

The Midwest Region and the Knowledge Economy

A Roadmap to the Future

James J. Duderstadt
President Emeritus and
University Professor of Science and Engineering
The University of Michigan

Midwest Media Project
Chicago Council on Global Affairs
May 15, 2007

A Flat World

Today we live in a time of great change, an increasingly global society, knitted together by pervasive communications and transportation technologies and driven by the exponential growth of new knowledge.

As Tom Friedman stresses in his provocative book, *The World is Flat*,

“Information and telecommunications technologies have created a platform where intellectual work and intellectual capital can be delivered from anywhere—disaggregated, delivered, distributed, produced, and put back together again, and this gives an entirely new freedom to the way we do work, especially work of an intellectual nature”.

Put another way, “The playing field is being leveled. Some three billion people who were out of the game have walked and often ran onto a level playing field, from China, India, Russia, and Central Europe, nations with rich educational heritages. It is this convergence of new players, on a new playing field, developing new processes for horizontal collaboration, that I believe is the most important force shaping global economics and politics in the early 21st century.”
(Friedman, 2005)

It is this reality of the hyper-competitive, global, knowledge-driven economy of the 21st Century that is stimulating the powerful forces that will reshape the nature of our society and that pose such a formidable challenge to regions such as the industrial Midwest.

Our states and cities, once the industrial heartland of the nation, the economic engine of the world, and, indeed, the arsenal of democracy, face the very real possibility of becoming an economic backwater in the global knowledge economy.

The impact of the flat world on the industrial Midwest has been disruptive, if not catastrophic in many respects. Yet we have only experienced the first waves of the approaching economic tsunami.

From Pennsylvania to Minnesota, Cleveland to Detroit to Chicago, the question is the same: In an increasingly knowledge-driven global economy, what will replace factory-based manufacturing as the economic engine of future prosperity in the industrial Midwest?

While this region benefited greatly during the 20th century in being the manufacturing center of the world, today's global phenomena such as outsourcing and off-shoring have destroyed the viability of low-skill, high-wage manufacturing jobs—and even threaten to displace many high-skill service activities—as a source of prosperity and social well-being.

As John Austin characterized it in a Brookings Institution study of the region, “Today the economic giant of the Great Lakes region stands with one foot planted in a waning industrial era and its other foot striding toward the emerging global knowledge economy” (Austin, 2005).

The Challenges of Today

By any measure, an assessment of today's status of the Midwest region is very disturbing. Our states are having great difficulty in making the transition from a manufacturing to a knowledge economy. In a recent Brookings Institution study, the challenges were summarized as follows

The Great Lakes Region

Still heavily reliant on mature industries and products, its aging workforce lacks the education and skills needed to fill and create jobs in the new economy.

Its entrepreneurial spirit is lagging, hampering its ability to spur new firms and jobs in high-wage industries.

Its metropolitan areas are economically stagnant, old and beat up, and plagued with severe racial divisions.

Its landscape is dotted with emptying manufacturing towns, isolated farm, mining, and timber communities.

It continues to bleed young, mobile, educated workers seeking opportunities elsewhere.

Its legacy of employee benefits, job, and income security programs—many of which the region helped pioneer—has become an unsustainable burden, putting its firms at a severe competitive disadvantage in the global economy.

And most important, the culture of innovation that made it an economic leader in the 20th century has long since vanished.

The Basket Case: Michigan

50th in personal income growth

50th in unemployment rate

50th in employment growth (only state with a decline)

50th in index of economic momentum (population, personal income, employment)

Our largest city, Detroit, now ranks as the nation's poorest.

We've already seen one of our major corporations, Delphi, file for bankruptcy, with great concern about whether its parent, General Motors and then possibly Ford, may soon follow. (Dead cat bounce...)

Our educational system is underachieving with one quarter of Michigan adults without a high school diploma and only one-third of high school graduates college-ready. Less than one-quarter of Michigan citizens have college degrees.

Furthermore, the out-migration of young people in search of better jobs is the fourth most severe among the states.

Lest you think Ann Arbor is an oasis, immune from the challenges of the flattening world, in February we learned that our largest employer, the huge Pfizer R&D center (the place that brought you Lipitor) would be closed by this fall, taking 2,400 high paying jobs with it!

Yet perhaps our greatest challenge at the state, regional, and national level lies in our attitude.

Preoccupied with obsolete political battles, addicted to entitlements, and assuming what worked before will work

again, our cities, our states, and perhaps our nation today are sailing blindly into a profoundly different future. public leaders were instead preoccupied with fighting the old and increasingly irrelevant cultural and political wars (cities vs. suburbs vs. exurbs, labor vs. management, black vs. white, religious right vs. labor left).

Thus far many of our citizens have been in denial, assuming our low-skill workforce would remain competitive and our factory-based manufacturing economy would be prosperous indefinitely. Yet that 20th-century economy will not return.

Our region is at great risk, since by the time we come to realize the permanence of this economic transformation, the outsourcing/off-shoring train may have left town, taking with it both our low-skill manufacturing jobs and many of our higher-paying service jobs.

To paraphrase Tom Friedman once again, "The world is flat! Globalization has collapsed time and distance and raised the notion that someone anywhere on earth can do your job, more cheaply. Can America [...and the Great Lakes States...] rise to the challenge on this leveled playing field?"

The Hope for Tomorrow

A vision for *tomorrow* can best be addressed by asking and answering three key questions:

1. *What skills and knowledge are necessary for individuals to thrive in a 21st century, global, knowledge-intensive society?*

Clearly a college education has become mandatory, probably at the bachelors level, and for many, at the graduate level. Beyond this goal, a region should commit itself to providing high quality, cost-effective, and diverse educational opportunities to all of its citizens throughout their lives, since during an era of rapid economic change and market restructuring, the key to employment security has become continuous education.

2. *What skills and knowledge are necessary for a population (workforce) to provide regional advantage in such a competitive knowledge economy?*

Here it is important to stress that we are not just competing among ourselves prosperity or with other states such as California or Texas. More serious is the competition from the massive and increasingly well-educated workforces in emerging economies such as India, China, and Central Europe.

3. *What level of new knowledge generation (e.g., R&D, innovation, entrepreneurial zeal) is necessary to sustain a 21st century knowledge economy, and how is this achieved?*

Here it is increasing clear that the key to global competitiveness in regions aspiring to a high standard of living is innovation. And the keys to innovation are new knowledge, human capital, infrastructure, and forward-looking policies. Not only must a region match investments made by other states and nations in education, R&D, and infrastructure, but it must recognize the inevitability of new innovative, technology-driven industries

replacing old obsolete and dying industries as a natural process of “creative destruction” (a la Schumpeter) that characterizes a hypercompetitive global economy.

How Do We Get There?

In a knowledge-intensive society, regional advantage in a highly competitive global marketplace is achieved through creating a highly educated and skilled workforce. It requires an environment that stimulates creativity, innovation, and entrepreneurial behavior.

More generally, in an age of knowledge in a global economy, educated people, the knowledge they produce, and the innovation and entrepreneurial skills they possess have become the keys to economic prosperity, social-well being, and national security.

Moreover, education, knowledge, innovation, and entrepreneurial skills have also become the primary determinants of one's personal standard of living and quality of life.

Hence one could well make the case that democratic societies—and state and federal governments—must accept the responsibility to provide all of their citizens with the educational and training opportunities they need, throughout their lives, whenever, wherever, and however they need it, at high quality and at affordable prices.

Furthermore, as education becomes increasingly important to one's personal standard of living and quality of life, it is important that opportunities for access and education should breach the boundaries and burdens of race, class, poverty, and geography.

Adequately supporting education is not just something we would like to do; it is something we have to do.

What is really at stake here is building our regional advantage, our ability to compete for prosperity, for quality of life, in an

increasingly competitive world. In a knowledge-intensive society, regional advantage is not achieved through tax cuts for the wealthy or using public dollars to prop up dying industries.

It is achieved through creating a highly educated and skilled workforce. As Bill Gates warned, cutting-edge companies no longer make decisions to locate and expand based on tax policies and incentives. Instead they base these decisions on a state's talent pool and culture for innovation—priorities apparently no longer valued by many of Michigan's leaders, at least when it comes to tax policy.

It requires an environment that stimulates creativity, innovation, and entrepreneurial behavior. Specifically, it requires public investment in the ingredients of innovation—educated people and new knowledge—by creating a ubiquitous, high-quality learning and knowledge infrastructure. Put another way, it requires public purpose, policy, and investment to create a knowledge society competitive in a global economy.

A Unique Asset

A recent study by the Brookings Institute (Austin, 2005) characterized the **assets** of our states as follows:

A **strong research, innovation, and talent cultivation infrastructure.**

Critical mass and expertise in emerging industries from advanced manufacturing to health care.

Global firms and universities that are significant players in the worldwide exchange of ideas, people, products, and services.

The tremendous amenity and resource of the lakes and their waterways.

Which of these assets might we use in a roadmap to the future of the Great Lakes region?

Probably not natural resources, although the fresh water resources of the Great Lakes might temporarily be an asset in areas such as tourism (until Nestle bottles it all up and sells it).

Unfortunately, human capital is also not currently an asset for our region, both because of aging (and perhaps declining) populations and the relatively low priority given to education

by a manufacturing economy—and unfortunately for many of our citizens and political leaders.

The current infrastructure of these states—both physical such as highways and industrial facilities and policies such as tax structure and public priorities—evolved to serve a manufacturing rather than a knowledge economy. Today this infrastructure represents more of a liability than an asset.

Yet there is one very unusual—indeed, unique—asset possessed by this region: the strongest concentration of flagship research universities in the world.

At its core are the Big Ten universities, or more correctly, the C. I. C. (Committee on Institutional Cooperation) group, which consists of the eleven Big Ten universities plus the University of Chicago.

These twelve universities conduct more research, produce more scientists and engineers, doctors and lawyers, business executives and teachers, than any collection of universities in the world, including the University of California, the Ivy League, Oxford and Cambridge, and the other leading universities in Europe and Asia.

More specifically, they conduct over \$6 billion/year of R&D, enroll over 300,000 undergraduates and 76,000 graduate students, award roughly one-fifth of the nation's doctorates in

fields such as engineering, chemistry, mathematics, and computer science.

When one adds to these institutions other leading research universities of the Great Lakes regions such as Washington University, Cornell, Carnegie Mellon, Pittsburgh, Case-Western Reserve, Iowa State, one has a significant fraction of the world's top research universities.

As the flagship universities of their states, these institutions already set the **pace for broader educational activities**, both at the post-secondary and K-12 levels.

Each of these universities has built **world-class excellence in unique areas** (e.g., **Illinois in computer technology**, **Minnesota in chemistry and chemical technology**, **Ohio State in materials science and technology**, **Michigan State and Penn State in agricultural technology**, **Wisconsin and Michigan in engineering**, **the natural and social sciences**, and **biomedical science**, **Northwestern in medicine and business administration**, and **Chicago in the humanities and sciences**).

Aggregating these "spires of excellence" by linking these institutions would give the region the world's leading programs in a broad range of key knowledge areas.

The **rapid evolution of digital technologies provide powerful new paradigms to integrate** together the programs and activities of these institutions. These institutions have long played important leadership roles in developing these technologies, e.g., **Minnesota's pioneering work in networking ("Gopher")**, **Illinois's development of the browser (Netscape)**, **Michigan's and Michigan State's role in developing the Internet**

(NSFnet), and Indiana's management of Internet2. Mention Great Lakes Computing Consortium and "Blue Water".

While the flagship public research universities in the Great Lakes region face similar challenges today as their state's budgets struggle to cope with staggering costs for health care, corrections, security, and infrastructure in the face of political forces demanding tax relief, this has made them lean and mean.

In effect, all of these institutions have already managed to become predominantly privately-supported public institutions and developed the flexibility and entrepreneurial skills to compete in an increasingly aggressive marketplace, with their quality and capacity essentially intact. (Zemsky, 2005)

Perhaps most important, there is a long-standing tradition of cooperation among these institutions (in addition to their highly visible competition through the Big Ten Athletic Conference). They work together on both regional and national agendas, merging library and research resources, and sharing curricula and instructional resources with faculty and students.

Because of their land-grant traditions, they also have a long history of public service and extension, not only within their states but throughout the world. These institutions are characterized by a long tradition of global outreach and international development that might enable them to coalesce into a true "world university", reaching into all parts of the globe to open up new markets and access world-class human capital.

Hence it seems natural to suggest that any strategic effort to better position the Great Lakes region for the global, knowledge economy must include these remarkable institutions as essential assets.

In fact, one might liken such an effort to that undertaken by California in the 1950s, when the challenge and opportunities afforded by a changing economy and population stimulated the development of the California Master Plan, a bold vision, which created a system of universal post-secondary education, with the University of California campuses at the helm, augmented by the California State University System and the California Community College System that together provided a very unusual combination of world-class quality with broad access.

Today most agree that the California Master Plan played a very critical role in providing the state with exceptional regional advantage, creating the strongest regional economy in the world. As *The Economist* recently observed: “The extraordinary growth in the California economy during the last half of the 20th century was due to many things: the development of California’s infrastructure (aqueducts and freeways), the development of agriculture, and perhaps the most important factor for today’s high-tech California economy: the creation of a superb set of public universities.” (The Economist, 2005)

Because of many generations of strong support and stewardship, today the Great Lakes states have a collection of flagship research universities not only comparable to but superior in many characteristics—quality, capacity, breadth, global presence—to those of the California institutions. Hence it is natural to question whether a similar planning effort could be launched to weave these formidable assets into a strategy to build regional advantage in a global, knowledge-driven economy.

Some Next Steps

So, where to next? Since I'm an engineer rather than an economist, I'd prefer to leave you with some suggestions rather than simply a series of questions.

The **first step is to engage the attention and commitment of leaders from the various sectors of our society, e.g., business and industry, state and local governments, higher education, foundations, and the media.**

Of course, as someone raised in Missouri, I am well aware of the old adage that sometimes to get a mule to move, you first have to whack it over the head with a 2x4. Hence let me suggest that **we turn to the CIC universities as the 2x4, a brain trust** perhaps working closely with other organizations such as the Brookings Institution, to join together to develop a detailed analysis of the economic and social challenges faced by our region as it grapples with the imperatives of a global, knowledge-driven economy, much as we have tried to do through the Michigan Roadmap.

The **media will play an important role in this effort by raising public awareness** of just how much at risk our states will be if we remain trapped in the low-skill industrial economy while the rest of our world evolves into a knowledge economy.

Second, we need to form organizations to link together the leadership of various sectors.

At the outset, let me suggest a steering group consisting of governors, mayors, CEOs, and university and foundation presidents. This might be a multi-state version of the government-university-industry roundtable groups that exist in other states such as California or at the national level through the National Academies. Perhaps a coalition of the Federal Reserve Banks (Chicago, Cleveland, Minneapolis) could host this activity?

Third, someone is going to have to bankroll the early work to form these groups, perform the necessary analysis, and develop the roadmap to our future. Here our region is fortunate to have a number of important and influential foundations, e.g., MacCarthur, Spencer, Kellogg, Mott, and others that have invested in the welfare of our states in the past, and that could join together in investing in just such a multi-state effort for the future.

Fourth, there would need to be a corresponding roadmapping effort within each sector. For example:

Both state and local governments need to do a better job in identifying and sharing information on “best practices”, both to provide new ideas to a political system all-too-frequently backing into the future, as well as perhaps to provide a political umbrella for the necessary action.

Leaders of business and industry—and of course, their shareholders and the investment community—need to look beyond quarterly earnings and consider the longer term impact of workforce quality, R&D and innovation, and regional prosperity on their future—indeed, their very survival, in the flat world of the knowledge economy.

Higher education should recommit itself to achieving world-class quality—not that every institution should strive to be a Stanford or Harvard—but community colleges and regional universities should focus to achieve world-class standards in serving their students and communities in a cost-effective fashion, while research universities should recognize that focusing to achieve excellence in key academic programs is more important in today’s hyper competitive global economy than building yet another Taj Mahal complex on their campuses (succumbing to the “edifice complex”) or winning a national championship in a revenue sport

Our foundations need a similar challenge. While their impact on national and global agendas is important, they must remember that their wealth has been drawn from our region. Hence while their original benefactors may have long since passed away, there remains a fundamental responsibility to address the needs of our states, particularly during a time of great challenge.

The media should demand that its reporters and editors pay attention to the big picture, building both the capacity and commitment to understand and educate our citizens about the real challenges posed by our changing world and the sacrifices they will be necessary both for their own long-term prosperity and security and that of their children.

And while we are talking about challenges, let us not forget the federal government. As we all are painfully aware, the national dialog has drifted far from the issues that really matter to our region and our nation for the longer term and instead tend to be distracted by narrow special interests or cultural wars. Yet perhaps the Great Lakes region has an opportunity to shift this debate. After all, if the coasts remain blue, while the south and west remain red, the roughly one-third of votes represented by the Great Lakes remain in play and could be used as the 2x4 to get the Washington mule's attention, in 2006 but even more so in 2008. If we could come together to develop an agenda for what actions are necessary at the federal level to help our region make the transition to a knowledge economy, then we could hold the feet of the candidates of both political parties to the fire, demanding they address these issues rather than the distractions they currently use to manipulate public opinion and voters.

Concluding Remarks

In our early effort to develop a strategic roadmap for the future of this region we sensed a growing concern and frustration on the part of many citizens with the deafening silence about our state's future that characterized our public, private, and education sectors.

Too many of our leaders, in government, industry, labor, and universities, have simply not been willing to acknowledge that the rest of the world is changing. They have held fast to an economic model that is not much different from the one that grew up around the heyday of the assembly line era—an era that passed long ago.

To be sure, it is difficult to address issues such as developing a tax system for a 21st-century economy, building world-class schools and colleges, or making the necessary investments for future generations in the face of the determination of the body politic still clinging tenaciously to past beliefs and practices.

- Yet the realities of a flat world will no longer tolerate procrastination or benign neglect. For this effort to have value, we believe it essential to explore openly and honestly where our region is today, where it must head for tomorrow, and what actions will be necessary to get there.
-
- We simply must stop backing into the future and, instead, turn our attention to making the commitments and investments today necessary to allow the Great Lakes states to compete for prosperity and social well-being tomorrow in a global, knowledge-driven economy.

Returning once again to Friedman:

“The flattening of the world is moving ahead apace, and nothing is going to stop it. What can happen is a decline in our standard of living if more Americans are not empowered and educated to participate in a world where all the knowledge centers are being connected. We have within our society all the ingredients for American individuals to thrive in such a world, but if we squander these ingredients, we will stagnate.” (Friedman, 2005)

Hence our goal is simple in principle if challenging in execution: To transform what was once the manufacturing center of the world economy into what could become its knowledge center. Put another way, while this region provided the *muscle* for the manufacturing economy that powered the 20th century, I believe it has the capacity to become the *brains* of the 21st century knowledge economy.

And what could be more appropriate for a region of the nation established more than two centuries ago on a founding principle of the Northwest Ordinance (now chiseled in the frieze above the central building on our Ann Arbor campus)

“Religion, morality, and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.”

Perhaps it has never been more imperative that we heed this principle by making education the cornerstone of the effort to position the Great Lakes states for prosperity and social well being in a global, knowledge economy!

References

- Augustine, Norman (chair), National Academies Committee on Prospering in the Global Economy of the 21st Century, *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, National Academies Press, Washington, D.C., 2005.
- Austin, John. "Defining a Great Lakes Economic Agenda", Brookings Institution, Washington, D.C., 2005.
- Bloch, Erich. National Science Foundation, testimony to Congress, 1988.
- Council on Competitiveness, National Innovation Initiative. Washington, DC: Council on Competitiveness, 2004.
<http://www.compete.org/nii/>
- Drucker, Peter. "Beyond the Information Revolution," *Atlantic Monthly*. 284:4 (October, 1999).
- Duderstadt, James J. (chair), National Academy of Engineering Committee to Assess the Capacity of the United States Engineering Research Enterprise, *Engineering Research and America's Future: Meeting the Challenge of a Global Economy*. Washington, D.C.: National Academies Press, 2003.
www.nap.edu.
- Duderstadt, James J. *A Roadmap to Michigan's Future: Meeting the Challenge of a Global Knowledge-driven Economy*, Millennium Project, The University of Michigan (2005);
<http://milproj.dc.umich.edu/>
- The Economist*, "The Brains Business: A Survey of Higher Education", September 10, 2005.

The Economist, "California: America's Dream, or Nightmare", October 1, 2005.

Friedman, Thomas, *The World Is Flat: A Brief History of the 21st Century*. New York: Farrar, Strauss, and Giroux, 2005.

National Intelligence Council, *Mapping the Global Future, Project 2020*. Washington: Government Printing Office, 2004.

Zemsky, Robert, William Massey, and Gregory Wegner, *Remaking the American University: Market-Smart and Mission Centered*. New York: 2005.