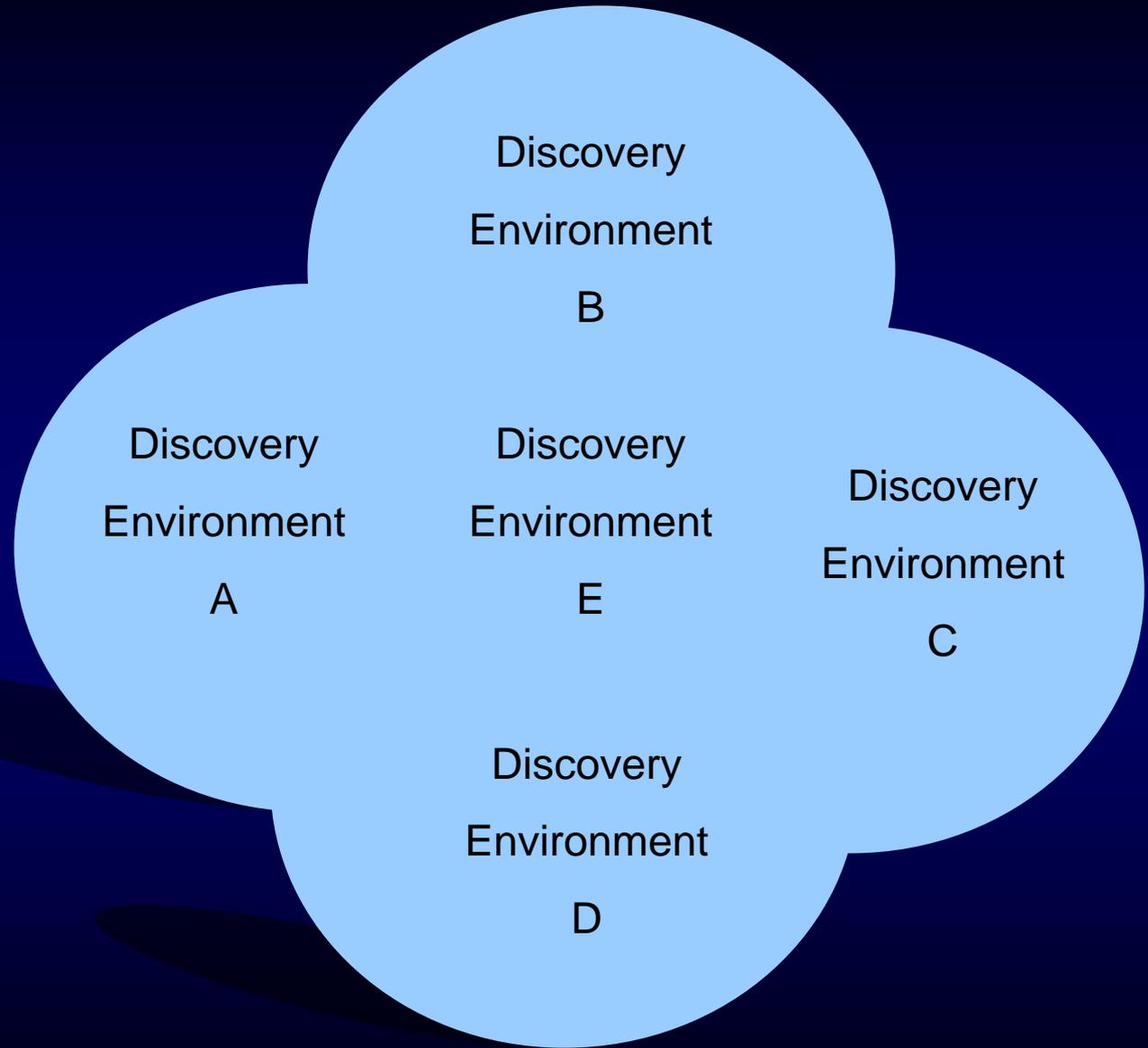


A Discovery Environment



Discovery Landscape

- Distributed
- Integrated
- Open source
- Evolvable
- Extensible



Thank you!

greer@nitrd.gov