

The Roadmapping Process

- Michigan Today
- Michigan Tomorrow
- Gap Analysis
- The Roadmap

The Roadmapping Process

- Michigan Today ("Where We Are")
- Michigan Tomorrow (Where We Need to Be")
- Gap Analysis ("How Far We Have to Go")
- The Roadmap ("How to Get There")

Michigan Today: Challenges

Michigan faces three major challenges:

- The emergence of an economy based on knowledge—educated people and their ideas—and powered by the breathtakingly rapid development of new digital technologies;
- The globalization of the world's economy and culture enabled by technologies of communication and travel; and
- The demographic changes in the American population bringing hitherto under represented groups into a majority of the workforce.



Globalization

Globalization



- "We see globalization—the growing interconnectedness reflected in the expanded flows of information, technology, capital, goods, services, and people throughout the world—as an overarching mega-trend, a force so ubiquitous that it will substantially shape all the other major trends in the world of 2020."

National Intelligence Council Project 2020



In 2020...

- China's GNP will exceed that of all individual western economic powers except for the U.S. India's GNP will be larger than European economies.
- Sheer size of China's and India's population (1.4 B and 1.3 B) along will make them powerful economies.
- The Asian mega-market—China, India, Russia, Korea, etc.—could become dominant—particular in human capital.

The Importance of Technology



"The greatest benefits of globalization will accrue to countries and groups that can access and adopt new technologies. Indeed, a nation's level of technological achievement generally will be defined in terms of its investment in integration and applying the new, globally available technologies."

"China and India are well-positioned to become technology leaders, particularly in the next revolution of high technology involving the convergence of info-, bio-, and nano-technology."



The Developed Nations

The transition to a global, knowledge-driven economy will not be painless, and it will hit the middle classes of the developed world in particular, bringing more rapid job turnover and requiring professional retooling. Outsourcing and off-shoring on a massive scale will be disruptive.

Example: Compensation levels in China and India for engineers are roughly one-fifth those in the U.S. How can American engineers produce **FIVE TIMES** the value-added necessary to be competitive in the global marketplace?

An Example: "Off-Shoring"



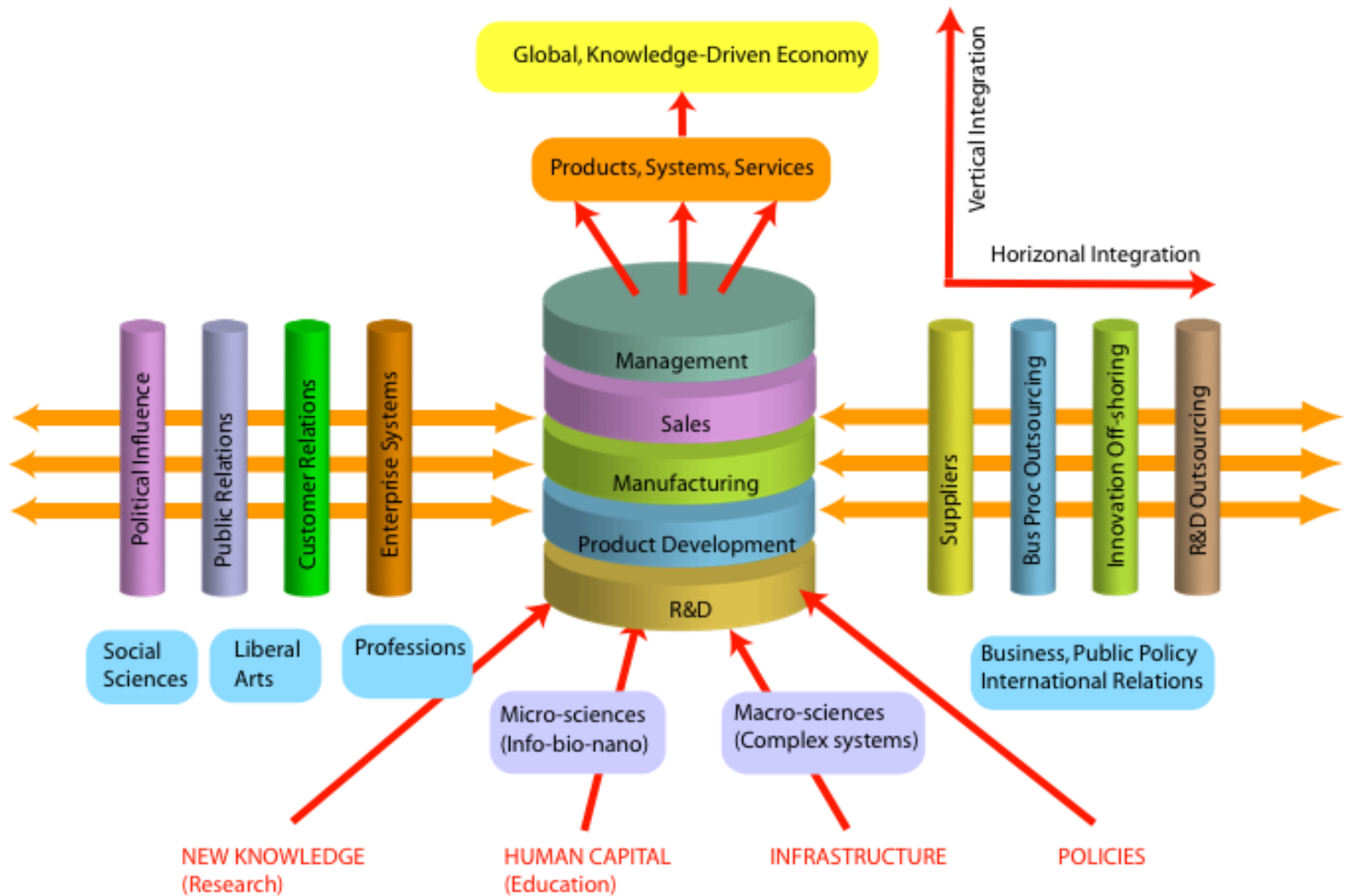
- U.S. has already lost most low skill, high pay jobs in manufacturing to Asia and Latin America ("outsourcing")
- Today it is losing high tech jobs to India and China ("off-shoring")
- Tomorrow, the convergence of the gigantic source of human capital represented by India, China, and Russia threatens will have serious implications for sustaining our standard of living
- (We cannot maintain prosperity by just mowing each other's lawns...)













Demographics



Demographics: Aging

- Over the next decade the percentage of the population over the age of 60 will grow to over 30% to 40% in the U.S., Europe, and parts of Asia.
- Half of the world's population lives in countries where fertility rates are not sufficient to replace their current populations.
- Aging populations and shrinking work forces will have an important impact, particularly in Europe, Russia, and some Asian nations such as Japan, South Korea, and Singapore.

The United States



- The U.S. will be one of the few developed nations with a growing population, estimated to grow from 300 M to over 450 M by 2050 because of immigration from Latin America and Asia.
- However an aging population will increasingly focus national priorities on the concerns of the elderly (e.g., health care, tax relief) rather than the needs of the young (e.g., education).

The United States (cont)



- Immigration will continue to diversify the American population with respect to race, ethnicity, and nationality, posing significant social and political challenges.
- Clearly the future of our nation depends on its capacity to draw strength from diversity, but political and economic barriers will continue to exist for many underrepresented populations.

The Developing World



- Most population will occur in the developing world with high fertility rates—Africa, Latin America, Asia—where the average age is less than 20 (with over 2 B teenagers).
- Unless the world can provide this rapidly growing population with the education necessary to compete in and survive in a global economy, the resulting despair and hopelessness among the young will continue to feed the terrorism that so threatens our world today.

An Observation



"The United States is a small part of a very large, poor, and rapidly changing world, and we, along with everyone else, must do a better job. Globalization appears to have become an irresistible force, but we must make it participatory and humane to alleviate the suffering of the world's poorest people and the effective disenfranchisement of many of its nations.

In our world today, the best defense against terrorism is an educated people. Education, which promises to each individual the opportunity to express their individual talents fully, is fundamental to building a peaceful world."

Peter Raven

One More Concern



Last month the United Nation's projected the Earth's population in the year 2050 as 9.1 billion, 50% larger than today.

Can we sustain a population of that magnitude on Spaceship Earth?

The image features a blue-tinted view of Earth from space, showing the continents of North and South America. The background is a light blue gradient with a faint grid pattern. The text "The Age of Knowledge" is centered in a black, italicized font.

The Age of Knowledge



The Age of Knowledge

- Today we are evolving rapidly into a post-industrial, knowledge-based society, a shift in culture and technology as profound as the shift that took place a century ago when our agrarian societies evolved into industrial nations.
- Industrial production is steadily shifting from material- and labor-intensive products and processes to knowledge-intensive products and services.



The Age of Knowledge

- A radically new system for creating wealth has evolved that depends upon the creation and application of new knowledge.
- In this "Age of Knowledge", the key strategic resource necessary for economic prosperity and national security has become knowledge itself—educated people and their ideas.

But...



- But unlike natural resources such as oil or iron that have driven earlier economic transformations, knowledge is inexhaustible. The more it is used, the more it multiplies and expands.
- But knowledge can be created, absorbed, and applied only by the educated mind.
- Hence the true wealth of nations in a global, knowledge-driven society has become human capital: educated people!



Implications

- A hypercompetitive, global, knowledge economy
- Outsourcing, offshoring, mega-markets
- Market forces >> public policies
- Importance of innovation
- Changing educational needs and paradigms for the 21st Century.

Michigan Today?

- The Michigan Economy
- Demographics
- Educational Performance
- Knowledge Generation
- Policies

Economic Performance

- \$308 billion (larger than Russia and Switzerland)
- Per capita income of \$30,296 just below national average (\$30,941); grew 12% slower than national average over past 25 years (4th worst in the nation)
- Thus far in 2004, Michigan ranks last in economic performance, losing more jobs than it is creating.
- Michigan is 3rd most dependent state on manufacturing, despite fact that most job growth has been in service jobs. Michigan lost 163,000 (out of 700,000) manufacturing jobs in the last three years.
- Michigan ranks 21st in knowledge-dependent service jobs, however.

Demographics

- 10 million (8th nationally)
- Increased only 7% in 1990s (13% in U.S.)
- 25% of growth from foreign immigrants
- Brain drain: loss of 12% of 25 to 44 year olds (4th largest in nation)
- Loss of 4% of 18 to 24 year olds
- Michigan is aging rapidly.

Metrics for a Knowledge Society

- Only 22% have BA or advanced degrees (4% below U.S. average and 34th)
- Below national average in S&E degrees
- UM and MSU have capacity to attract S&E students from outstate, 55% of whom stay (but state discourages this).
- Most R&D is product development (automobile or pharmaceuticals)
- Michigan is at national average in academic R&D, but this is mostly due to UMAA.
- Michigan ranks last in venture capital (only 10% of national average).

Policies of State Government

- No real state higher education policy (at least at a strategic level)
- The funding of higher education has been a low priority of the state. Over the past 20 years, higher ed funding has increased by 30%; prison funding has increased by 300% and now is considerably larger than higher ed.
- Recent polls suggest that much of population does not perceive a need for post-secondary education.
- Little understanding of R&D needs or opportunities.

Michigan Tomorrow

- What skills and knowledge are necessary for individuals to thrive in 21st Century?
- What skills and knowledge are necessary for a population (workforce) to provide "regional advantage" in such a competitive economy?
- What level of knowledge generation (R&D, innovation, entrepreneurialism) is necessary to sustain a 21st Century Economy?

Educational Needs for 21st C Citizens

- College education is a necessity
 - Perhaps even graduate education
- Lifelong learning is an imperative
- New forms of pedagogy
 - Collaborative, interactive, hyperlearning
 - Constructionist, extrinsic, intrinsic
- "Liberal learning" for the 21st C?

Building a Competitive Workforce

- Continuous improvement of workforce skills (20% of time in formal learning)
- Knowledge workers will make less and less distinction between work and learning.
- From "just-in-case" to "just-in-time" to "just-for-me"
- Capable of competing with workforces in China and India earning much less...

Technological Innovation

- The key to U.S. economic prosperity and national security: innovation!!!
- Schumpeter: "Creative destruction" ... continually replacing old industries with new...
- But other nations are investing heavily in creating the human capital, new knowledge, and infrastructure necessary for innovation.



The Ingredients of Innovation

- The U.S. culture—a diverse population, democratic values, free market practices— provide a fertile environment for innovation,
- But history has show that significant public investments is necessary to produce key ingredients for technological innovation:
 - New knowledge (research)
 - Human capital (education)
 - Infrastructure (physical, cyber)
 - Policies (tax, intellectual property)

Gap Analysis: How Far to Go?

- Educational Performance
- Knowledge Generation
- Infrastructure
- Investments
- Public Policy
- Public Attitudes

Glazer-Grimes Report

"These days the keys to economic success are a well-educated workforce, technical know-how, high levels of capital investment, and entrepreneurial zeal. If the U.S. (and Michigan) is to meet the challenge posed by a truly global economy, it will have to insure that its scientists are the most creative, its business leaders are the most innovative, and its workers are the most highly skilled—not easy when other nations (and other states) are seeking the same goals.

Yet...Michigan lags behind

In educational achievement:

- Our population is aging and our 25-44 year olds are leaving the state.
- Only one-third of K-12 graduates are college ready.
- Only 22% have bachelors degrees, a shortfall of 270,000 degrees.

There is growing evidence that a skilled worker shortage—created by low birthrates, out-migration of young adults, and poor performance of our educational systems—poses a serious threat.

Educational Performance

- 44% of Michigan adults have a literacy level too low to function in today's society.
- Serious regional and ethnics gaps.
- Only 73% of 9th graders will graduate from high school
- Only 32% of H.S. graduates are "college ready" (below national average)
- Less than 50% of college students will graduate
 - UM: 90%; MSU: 70%
 - All other publics at less than 50%!

In generating new knowledge...

- New jobs will be created by new knowledge and new activities (info-bio-nano, knowledge services, etc.)
- Private rate of return from R&D investments is 25% to 30%.
- Unfortunately, most industrial R&D in Michigan is in product development rather than basic research.
- While the state has two world-class research universities (and only can support two), they are funded at a level more typical of regional four-year colleges than research-graduate-intensive universities.
- And again chasing rainbows such as the Life Sciences Corridor.

In infrastructure...

- Ranking only 24th among states in deployed broadband
- And very last in ILEC per-line investments.
- Also lacking in any visionary public policy (instead wasting time and funding on wild goose chases such as giving all 6th graders laptop computers).
- Relying on the marketplace (e.g., SBC...which is headquartered in San Antonio) to provide connectivity.

Investments

- Michigan's support of higher education is the lowest among the Great Lakes states and ranks in the bottom third of the nation.
- Over past two years, state has cut \$260 million from higher ed budget (while exerting political pressure to cap tuitions).
- Michigan also lags far behind other states in providing state support of academic buildings (with no capital outlay program for almost a decade).

Public Policy?

- Higher education is a low priority.
- Rather than adequately funding higher education, Michigan prefers to attack its universities (e.g., tuition) of set empty goals such as "doubling the number of college graduates" with no strategy for funding this growth.
- Instead state politicians grasp at straws such as gambling, tax abatements for dying industries, or tax cuts (primarily benefiting the wealthy).

"State government treats its universities the way I treat my roof, putting off repairs to fund other desires, and waiting until the roof falls in before paying any attention to needs."

Public Attitudes

- Polling indicates that the public supports a greatly enhanced investment in education.
- They view education as the key to their economic future.
- But, as yet, state politicians do not recognize this sea change.

The Gap: A Summary

- A difficult transition from a manufacturing to a knowledge economy: unemployment, declining per capita income, brain drain
- Education gap: Weak K-12, low college participation, low public investment
- Knowledge gap: Low federal R&D, industry R&D almost all product development
- Culture gap: inadequate investment in future, baby boomer priorities, fighting old battles, "an extreme intolerance of extraordinary excellence"

What to do?

The Cherry Commission:

- Preparation
- Participation
- Completion
- Economic Benefits

But still tinkering about the status quo...

(and mostly blaming higher ed rather than challenging the politicians...)

A Roadmap for Michigan

- The Near Term
 - Human capital
 - New Knowledge
 - Infrastructure
 - Policies
- Longer Term

Human Capital

- Michigan must increase the participation of its citizens in higher education at all levels—community college, baccalaureate, and graduate and professional. This will require both a substantial increase in the funding of higher education from both public and private sources, as well as significant changes in policy. It will also likely require a dedicated source of tax revenues to achieve and secure the necessary level of investment during a period of gridlock in state government, perhaps through a citizen-initiated referendum.

Human Capital (continued)

- To achieve and sustain quality of and access to educational opportunities, Michigan needs to move into the top quartile of states in its higher education appropriations (on a per student basis) to its public universities. To achieve this objective, state government should set a target of increasing by 30% (beyond inflation) its appropriations to its public universities over the next five years.

Human Capital (continued)

- The increasing dependence of the knowledge economy on science and technology, coupled with Michigan's relatively low ranking in percentage of graduates with science and engineering degrees motivates a strong recommendation to state government to place a much higher priority on providing targeted funding for these programs in state universities.
- Colleges and universities should place far greater emphasis on building alliances that will allow them to focus on core competencies while joining with other institutions in both the public and private sector to address the broad and diverse needs of society..

New Knowledge

- Michigan must invest additional public and private resources in stimulating the R&D, innovation, and entrepreneurial activities key to transforming its 20th century manufacturing and low-skill services economy into a 21st century knowledge-driven economy.
- The quality and capacity of Michigan's learning and knowledge infrastructure will be determined by the leadership of its two flagship universities, UMAA and MSU. These institutions should be encouraged to stress their roles as sources of advanced knowledge and learning while providing the state with access to human capital and markets throughout the nation and the world.

New Knowledge (continued)

- In response to such reinvestment in research capacity, Michigan's universities in turn must become more strategically engaged in both regional and statewide economic development activities.
- Michigan must also invest additional public and private resources in private-sector initiatives designed to stimulate R&D, innovation, and entrepreneurial activities.

Infrastructure

- Providing the educational opportunities and new knowledge necessary to compete in a global, knowledge-driven economy requires an advanced technological infrastructure. Michigan should give far higher priority to public investments in technologies such as broadband connectivity, which will support, link, and provide access to all of the state's knowledge resources, e.g., K-12, higher education, libraries, museums, cultural resources, and government agencies.

Policies

- As powerful market forces increasingly dominate public policy, Michigan's higher education strategy should become market-smart, investing more public resources directly in the marketplace through programs such as need-based financial aid or competitive research grants rather than exclusively in academic institutions, while enabling public colleges and universities to compete in this market through encouraging greater flexibility and differentiation in pricing, programs, and quality aspirations.

Policies (continued)

- Michigan should target its tax dollars more strategically to leverage both federal and private-sector investment in education and R&D. For example, a shift toward higher tuition/need-based financial aid policies in public universities not only leverages greater federal financial aid but also avoids unnecessary subsidy of high-income students. Furthermore greater state investment in university research capacity would leverage greater federal and industrial support of campus-based R&D.

Policies (continued)

- Key to achieving the agility necessary to respond to market forces will be a new social contract negotiated between the state government and Michigan's public colleges and universities that provides enhanced autonomy and agility in return for greater (and more visible) public accountability with respect to quantifiable deliverables such as graduation rates, student socioeconomic backgrounds, and intellectual property generated through research and transferred into the marketplace.

The Longer Term

- Michigan needs to develop a more systemic and strategic perspective of its educational and cultural institutions—both public and private, formal and informal—that views these knowledge resources as comprising a learning ecology that must be allowed and encouraged to adapt and evolve rapidly to serve the needs of the state in a change-driven world, free from micromanagement by state government or intrusion by partisan politics.

The Longer Term (continued)

- Michigan should strive to encourage and sustain a more diverse system of higher education, since institutions with diverse missions, core competencies, and funding mechanisms are necessary to serve the diverse needs of its citizens, while creating an educational infrastructure more resilient to the challenges presented by unpredictable futures.
- Serious consideration should be given to reconfiguring Michigan's educational enterprise by exploring new paradigms and launching experiments based on the best practices of other regions and nations.

The Longer Term

- Using a combination of technology and funding policies, efforts should be made to link all elements of Michigan's learning and knowledge resources into a seamless web, centered on the needs of the learner rather than the ambitions of institutions and political leaders.
- While it is natural to confine state policy to state boundaries, in reality such geopolitical boundaries are of no more relevance to education policy than they are to corporate strategies in an ever more integrated and interdependent global society. Hence Michigan's educational strategies must broaden to include regional, national, and global elements.

The Longer Term (continued)

- Michigan's research universities should explore new models for the transfer of knowledge from the campus into the marketplace such as "open source paradigms" in which the intellectual property created through research and instruction is placed in the public domain as a "knowledge commons", available without restriction to all, in return for strong public support.

The Longer Term (continued)

- Michigan should explore bold models aimed at producing the human capital necessary to compete economically with other regions (states, nations) and provide its citizens with prosperity and security. One such model might be to develop a 21st century analog to the G.I. Bill of the post WWII era that would provide—indeed, guarantee—all Michigan citizens with access to abundant, high quality, diverse learning opportunities throughout their lives, and adapts to their ever-changing needs.

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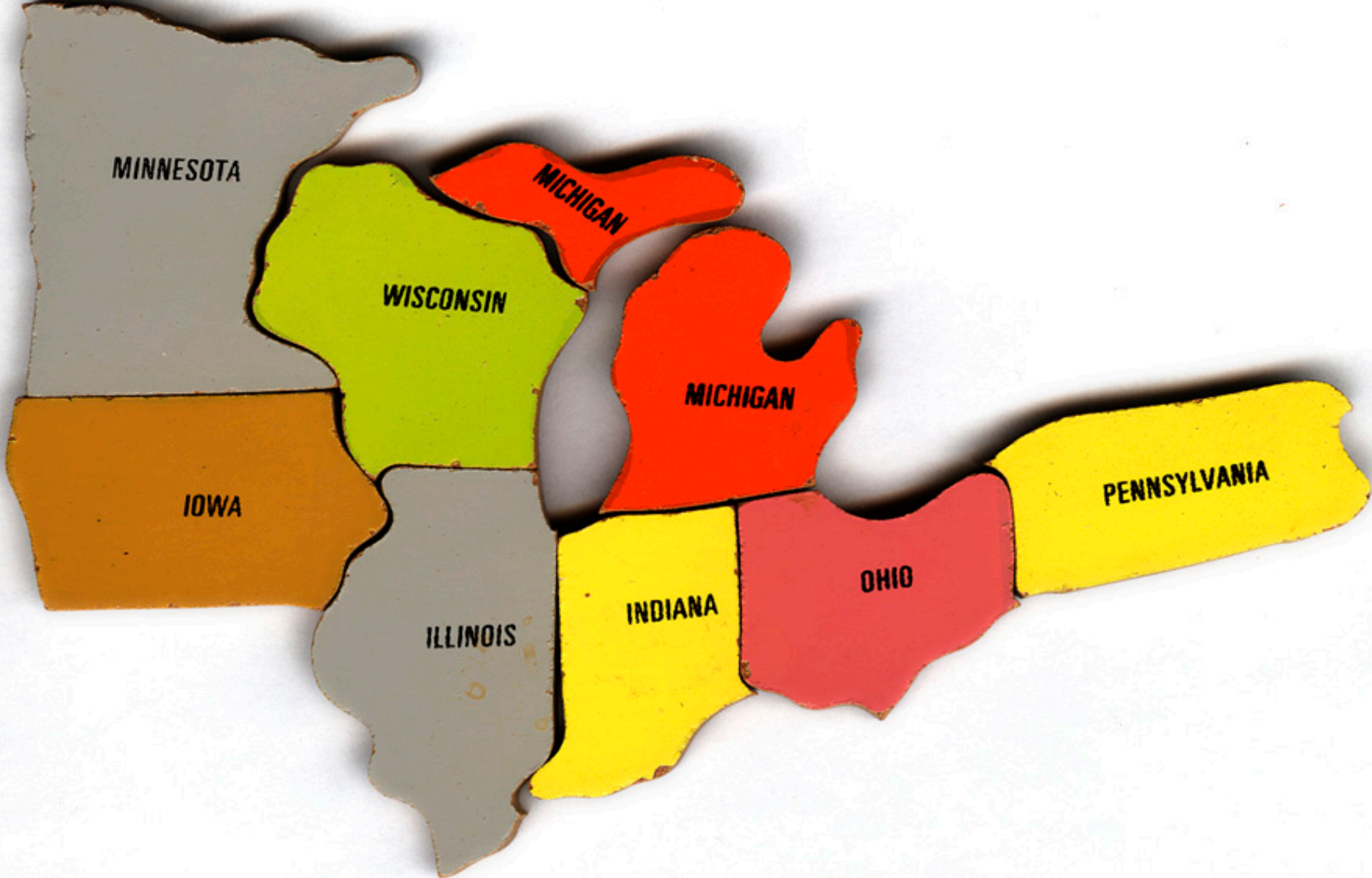
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- More on this later when we discuss the National Commission on the Future of Higher Education...

Another Roadmap

Actually, the same concerns and discussions are occurring in many other Great Lakes cities—Chicago, Cleveland, Pittsburgh, Toronto...

Perhaps the Michigan Roadmap should be extended to the Great Lakes region.



MINNESOTA

WISCONSIN

IOWA

ILLINOIS

MICHIGAN

MICHIGAN

INDIANA

OHIO

PENNSYLVANIA

Committee on Institutional Cooperation



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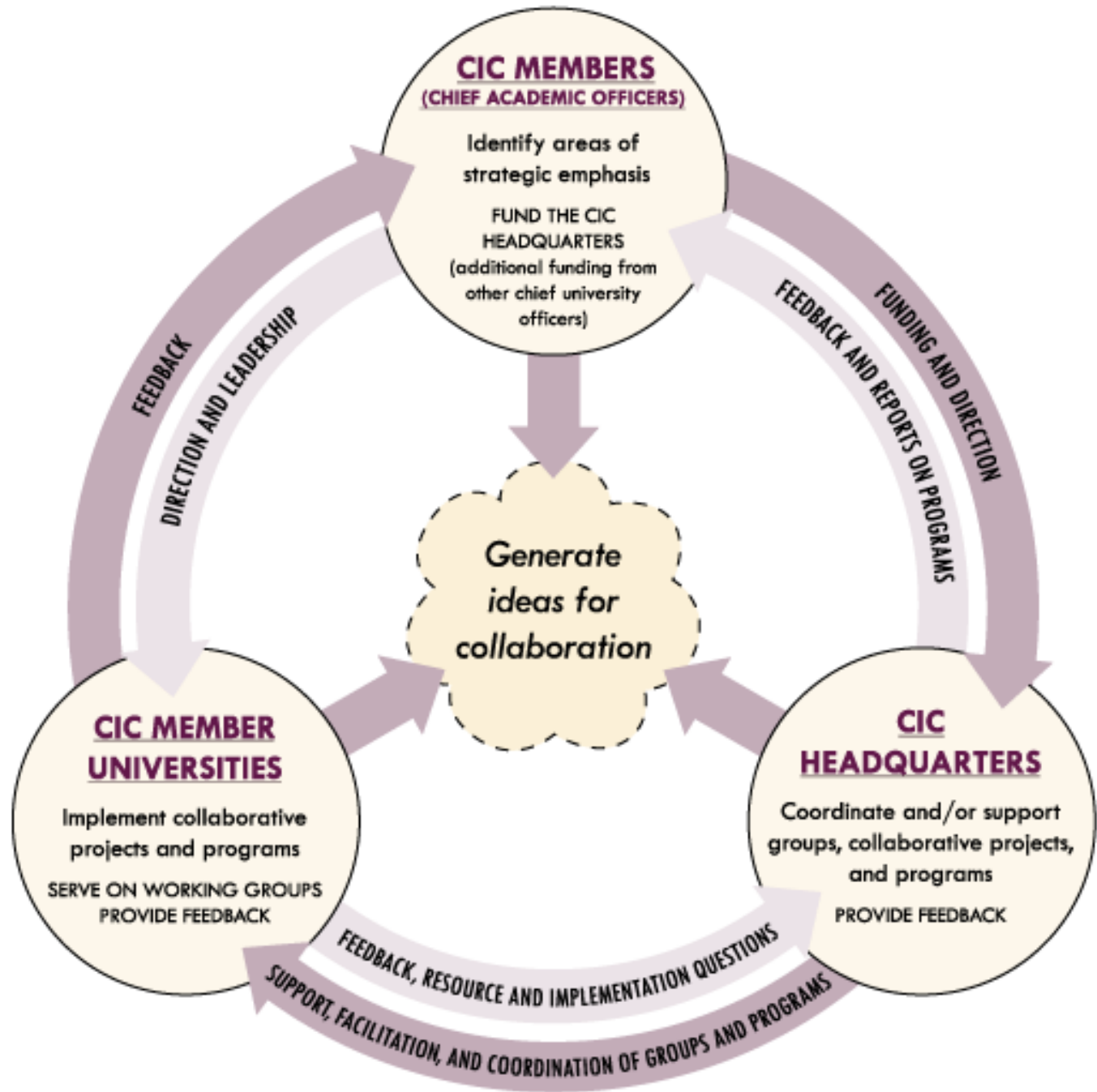
- [CIC Library Spaces Conference, May 2-3, 2005](#)
- [Scholarly Communication: Access to Journal Literature Report](#)
- [Register for the CIC Diversity Forum 2005, Being Held April 3-5](#)
- [Report to the Members - Dec. 2004](#)
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The Committee on Institutional Cooperation (CIC) is the academic consortium of the [Big Ten universities](#) and the [University of Chicago](#). The CIC is committed to advancing academic excellence through resource sharing and collaboration.



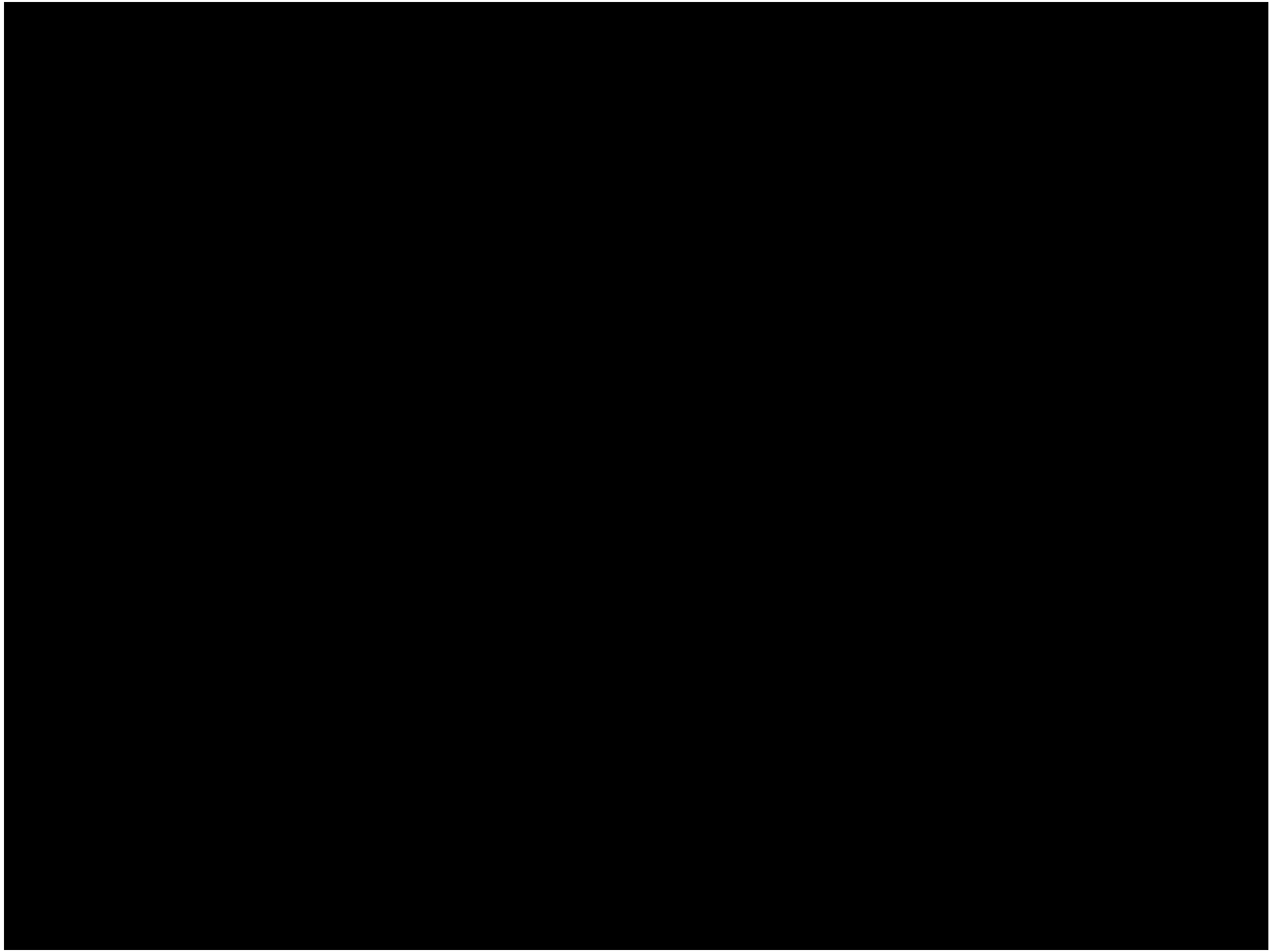
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The Task at Hand...

- What are the key recommendations (both near term and long term) that need to be on the table?
- Who is the target audience, and how do we follow up?
- What should be the key document? A brief 2-3 pager? A more comprehensive report? To whom should it be sent?



Environmental Scans

Today (2005)

Globalization
 Transport + Commun
 Integrated Economies, Culture, Conflict

Demographics
 Population Growth
 Baby-boomers vs. Global Teenager
 Diversity

Exponentiating Technologies
 Info-bio-nano technology
 Complex systems

Explosion of New Knowledge

Implications

Hypercompetitive, global,
 knowledge-driven economy
 Global disparity in wealth and power
 driving geopolitical conflict
 Market forces dominating public policy
 Obsolescence of existing social
 institutions (e.g., nation-state)

Tomorrow (2010-2050)

Global Sustainability
 Population growth to 8 - 10 billion
 End of Fossil Fuels
 Global Climate Change

Hypercompetitive, integrated, global economy
 China, India, Eastern Bloc
 Off-shoring

National/homeland Security
 Terrorism vs. Freedom

Exponential Technologies

Possible surprises:
 Human lifespan doubles (or pandemics)
 Disappearance of work
 Artificial intelligence ("mind children")
 Contact

Michigan Challenges

Erosion of Traditional Economic Base
 Low-skill jobs (outsourcing) and high-skill jobs (off-shoring)
 No obvious candidate for future economic engine
 Current culture hostile to innovation

Increasing obsolescence of social institutions—but resistant to change
 Government, corporations, labor, education
 Political system, public opinion

Structural budget obsolescence
 Unfunded mandates (Medicaid, K-12, Corrections)
 Obsolete tax system (irrelevant to a service economy)

Inadequate Michigan leadership
 Sense of denial—hoping the past will return
 Lack of vision—and inability to develop one
 Clueless—today's political issues are meaningless
 (gay marriage, affirmative action, creationism, stem cell ban)
 Current priorities are basically stupid
 Detroit casinos, SUVs, Michigan football

Investments in higher education, research, and innovation are
 Woefully inadequate (lowest in Midwest)
 Blatantly political (Merit Scholarship Program, Life Sciences Corridor)
 Tragically ill-considered (Low tuition + low support = low quality + low access;
 targeting R&D investments to areas of weakness)

Recommendations

The Near Term

Today's Challenge: Enabling Michigan's transition to a knowledge-driven economy capable of providing prosperity, security, and social well-being in a hypercompetitive global economy.

Key Vision:

To invest more adequately, strategically, and intelligently.

Investment Goals:

- ...human capital (lifelong learning)
- ...new knowledge (research, innovation, entrepreneurship)
- ...infrastructure (institutions, labs, cyber)
- ...policy (tax, investment, intellectual property)

The Elements:

1. Increase participation of all citizens in higher education.
2. Move Michigan into top quartile in higher ed investments.
3. Targeted state investment in science and engineering.
4. Stress alliances among Michigan's colleges and universities.
5. Michigan should increase investments in university research infrastructure (similar to Research Excellence Fund).
6. Michigan universities should become more engaged in tech transfer and economic development.
7. Michigan should develop incentives (including tax policy) to stimulate private sector R&D and innovation.
8. Public investment in infrastructure such as broadband is critical.
9. Michigan should invest more in higher education marketplace (particularly need-based financial aid).
10. State funds should be used to leverage private and federal funds.
11. State universities should be provided with agility to adapt to market, subject to accountability measures.

The Longer Term

Tomorrow's Challenge: To provide all of Michigan's citizens with the education and training they need, throughout their lives, whenever, wherever, and however they desire it, at high quality, and affordable cost.

Key Vision:

To develop a knowledge society capable of responding to the imperatives of a 21st century, global, knowledge-driven society.

Goal:

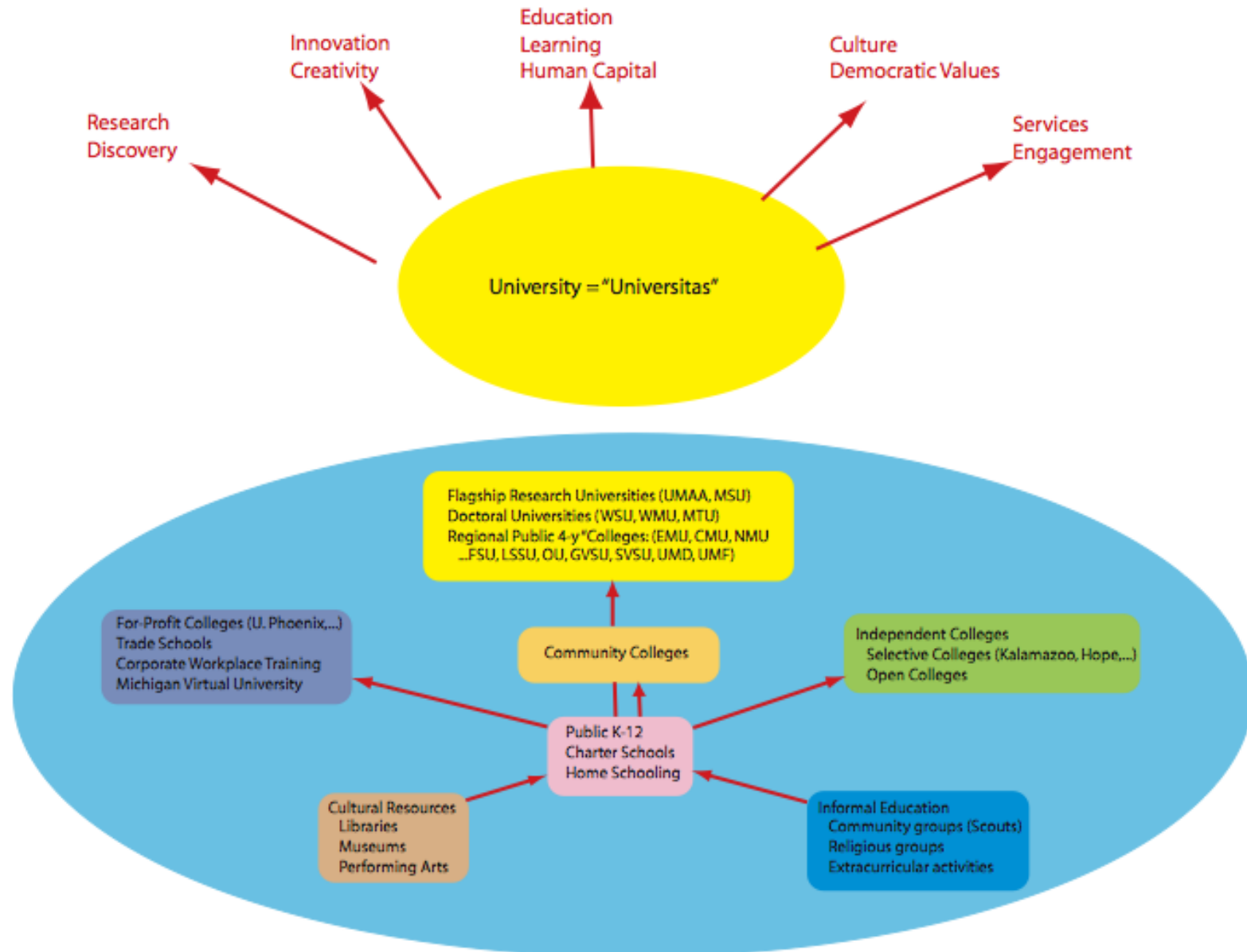
A society of learning, capable of adapting and evolving rapidly to provide learning opportunities, knowledge, and innovation during a period of extraordinary change.

The Elements:

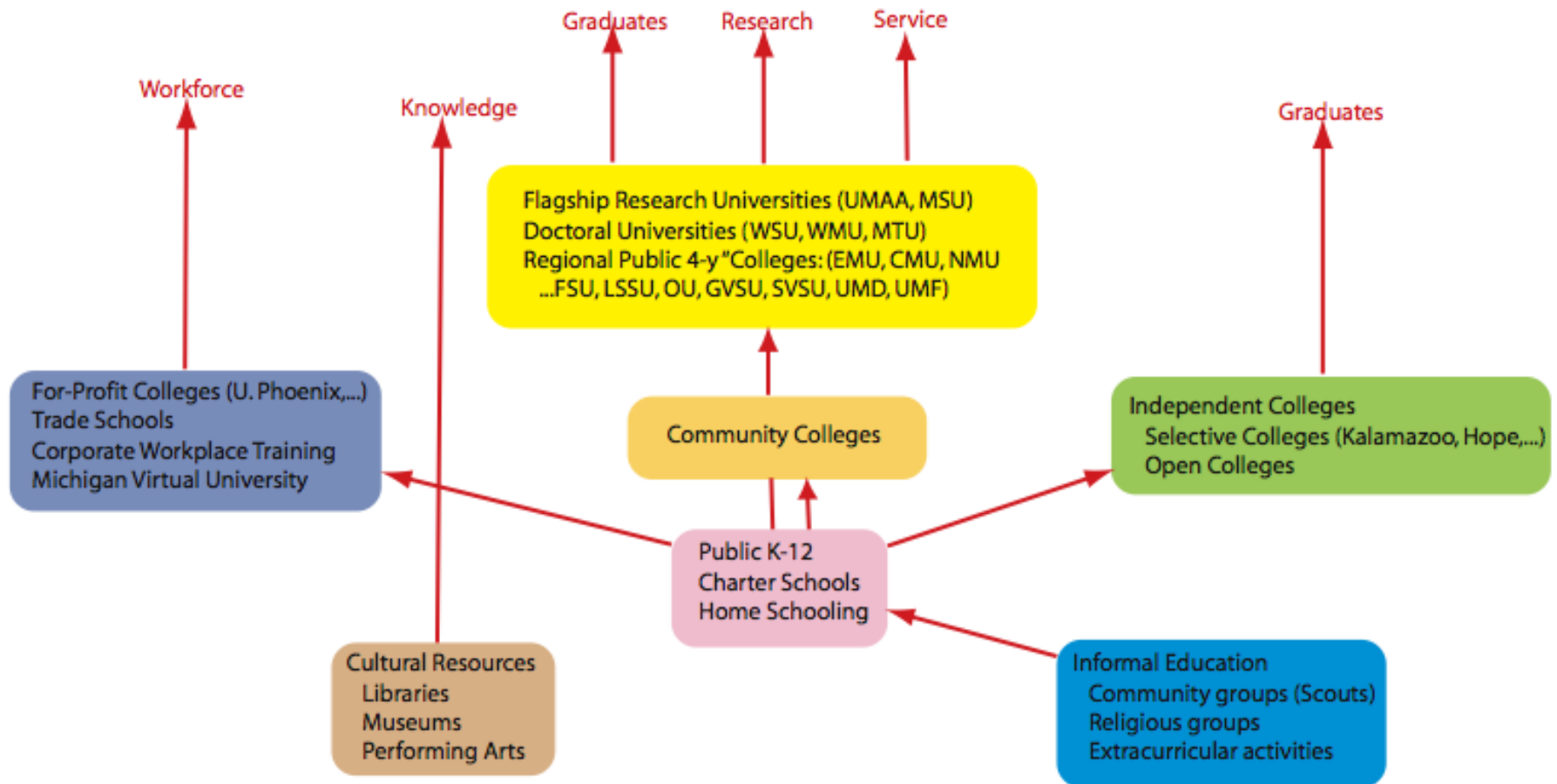
1. Michigan must develop a more systemic and strategic approach to its knowledge resources.
2. The state should encourage more diversity in institutions.
3. New paradigms for K-16 education should be explored.
4. UM and MSU should be encouraged to stress advanced education and research.
5. UM and MSU should be encouraged to develop capacity to access global markets.
6. Michigan's universities should explore bolder models of tech transfer, spinoffs, and startup activities.
7. Michigan should consider bolder models for producing human capital such as a 21st century version of the G.I. Bill that guarantees lifelong educational opportunities for all citizens.

A university is a community of masters and scholars (universitas magistorium et scholarium), a school of universal learning (Newman) embracing every branch of knowledge and all possible means for making new investigations and thus advancing knowledge (Tappan).

→ "A Catholepistemiad for the 21st Century"
 "A Knowledge Society"
 "A Knowledge Net"
 "A Learning Ecology"

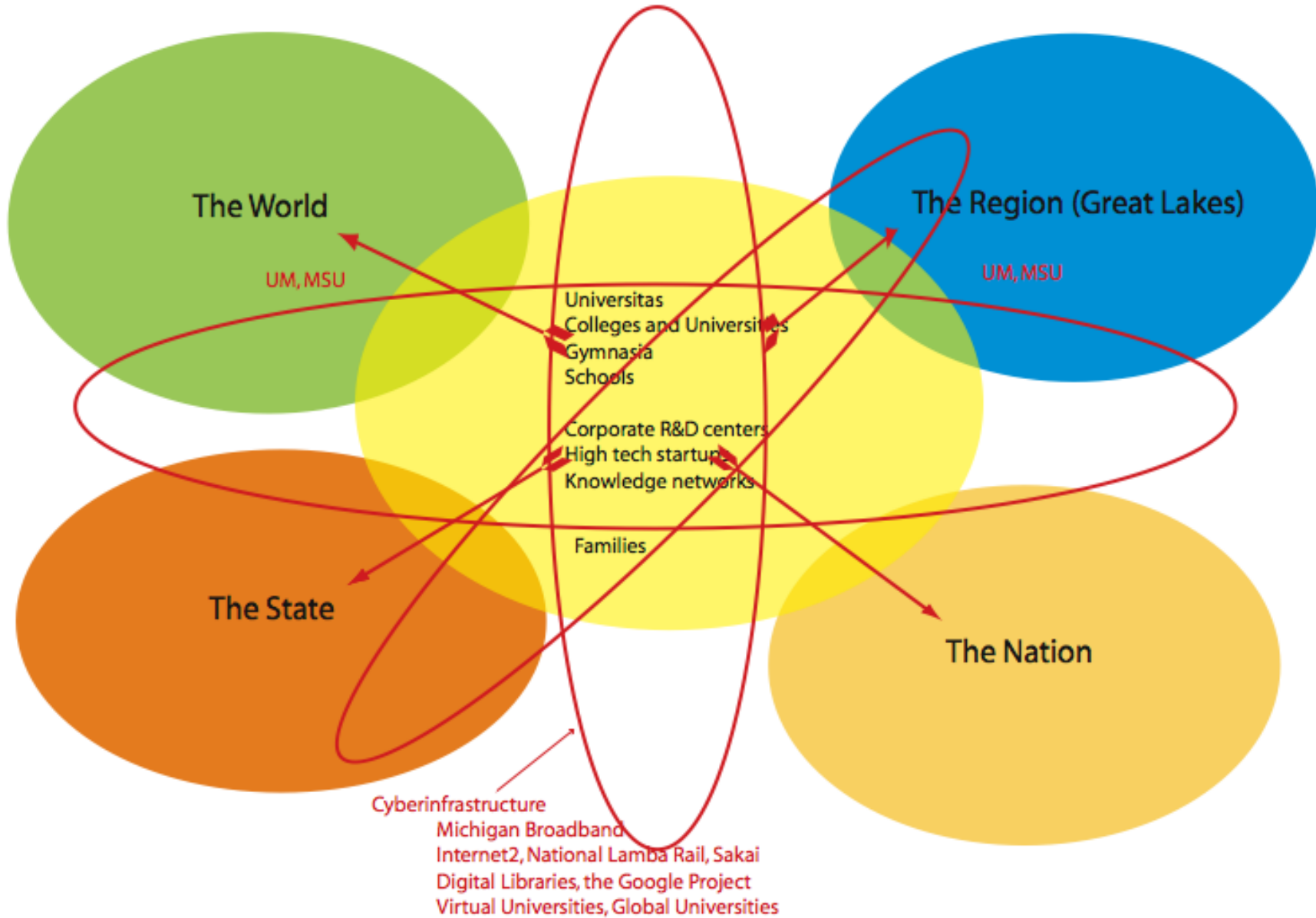


Michigan Today

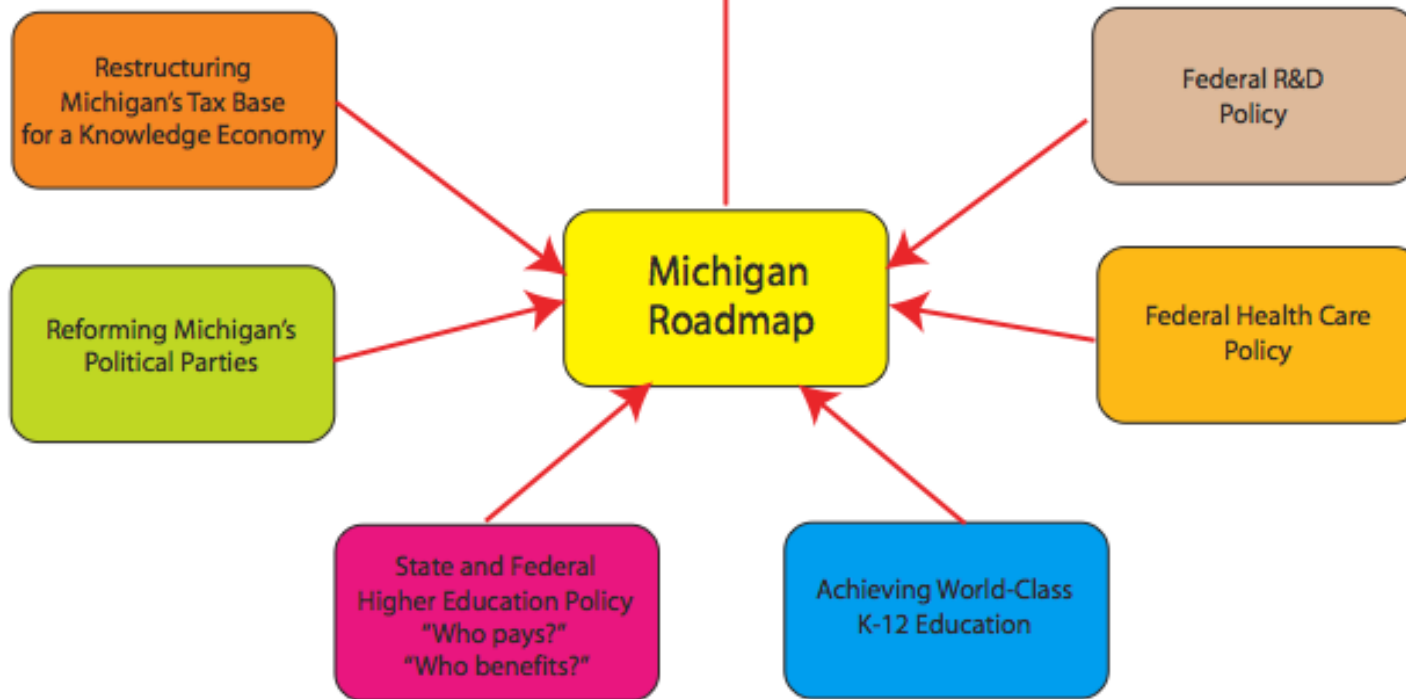


Michigan Tomorrow

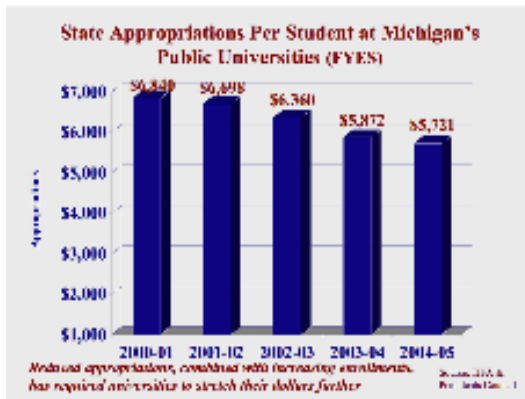
A Digital "Catholepistimead" or "Society of Learning"



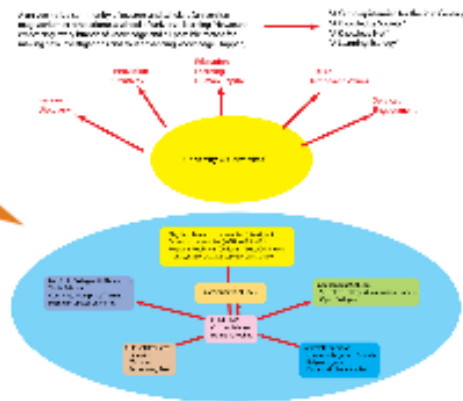
Prosperity, Security, and Social Well-Being
in a
Global, Knowledge-Driven Economy



The Present

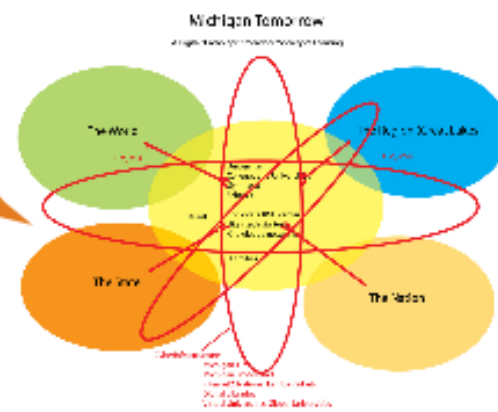


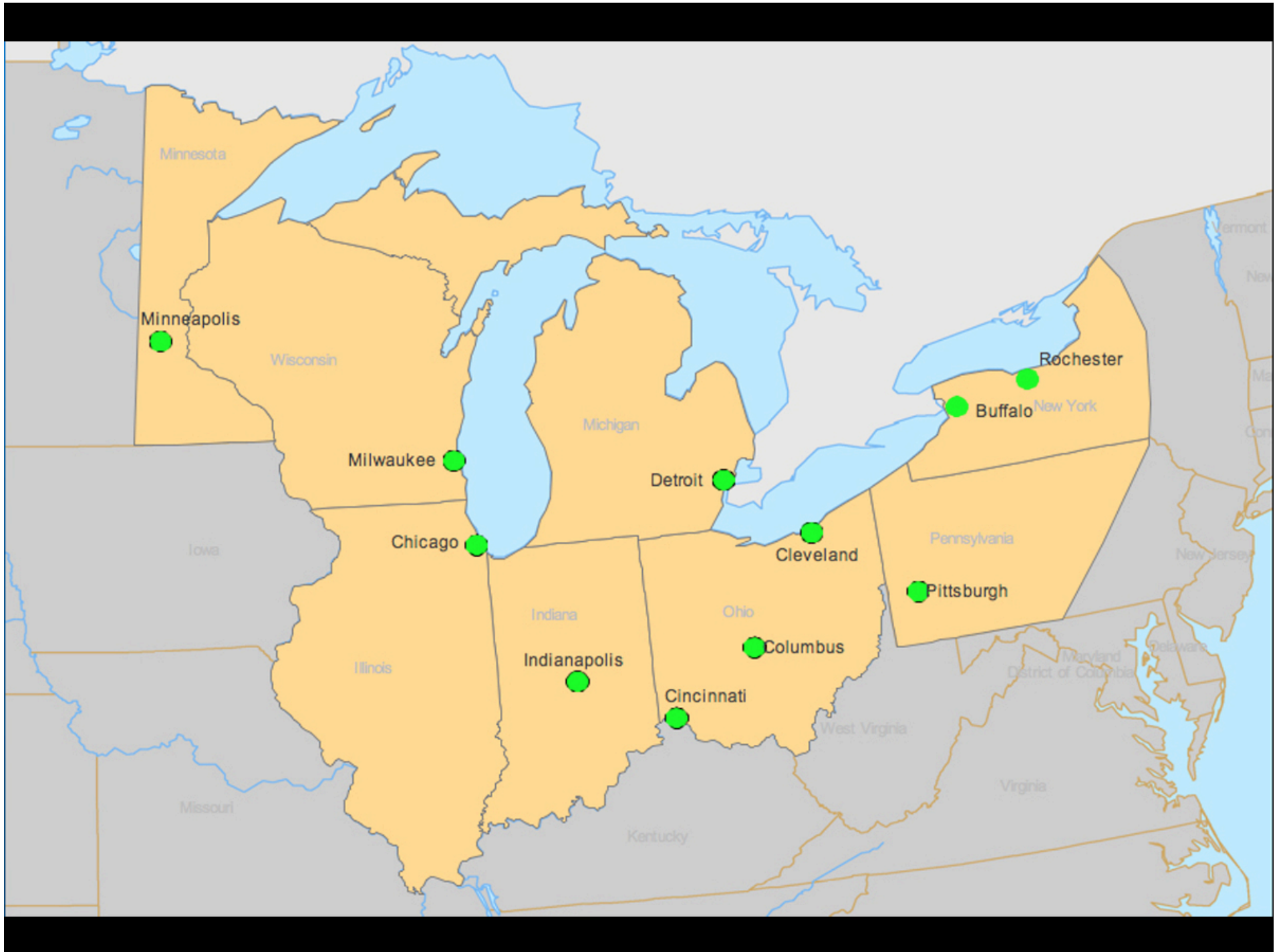
The Near Term

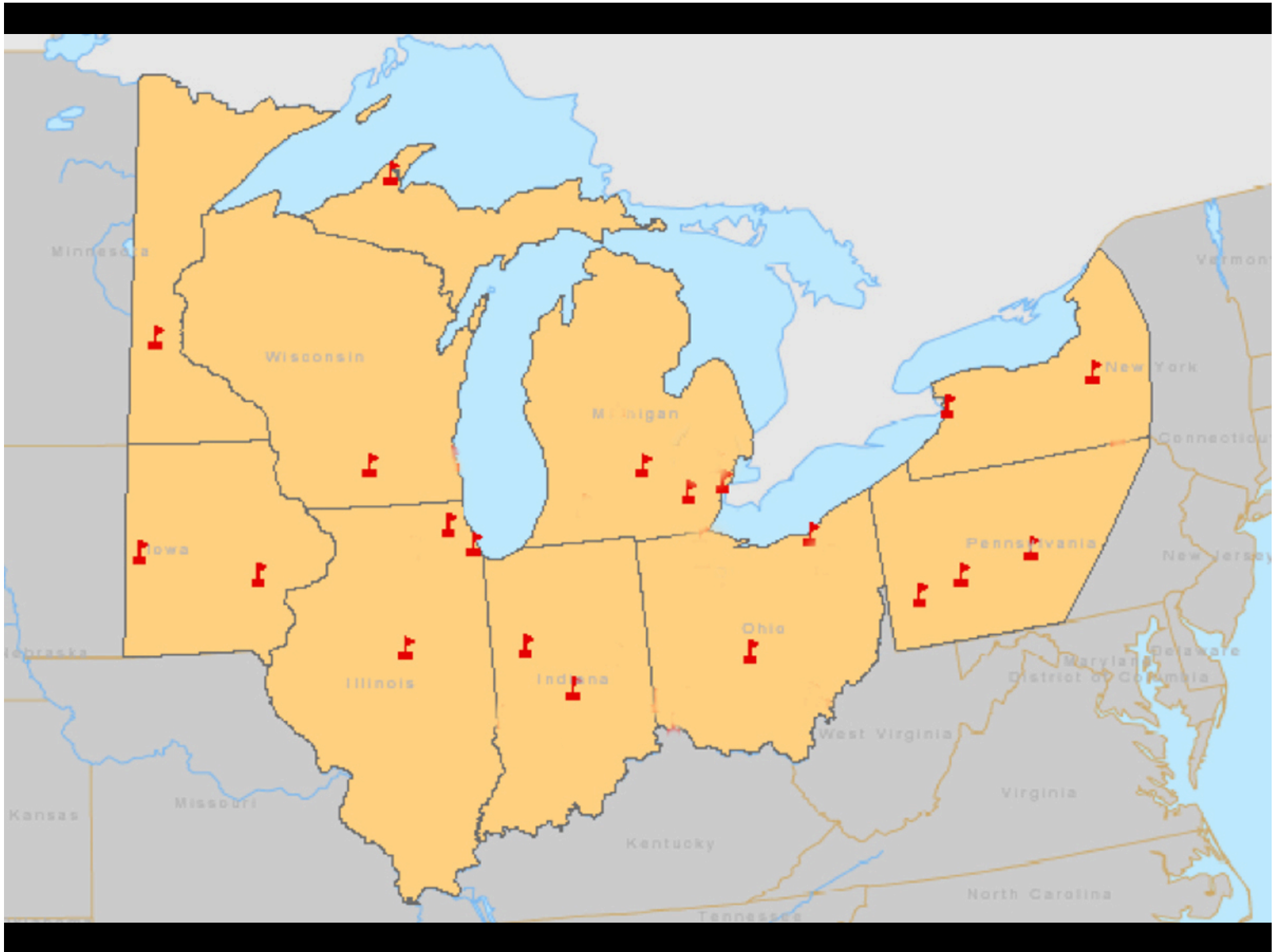


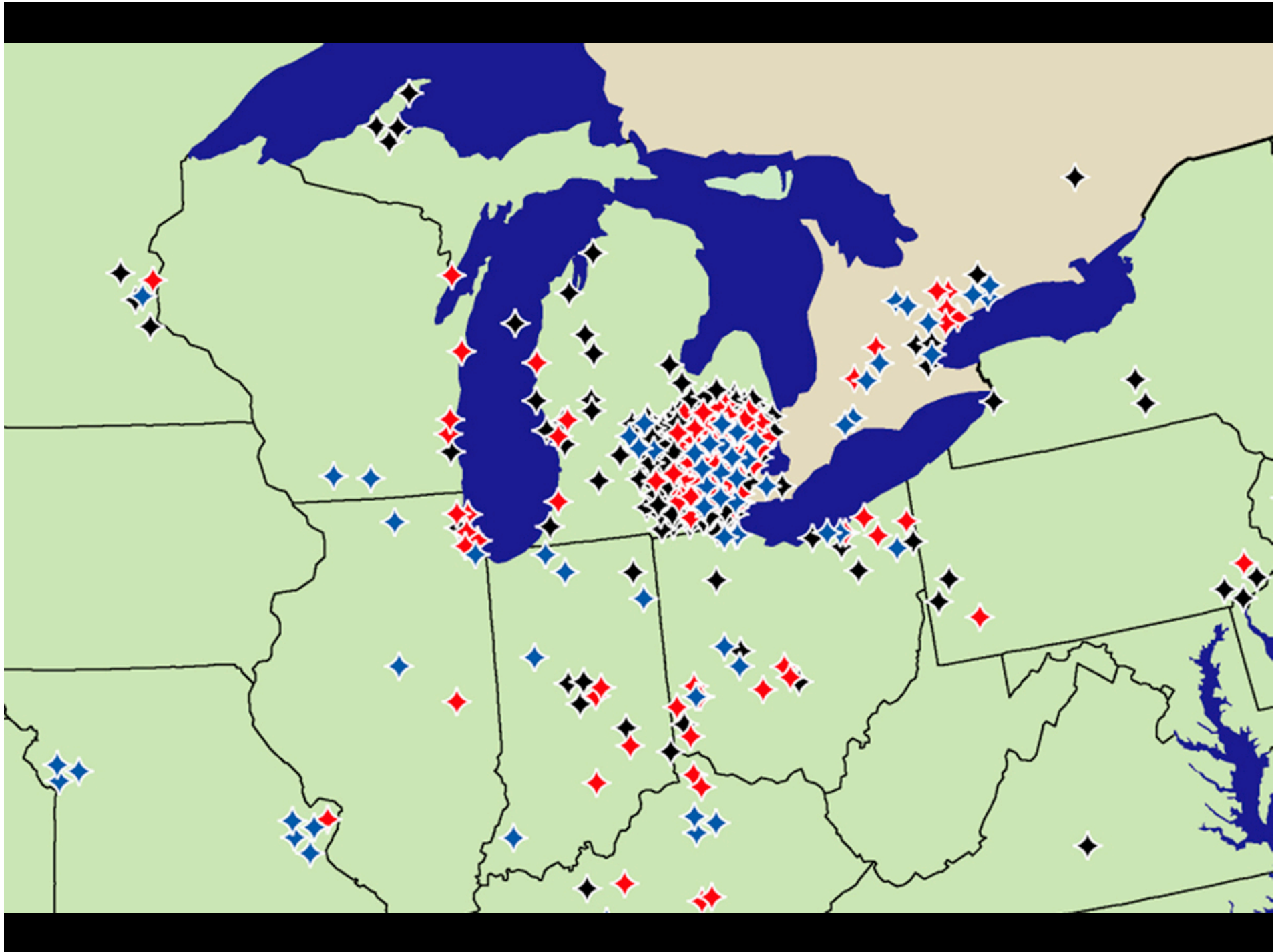
Michigan's Roadmap to A Knowledge Society

The Long Term











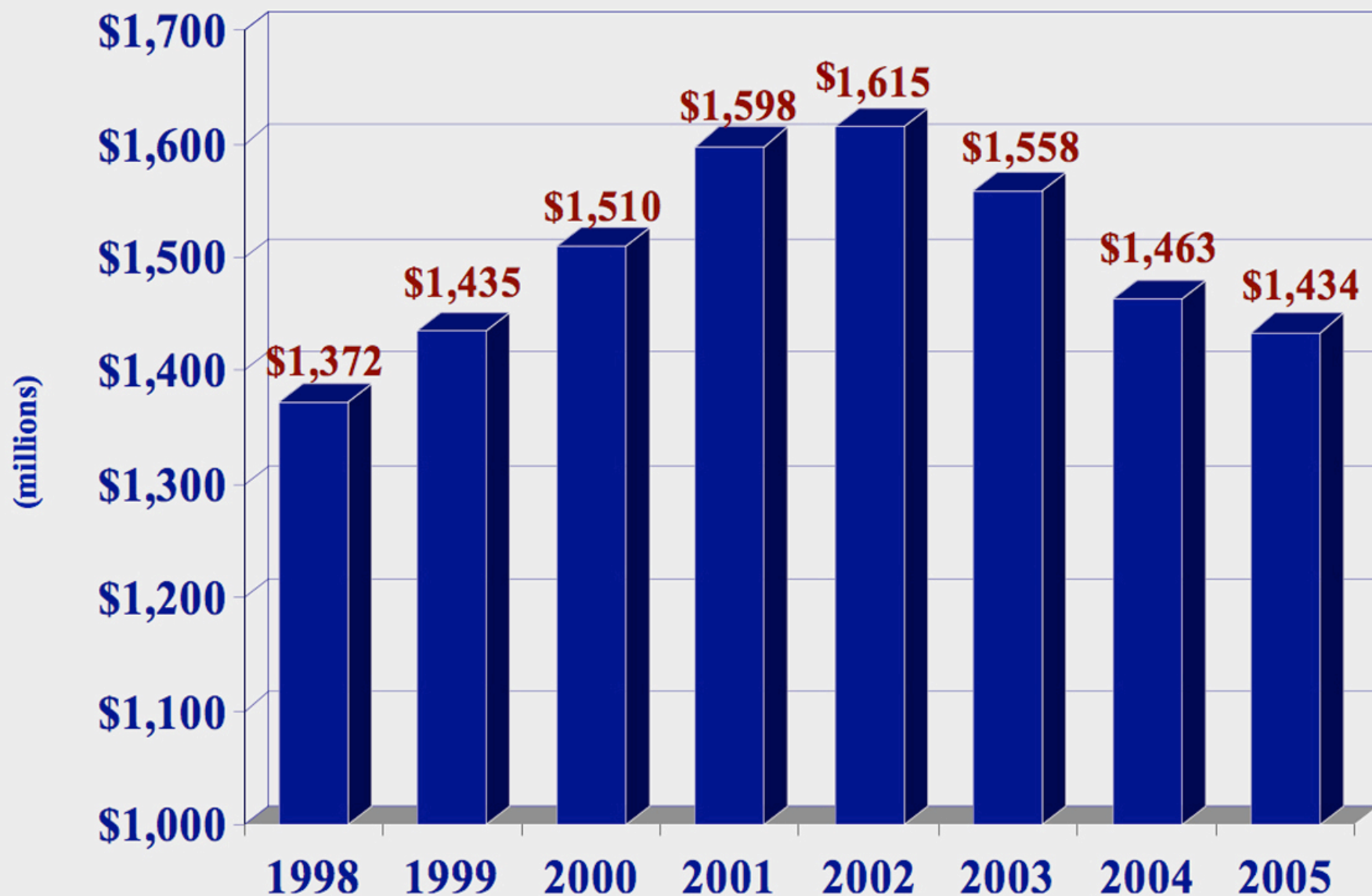
State Appropriations Per Student at Michigan's Public Universities (FYES)



Reduced appropriations, combined with increasing enrollments, has required universities to stretch their dollars further

Source: HFA & Presidents Council

State Appropriations to Michigan's Public Universities

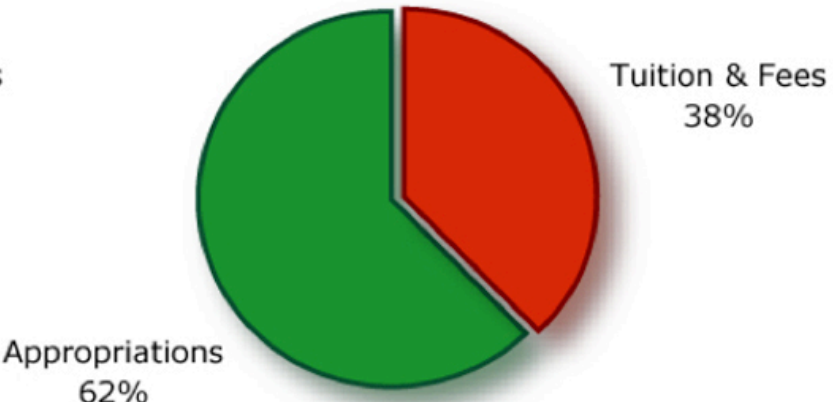


Sources of General Fund Operating Revenues Michigan Public Universities

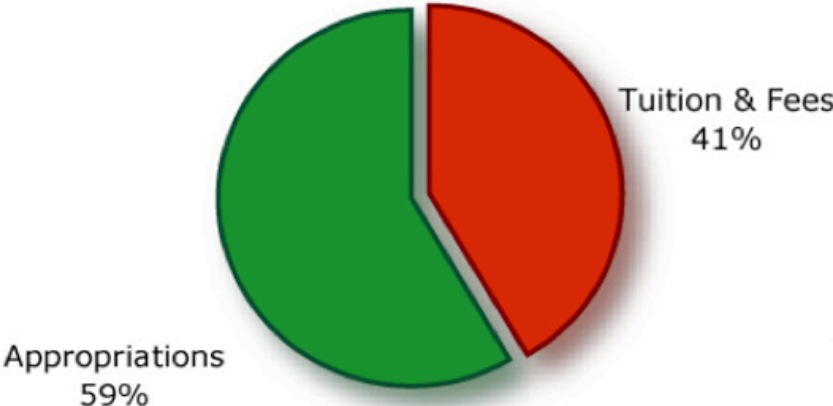
1972-73



1982-83



1992-93



2003-04 estimate



Source: Presidents Council, State Universities of Michigan

