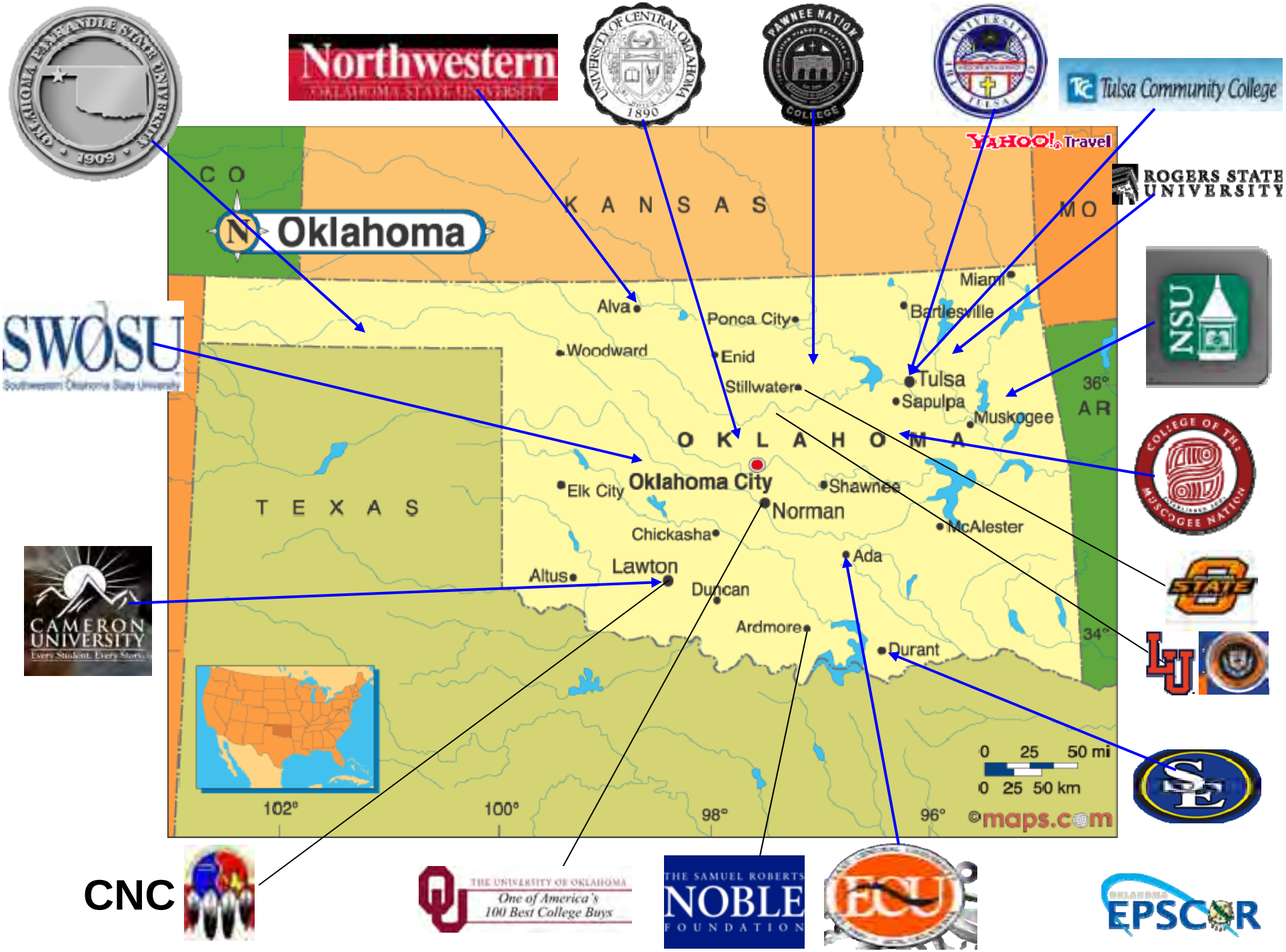
22nd National NSF EPSCoR Conference

From invasive species

to

symbiotic legumes


Northwestern
Tulsa Community College
ROGERS STATE UNIVERSITY
SWOSU
NSU
CAMERON UNIVERSITY
CNC
THE UNIVERSITY OF OKLAHOMA
One of America's 100 Best College Buys
THE SAMUEL ROBERTS NOBLE FOUNDATION
ECU
EPSCOR
Oklahoma
K A N S A S
M O
A R
T E X A S
O K L A H O M A
Alva
Ponca City
Miami
Bartlesville
Woodward
Enid
Stillwater
Tulsa
Sapulpa
Muskogee
Elk City
Oklahoma City
Shawnee
Norman
McAlester
Chickasha
Ada
Altus
Lawton
Duncan
Ardmore
Durant
36°
34°
102°
100°
98°
96°
0 25 50 mi
0 25 50 km
©maps.com

OKLAHOMA EPSCoR OUTREACH

POST-SECONDARY STUDENT DEVELOPMENT AND PUBLIC OUTREACH: Y3

Research Day at the Capitol:

- 21 students from 15 universities statewide
- 22 State legislators visited students
- 52% of student participants were from an underrepresented group
- 52% of students were enrolled in regional universities
- Top 3 presenters were female
- 2 of the top 3 award recipients represented regional colleges

OKLAHOMA EPSCoR OUTREACH

HIGHER EDUCATION FACULTY OUTREACH

Strengthening Collaborations & Increasing Participation: Y3

New programs developed to strengthen collaborations & participation:

- **Internet-Supported Monthly Bioenergy Teleconference Series**
  8 teleconferences; 193 student and faculty researchers participating
- **Regional University Small-Projects Award for Bioenergy Research**
  Native American female researcher (regional college)
- **Researcher Listserv & Blogs**

Existing programs modified to better meet objectives:

- **Research Opportunity Awards**
- **Grant Writing Workshops**
- **Travel for Researchers**

OKLAHOMA EPSCoR OUTREACH

K20-ALT ONLINE CURRICULUM PORTAL

K-12 Students & Teachers

Newly-developed program for Y3

- Scientists providing authentic resources for K-12
- Registered members: Teachers from 46 states and 22 countries
- EPSCoR cellulosic bioenergy curriculum and lesson plans
- Video chats with EPSCoR scientist
- Online video tutorials
- Web support
- Online collaborations

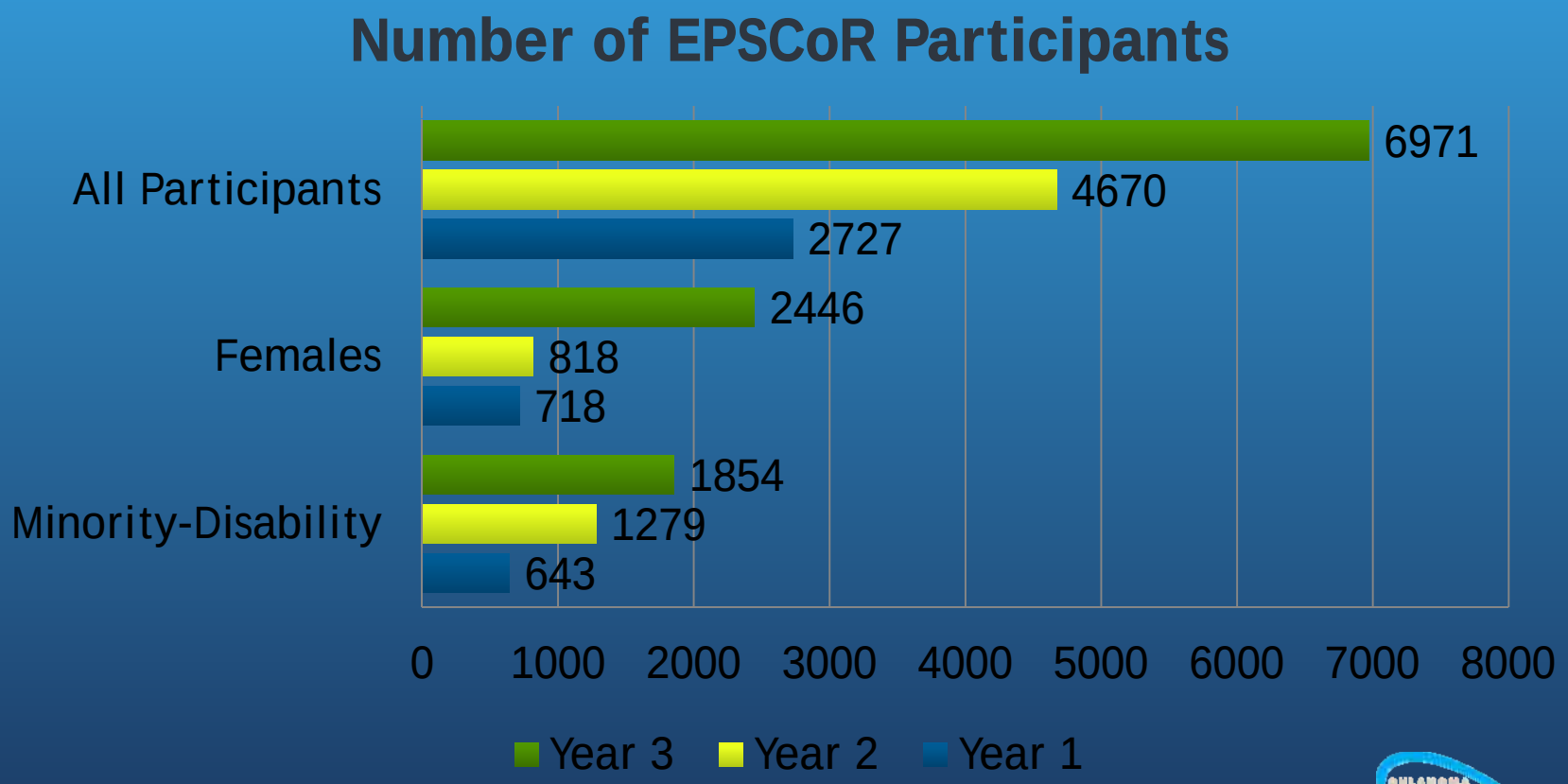
OKLAHOMA EPSCoR CI PLAN

OK CYBERINFRASTRUCTURE INITIATIVE

- All academic institutions in Oklahoma are eligible for free use of OU and OSU centrally-owned CI resources (special HPCs)
  - Currently more than 540 users at 15 academic institutions statewide
- Other institutions (government, NGO, commercial) are eligible to participate, though not necessarily for free.
  - Nonacademic users
  - NOAA agencies (NSSL)
  - Oklahoma Medical Research Foundation
  - U.S. Military
- Open participation in CI education initiatives
  - Supercomputing in Plain English
  - Supercomputing overviews and tours
  - SC09-11 (and beyond) workshops at OU and OSU
  - Oklahoma Supercomputing Symposium

OKLAHOMA EPSCoR EVALUATION

WHO ARE THE RECIPIENTS OR PARTICIPANTS IN EPSCoR SPONSORED INITIATIVES?



cyberCommons

A Project for Ecological Forecasting

CYBERCOMMONS

Project Goal

Integrate ecological science and cyberinfrastructure for predicting ecological consequences of climate and land-use/cover changes

- Oklahoma and Kansas EPSCoR collaboration
- University of Oklahoma, University of Kansas, Kansas State University, Oklahoma State University
- NSF 3-year grant, $6 mi

TWO SCIENCE QUESTIONS

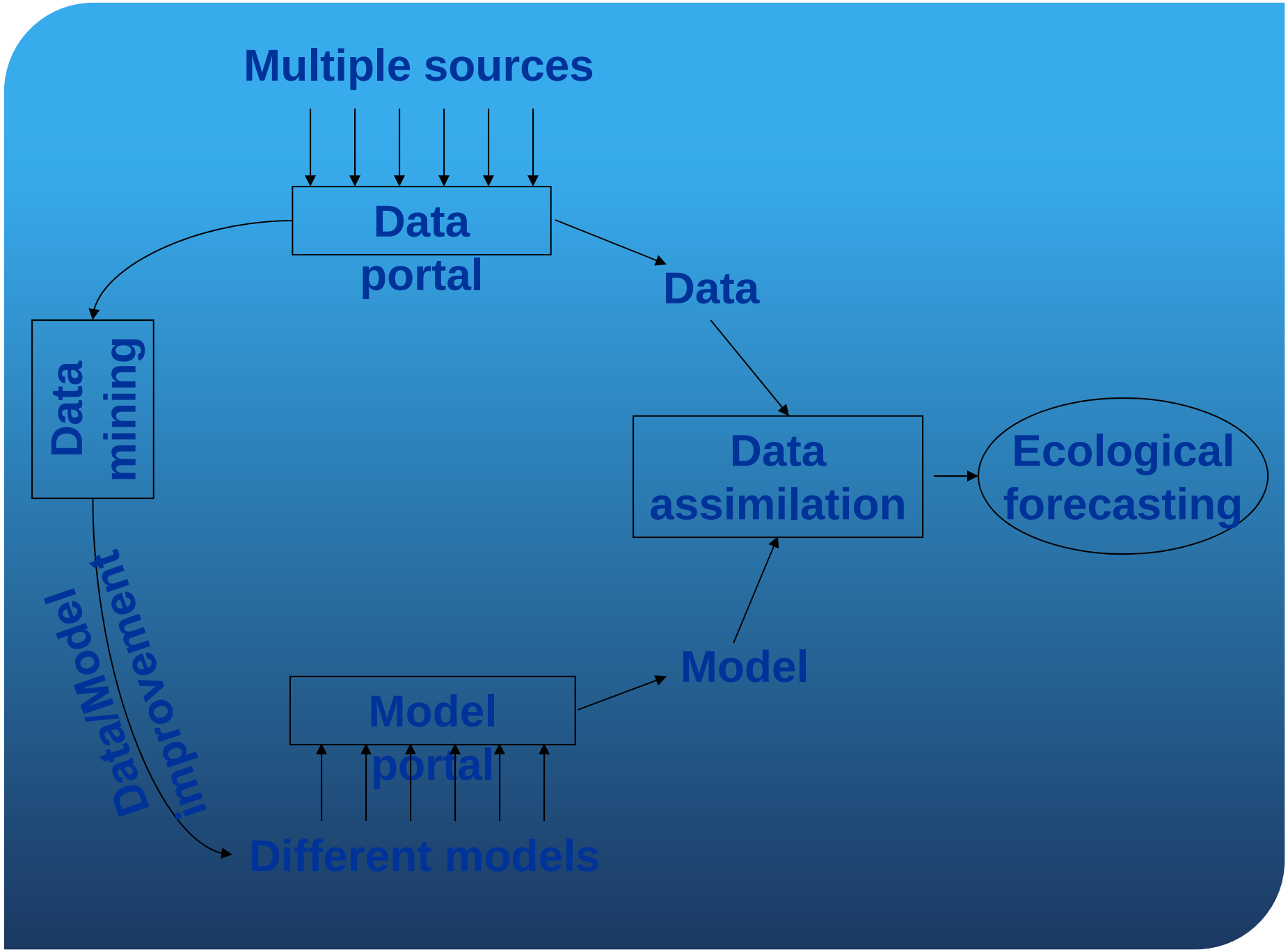
What are the impacts of changes in land-use/land-cover and climate:

Question #1

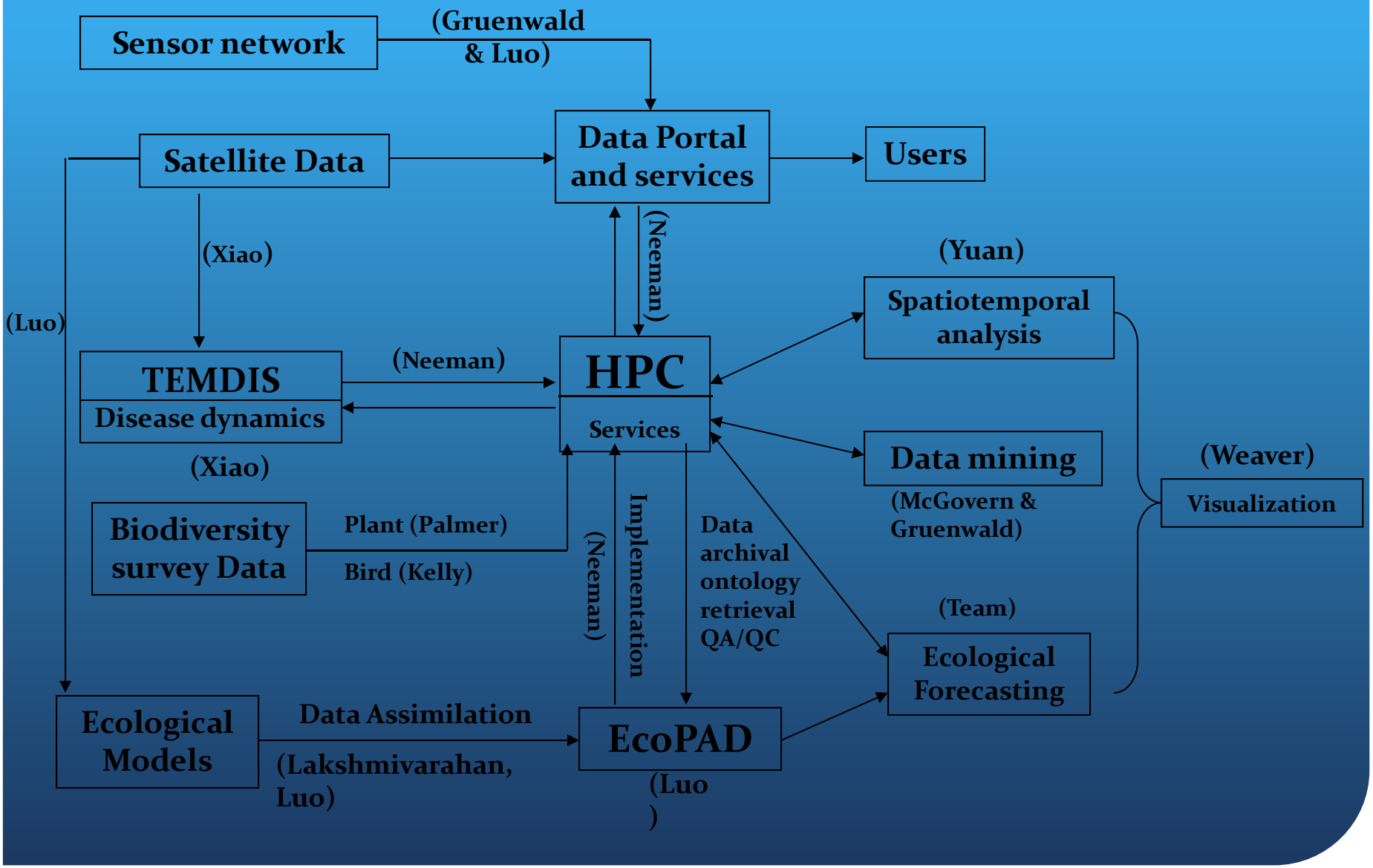
on biogeochemical cycles and ecosystem structure, function and services? What are the feedbacks among these drivers and consequences?

Question #2

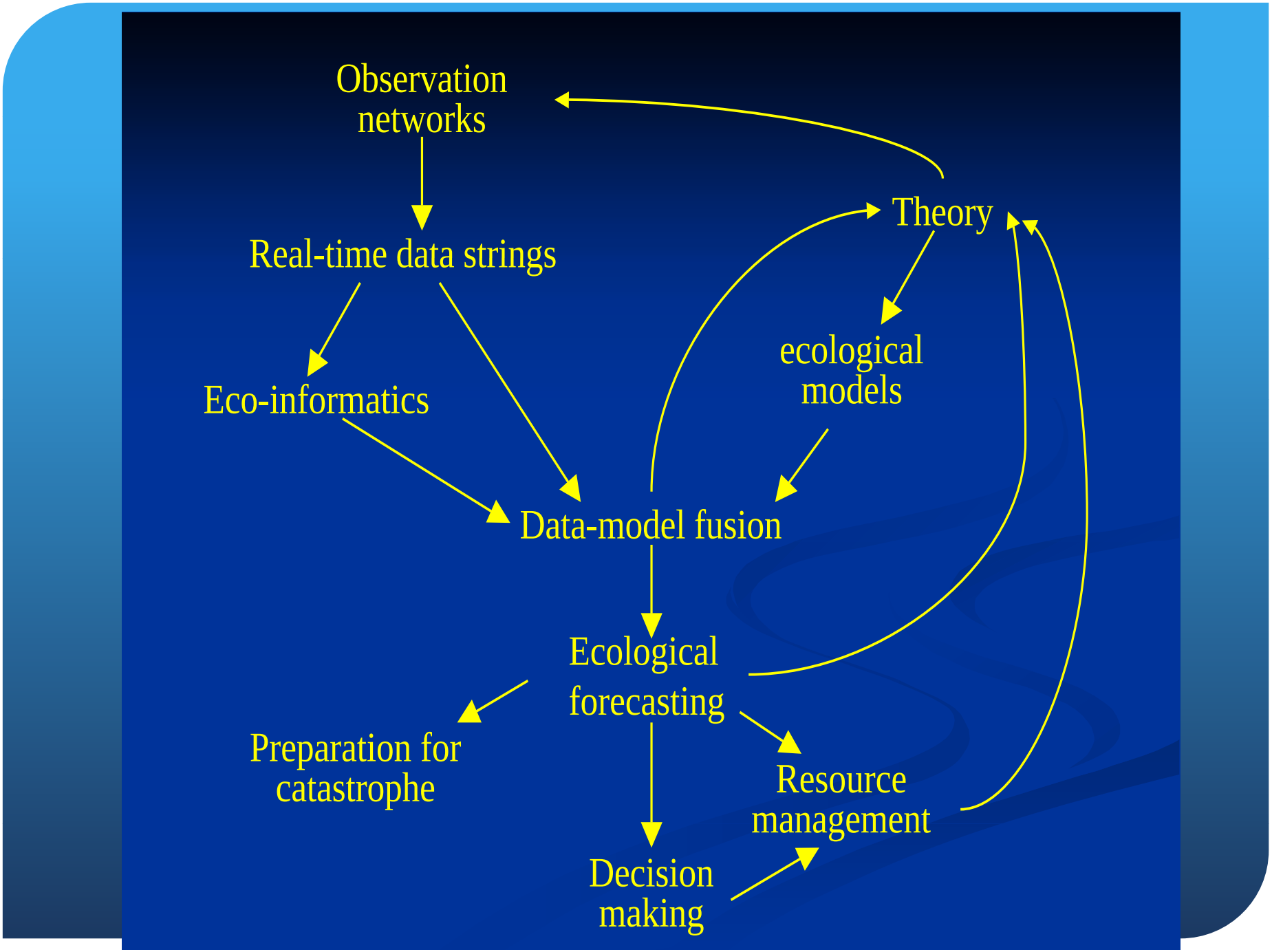
on biodiversity—its pattern, composition and dynamics? How do these changes in biodiversity affect the spread of plant and animal diseases and invasive species, and how do these phenomena influence ecosystem structure, function and services?


Multiple sources
Data portal
Data
Data mining
Data assimilation
Ecological forecasting
Model
Model portal
Data/Model improvement
Different models

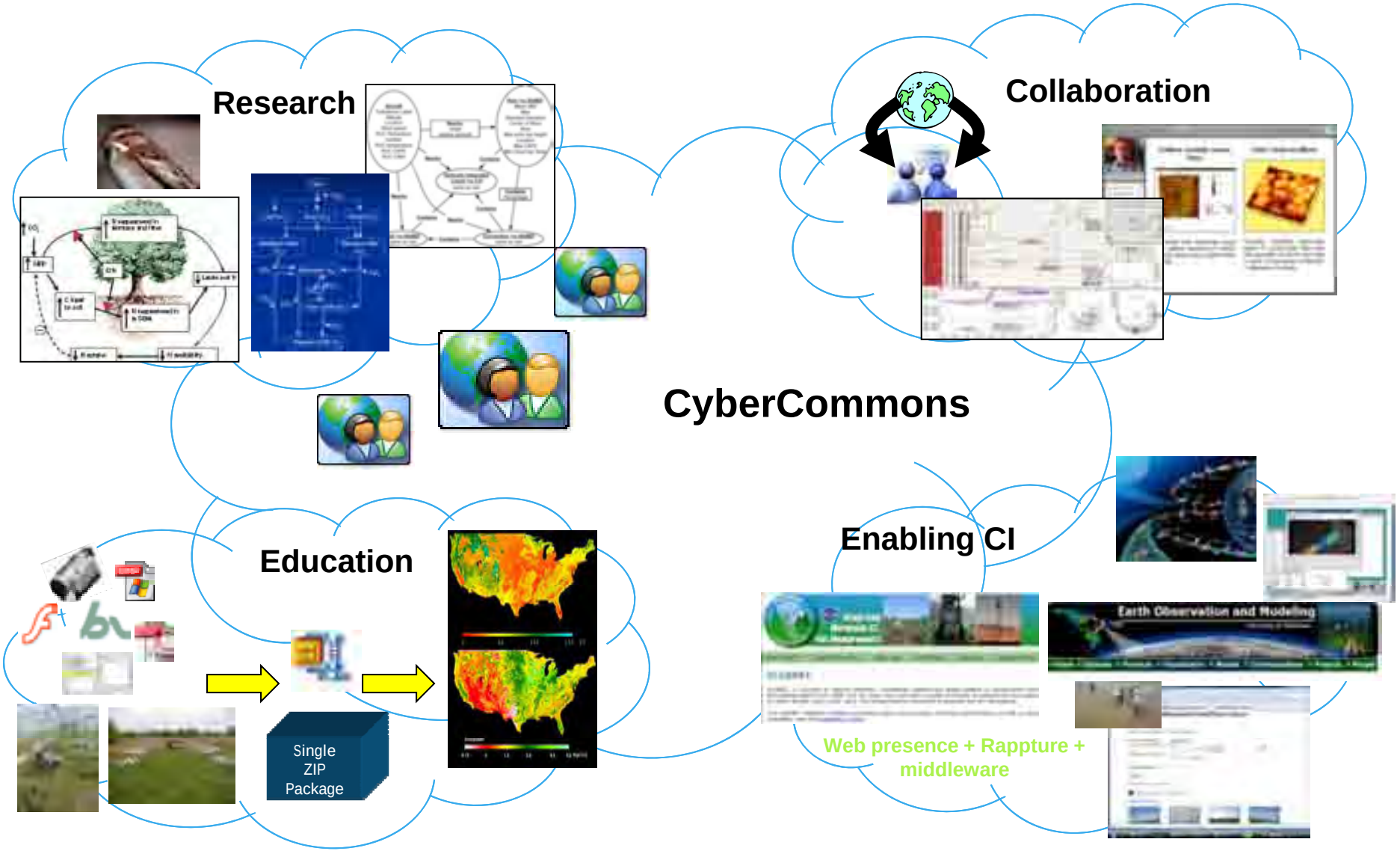
CYBERCOMMONS (EARLY VERSION)



USES OF MULTIPLE DATA SETS TO IMPROVE MODELS


Observation networks
Real-time data strings
Theory
Eco-informatics
ecological models
Data-model fusion
Ecological forecasting
Preparation for catastrophe
Resource management
Decision making

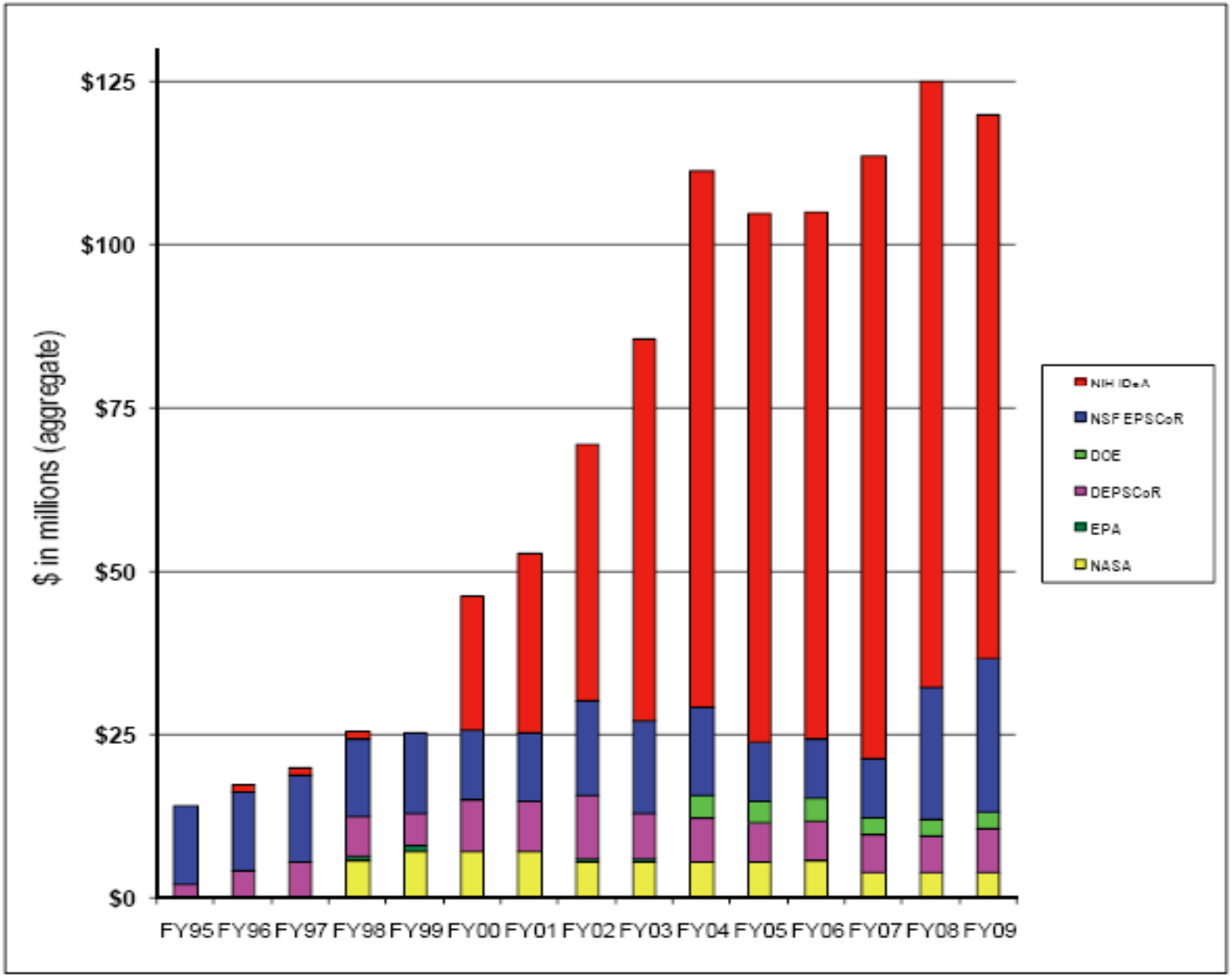
CYBERCOMMONS CONNECTING THE CLOUDS



Current Active Oklahoma EPSCoR/IDeA Awards

Program	Award	Amount	Type of Award	
NSF	EPSCoR	$24.97 million	Research Infrastructure	(3 awards)
NIH	IDeA	$19.6 million	INBRE	(1 award)
NIH	IDeA	$63.5 million	COBRE	(6 awards)
DoD	DEPSCoR	$6.8 million	Applied Research	(9 awards)
DOE	DOE EPSCoR	$5.4 million	Implementation Grant	(2 awards)
NASA	EPSCoR	$3.8 million	Research Infrastructure	(3 awards)

Active Oklahoma Awards by Year



Today's Economy

- Innovation and technology, >50%, economic growth since WW II (Augustine, 2005, 2008)
- Companies < 5 yrs old produced all net growth in U.S. jobs (EDGE 2010)
- 80% of the new jobs created by our knowledge-driven economy require education at the college level (Glazer, 2009)

Economic Development: EPSCoR creates key ingredients of innovation

- New knowledge (e.g., research)
- World-class human capital (e.g., education, diversity)
- Infrastructure (e.g., institutions, facilities, and networks)
- Policies (e.g., tax, investment, and intellectual property)

Duderstadt, J.J. 2011

Education, Innovation and Economic Growth

- 36 jobs are created for every $1.0 million dollars spent on university-based R&D (Hurley, D. 2008)

- Bachelor's degree created 92% new U.S. start-up firms
  - 50% STEM disciplines (science, technology, engineering, math)
  - 33% business, accounting and finance.

- 45% new businesses in the state where college education

- After five years companies with founders with high school degrees
  - earned <50% average revenues
  - <<employees compared to firms established by business leaders with college degrees (Wadhwa, V., R. Freeman and B. Rissing. 2008)

America is once again becoming a highly diverse nation of immigrants

- Past decade, Latin America and Asia immigrants contributed 53% of U.S. population growth
- Without immigration the U.S minority population will rise 42% by 2050 (Frey, 2010)
- Minorities now 40% of the millennial generation, students now entering our colleges (Brownstein, 2010)

Economic power of diversity

1995-2005, skilled immigrant founders

- 26% of U.S. start-up companies
- 50% of all Silicon Valley start-up companies, at least one founder, an immigrant or first-generation American.

(Wadhwa, V., R. Freeman and B. Rissing. 2008)

Oklahoma

Cost of living

- Oklahoma City 91 (100)
- Tulsa 89 (100)

- Poverty rate 16.4% (13.5%)
- Median household income $41,644 (46th)
- Per capita income $36,421 (33rd)

Oklahoma Employment Security Commission, 2010

Oklahoma Rankings

National Science Foundation

Science and Engineering Statistics

(http://www.nsf.gov/statistics/)

January 15, 2010

	#	%
First quartile	**0**	**0**
Second quartile	**11**	**21**
Third quartile	**24**	**46**
Fourth quartile	**17**	**33**

The 2010 State New Economy Index

Ewing Marion Kauffman Foundation
(26 indicators)
http://www.itif.org/files/2010-state-new-economy-index.pdf

Globalization	48
Non-industry R&D investment	48
High tech jobs	44
Industry investment in R&D	44
Venture capital	44
New economy score	42
Scientists and engineers	40
Knowledge jobs	39
Patents	31
Entrepreneurial activity	14
Economic dynamism	17

(Job churning, IPOs, patents, new entrepreneurs starting businesses)

The 2010 State New Economy Index

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S&E doctorates perform well; active high technology sector
2nd Quartile

- S&E doctorates conferred/1000 employed S&E doctorates
- Academic S&E articles/$1 M in academic R&D
- Academic patents awarded/S&E doctorates

- Net high-technology businesses formations/all business establishments

The 2010 State New Economy Index

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Too few with degrees

4th Quartile

- Associate degrees or higher, 25-44 yrs
- Bachelor's degrees or higher, 25-44 yrs

- Employed S&E holders as share of workforce
- Life & physical scientists of workforce (Engineers = 3rd)

EPSCoR and Building Oklahoma's Economy

Oklahoma Analysis

- More globalization
- More S&E degrees
- More S&E and knowledge jobs
- More industry and non-industry investment
- More venture capital

An Oklahoma-specific EPSCoR (symbiotic legume)

Targeted actions for EPSCoR projects:

- Included international business partner (10%)
- Supported completion of Professional Science Masters Degree (25%)
- Included two business partners from two different industry sectors (25%)
- Industry investment in applied science component (15%)
- Active participation in state's economic development (15%)
- One venture capitalist advisor (10%)

cyberCommons Project
(symbiotic legume)

Agencies discussed ways project could be helpful

to

cyberCommons to build an information supply chain to

meet agency information, products and people needs

Academic – Business – Government

Proposal reviewed by and endorsed by:

- Chair of Senate and House economic development committees
- Chair of State Chamber of Commerce

Products presented in terms valued by:

- Chair of Senate and House economic development committees
- Chair of State Chamber of Commerce

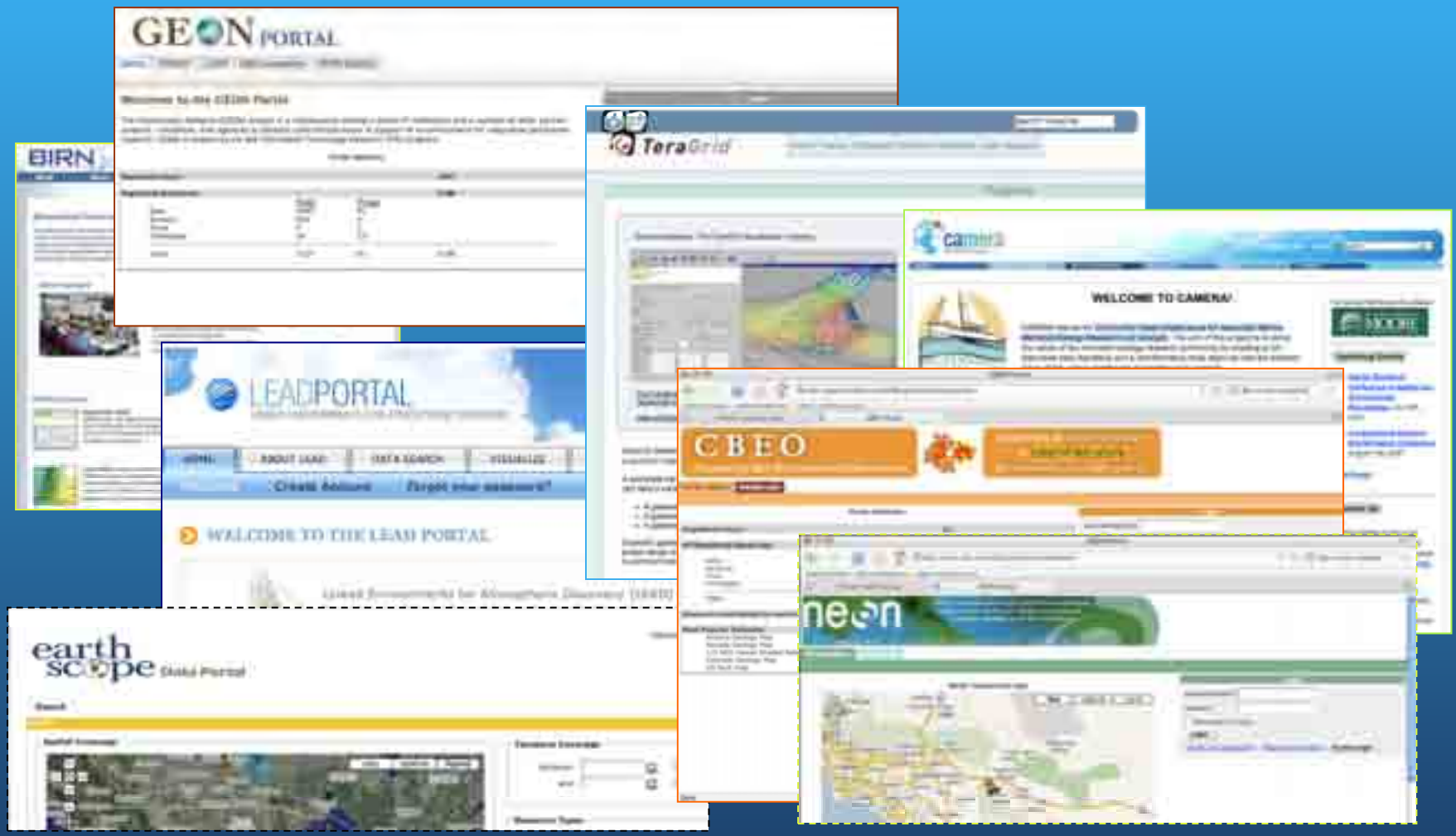
National EPSCoR Program

- NAS and AAU STEM initiatives
- K-12 National Common Core Standards
- Statewide longitudinal data systems - interventions

Invasive species to symbiotic legumes…

THANK YOU

COLLABORATIVE SCIENCE ENVIRONMENTS



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(Job churning, IPOs, patents, new entrepreneurs starting businesses)

Percentage attaining baccalaureate degrees

- African Americans 19%
- Hispanics 13%
- Whites 33%
- Asian Americans 52%

Inadequate K-12 preparation, poverty, and discrimination (Chronicle, 2010)

EPSCoR Outreach Programs

- 1,221 K-12 students
- 111 K-12 teachers
- 1,621 university students
- 463 university faculty members
- 59 business and industry representatives
- 91 national and state government staff members
- 50 technology center employees

(estimated numbers served during last 12 months)

Oklahoma EPSCoR Funding History		
	NSF EPSCoR RII Awards	New funding generated*
2002-2008	$15,000,000	$44,000,000
2008-2011	$9,000,000	$29,500,000
Total	$24,000,000	$73,500,000

* does not include funds from the NSF RII awards or State Regents

The 2010 State New Economy Index

Ewing Marion Kauffman Foundation

(26 indicators)

http://www.itif.org/files/2010-state-new-economy-index.pdf

Too few with degrees

4th Quartile

- Associate degrees or higher, 25-44 yrs
- Bachelor's degrees or higher, 25-44 yrs
- Employed S&E holders as share of workforce
- Life & physical scientists of workforce
- (Engineers as share of workforce = 3rd quartile)

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2nd Quartile

- S&E doctorates conferred/1000 employed S&E doctorates
- Academic S&E articles/$1 M in academic R&D
- Academic patents awarded/S&E doctorates

- High-technology share of all business establishments
- Net high-technology businesses formations/all business establishments
- Employment in high-technology businesses/total employment