Creating an Innovation Economy

Annual Public Meeting
Canada Foundation for Innovation
October 4, 2007

Eva Klein
President, Eva Klein & Associates
and Managing Member, IDEA Partnerships, LLC

Outline

- Our Perspectives on the Innovation Economy
- The Global Knowledge Economy
  - Are Traditional Strategies Still Effective?
  - Or, Why Are We So Challenged?
- Creating an Innovation Economy
  - Five Success Factors
- Conclusions

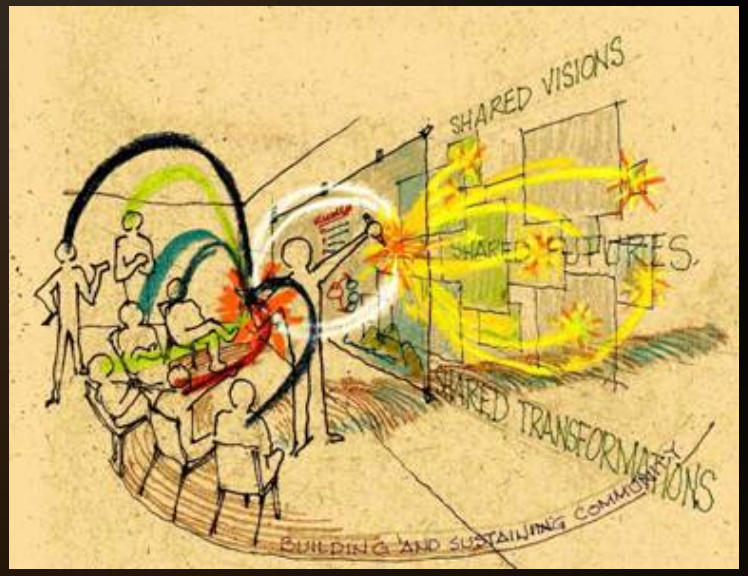
Our Perspectives on the Innovation Economy

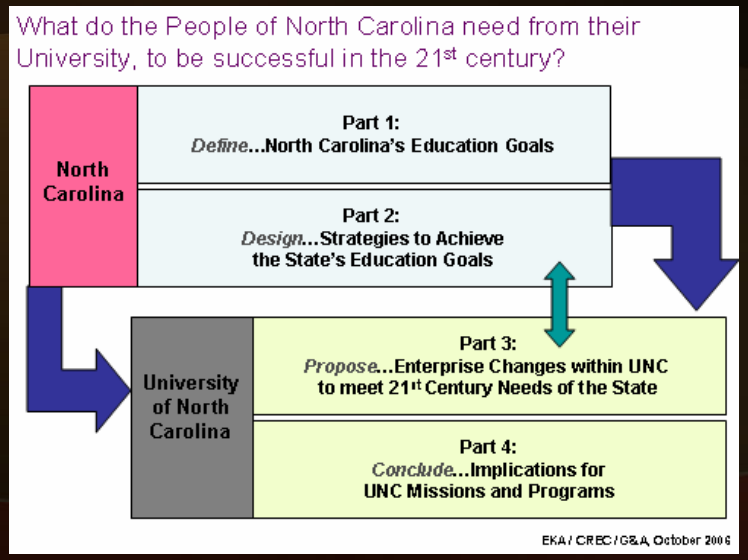
Eva Klein & Associates, Ltd.

IDEA Partnerships, LLC

Eva Klein & Associates:
Strategies for the Global Knowledge Economy

- Higher Education Strategy
  - Strategic planning
  - Capital planning
  - Finance
  - Governance & management
- Pioneering in engagement of universities in *knowledge-based economic development*
  - Research parks
  - Incubation and commercialization
  - Regional strategies and alliances
  - Higher education policy

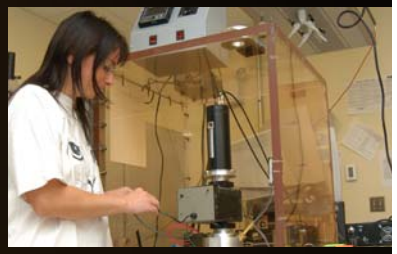




IDEA Partnerships:
New Communities in the Knowledge Economy

- Real estate development services
  - At risk or fee-based
  - In partnership with institutions and public sector agencies

- *Strategic Business Plans*
  - Research parks
  - Mixed-use campus sites
  - Comprehensive regional strategies



Two Questions Posed for Today

- Are traditional strategies to support education, research, and economic development still effective for building prosperity in the new Global Knowledge Economy?

- What collaborative new approaches can government, universities, and their private sector partners adopt to assure long-term success in creation of an *Innovation Economy*?

The Global Knowledge Economy

Are Traditional Strategies Working?

or

Why Are We So Challenged?

Human Economies and Societies:
3 Major Transformations in 8,000 Years

Pre-Agrarian
- Pre-history to 8,000 BC

- Hunting/Gathering
- Nomadic Cultures
- Emergence of Tools

Agrarian
- Since 8,000 BC

- Agricultural Cultivation
- Formation of Communities
- Laws for Land Ownership

Industrial
- Since @ 1800

- Machines/Production Process
- Literacy/Public Schools
- Business Organizations & Law

Knowledge
- Since last few decades

- Innovation & Technology
- Knowledge Work Force
- Globalization, Alliances, Regionalism, Networks

Economic Transformation:
What's Different? (Everything)

- **Time**
  - Rapid velocity of change
- **Communications**
  - Instant and constant
- **Economic Performance**
  - Regionalization
- **Markets/Trade**
  - Transnational
- **Business Firms**
  - Agility
- **Work Force**
  - High-skilled and mobile
- **Industry Clusters**
  - Visible scale & critical mass
- **Economic Strategy**
  - Larger regional scale
- **Key Strategic Assets**
  - Human capital
  - Knowledge institutions

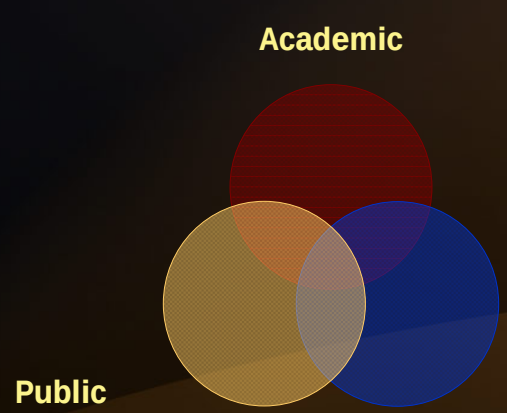
Wealth Creation:
The Inputs Are Different

- Agricultural Economy
  - Land + Labor
- Industrial Economy
  - Capital + Labor
  - With more forms of capital
- Knowledge Economy
  - Innovation + Capital
  - Knowledge (human capital) accounts for increasing percentage of the value of business enterprises

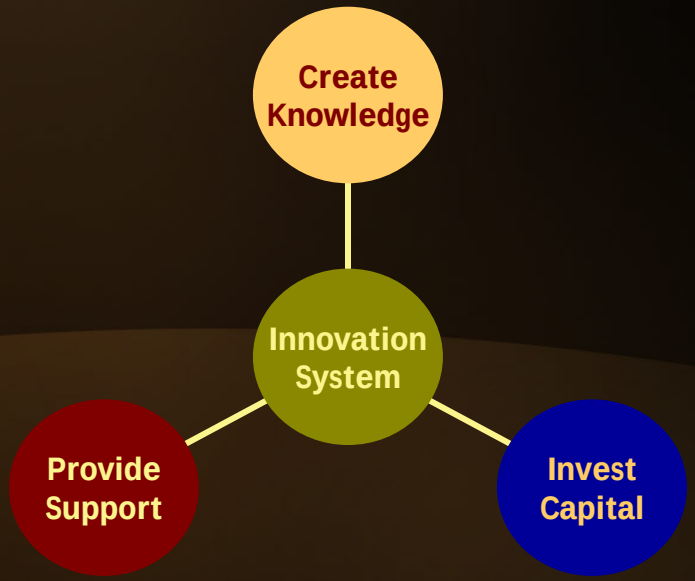
How We Accomplish Things:

Big Change from Sectors to Functions

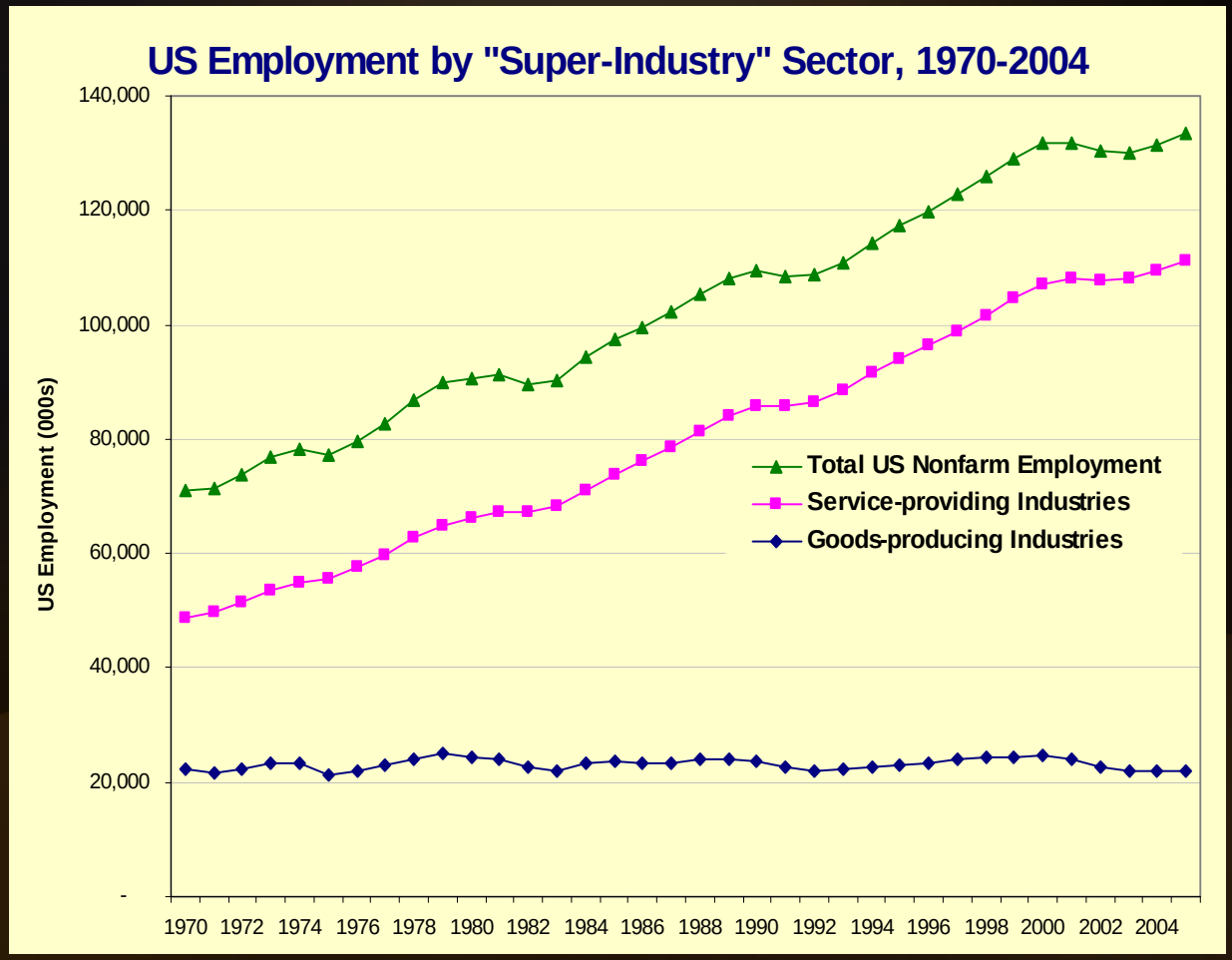
Industrial Economy
Functions organized within sectors



Knowledge Economy
Functions organized across sectors



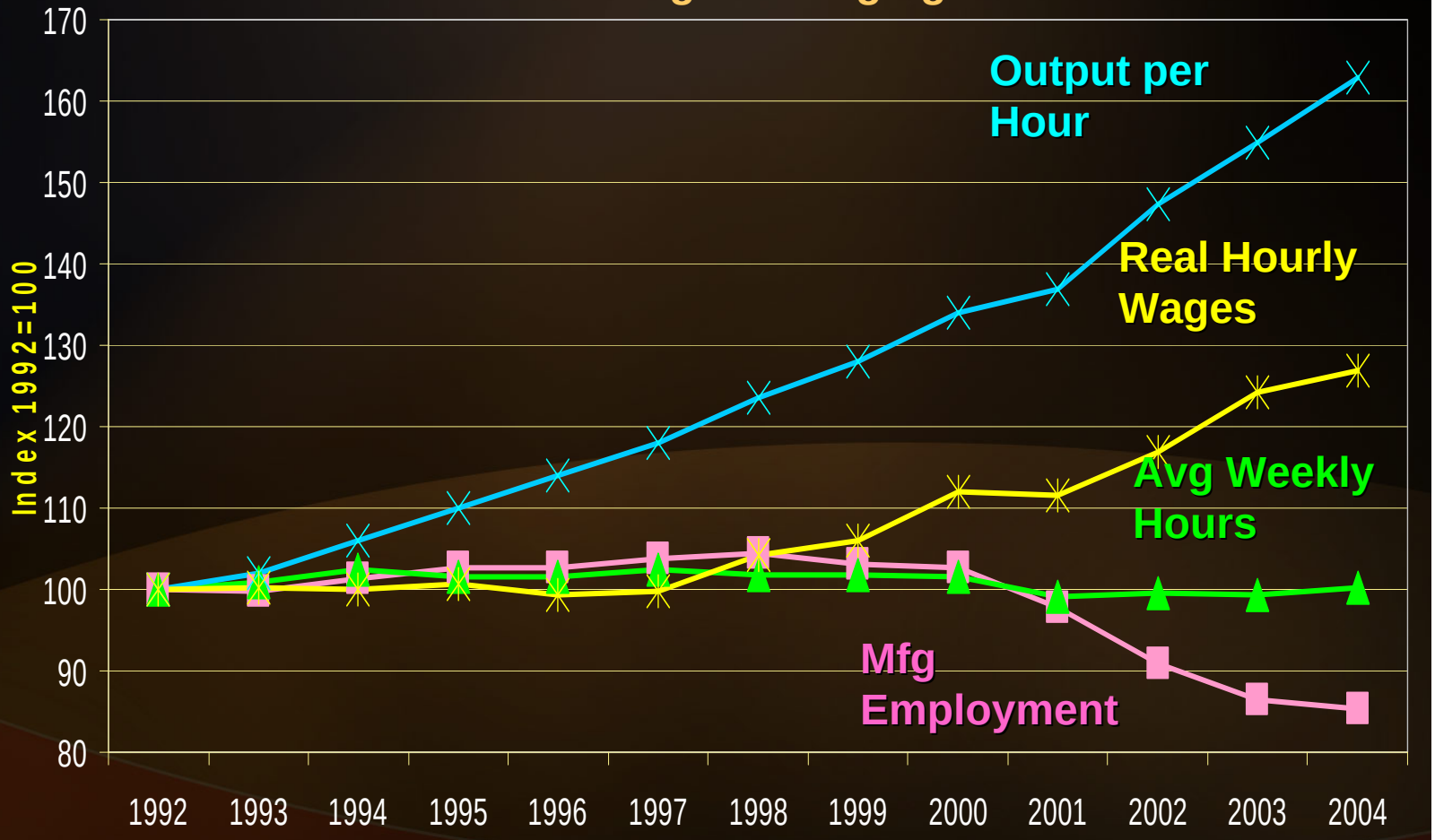
Industrial Economy Jobs:
Goods vs. Services, US, 1970 to 2004



Source: BLS Current Employment Statistics, prepared by ACCRA/CREC

Advanced Manufacturing:
Effects of Innovation

Manufacturing employment declines. Wages and output are up. The structure of manufacturing is changing.



Source: Center for Regional Economic Competitiveness, from BLS data

Industrial Economy Jobs:
Why is Canada's Performance Different?

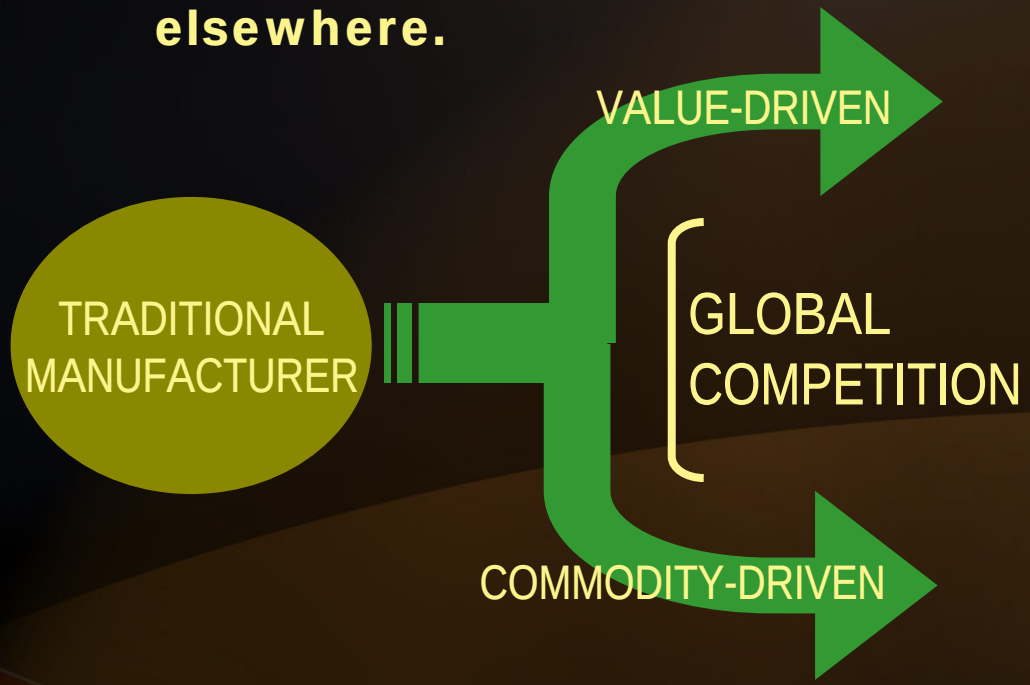
Table 6. Civilian Employment Approximating U.S. Concepts by Economic Sector, 1960-2006 (in thousands)

Year	USA	Canada	Australia	Japan	France	Germany	Italy	Neth'lds	Sweden	UK
					Manufacturing					
1996	20,518	1,926	1,123	14,420	4,073	8,643	4,955	1,106	773	4,966
1997	20,835	2,011	1,143	14,390	4,035	8,521	4,872	1,128	763	4,903
1998	20,733	2,094	1,106	13,780	4,047	8,687	4,956	1,129	770	4,884
1999	20,070	2,192	1,071	13,410	4,034	8,591	4,961	1,147	759	4,763
2000	19,644	2,249	1,129	13,180	4,079	8,647	4,944	1,159	761	4,612
2001	18,434	2,229	1,095	12,800	4,131	8,626	4,924	1,147	751	4,469
2002	17,233	2,286	1,106	11,990	4,065	8,504	4,975	1,116	722	4,276
2003	16,902	2,275	1,085	11,750	3,976	8,286	5,027	1,076	696	4,105
2004	16,484	2,292	1,093	11,470	3,869	8,242	4,842	1,088	683	3,784
2005	16,253	2,207	1,073	11,390	3,784	8,015	4,822	1,097	658	3,731
2006	16,377	2,118	1,062	11,582	NA	NA	4,817	NA	658	NA
% Chg	**-20%**	**10%**	**-5%**	**-20%**	**-7%**	**-7%**	**-3%**	**-1%**	**-15%**	**-25%**

www.bls.gov/fls/flscomparelf.htm

Current Manufacturing Challenge:
Make it Smart or Make it Cheap

Public policy should not provide incentives to take production jobs elsewhere.



COMMUNITY RESPONSES:

- TALENT
- QUALITY OF PLACE
- HIGH-VALUE SITES
- TRANSPORTATION

- LOW COST LABOR
- LOW TAXES
- RAW MATERIALS
- TRANSPORTATION

The value of goods is no longer in the processing and manufacture of raw materials.

Source: Adapted from Jon Roberts, TIP

In the Flat World:
Asia on the Rise

- Asia (nations other than Japan)
  - South Korea and Taiwan were already well established in particular markets
  - Singapore, Malaysia, Thailand, and others boosted their market strength and showed potential for further increases in competitiveness.
- China has become the world's third-largest R&D performer
  - According to data compiled by OECD, Chinese R&D spending reached $84.6 BB in 2003, up from $12.4 BB in 1991.

Source: Science and Engineering Indicators 2006, NSF

Source: Prof. SHIH Choon Fong, Singapore University

In the Flat World:
But, EU Also on the Rise

EKA

The Lisbon Strategy

New objectives of making the EU, by 2010,

"the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion".

Source: Lisbon European Council, 2000

The Knowledge Economy:
A Definition

- Captures and commercializes innovation
- Advances competitiveness of traditional industries
- Grows visible, globally-competitive clusters in new knowledge enterprises
- Creates and sustains a highly-skilled work force

Source: Eva Klein, 1985

Creating an Innovation Economy

5 Success Factors

Creating an Innovation Economy:
5 Success Factors

- Niches of competence
- Infrastructure for innovation
- Human capital
- Smart community “places”
- Regional leadership and strategy

Creating an Innovation Economy

Niches of Competence

Niches of Competence:
4 Mega-Industry Clusters

- Information and Telecommunications
  - Hardware
  - Software
  - Telecommunications and Internet services
- Life Sciences
  - Genomics-human, plant, animal
  - Biomedical diagnostics, treatments, biomaterials, bioengineering
  - Food supply
- Advanced Manufacturing
  - New Materials, e.g. nano-materials
  - New Processes, e.g., nano-manufacturing
  - Customization; identification; compatibility
- Energy and Environment
  - Alternative/clean energy
  - Protection and remediation of water, air, earth—and SECURITY
  - Sustainability

Source: Eva Klein, 1985

Clusters:
Very Old Phenomenon; New Importance

- Groups of businesses that form a value or supply chain and that interact by…
  - Buying from and selling to one another
  - Using the same physical infrastructure
  - Relying on the same institutions
  - Both competing and collaborating
  - Sharing workforce pools

- Clusters build on some form of competitive advantage, usually intertwined factors:
  - Infrastructure investments
  - Business climate
  - Presence of entrepreneurs
  - Emergence of a new technology
  - Niche expertise of a university

Old Cluster Examples:

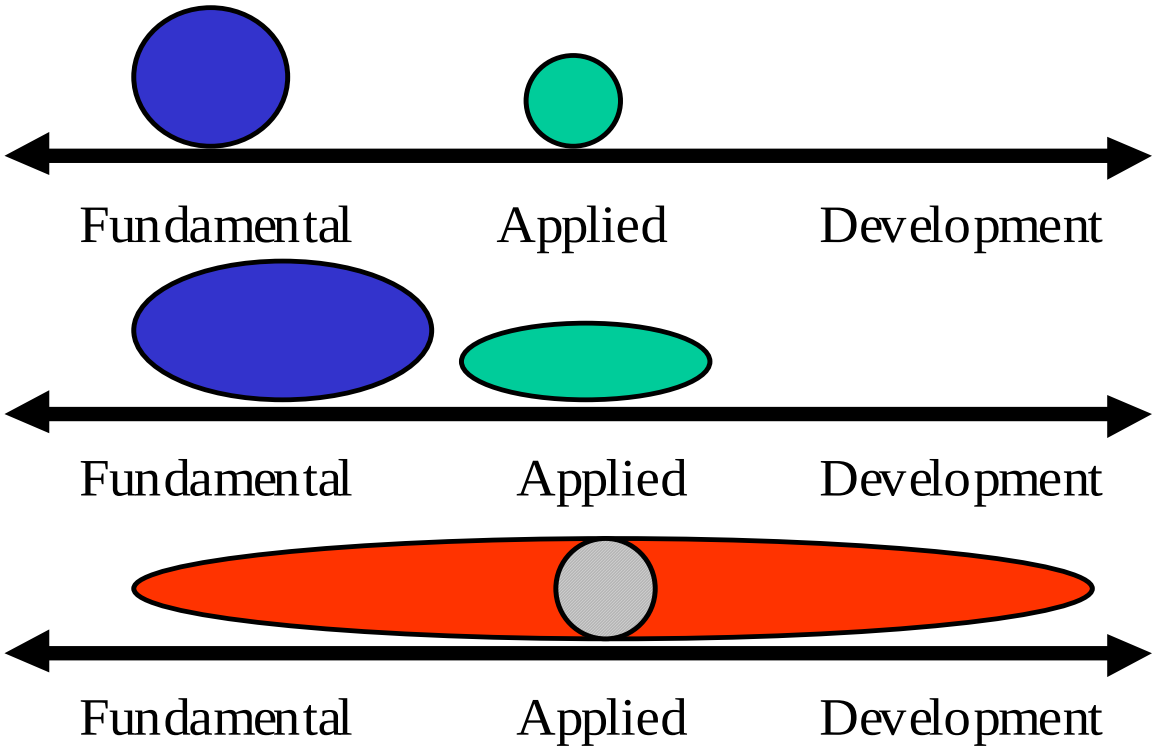
Holland	Bulbs
London	Finance
Antwerp	Diamonds
Hollywood	Cinema

Creating an Innovation Economy

Niches of Competence

Infrastructure for Innovation

Research and Development:
Evolving Models



College of Textiles NC State

New Models for Multidisciplinary, "Problem-Focused" R&D Are Emerging:

Not Yet Perfected

Technology Transfer:
A Paradigm Lost?

- New art form for university and government science since 1981 (in US)
  - Disclosures, patents, licensing, options, royalties
  - Some flashy big winners, like Gatorade, Taxol

- Threats to the paradigm—It's a tool of the *Industrial Economy*:
  - Software piracy
  - Patents under review and patent infringements
  - Costly litigation
  - Velocity of information & capital = faster than rule of law
  - Emerging economies play by different rules

Technology Development:
The Newer Game

- Technology Development or Knowledge Management:
  - Company and product formation and growth strategies
  - Focus on:
    - Supporting entrepreneurs
    - Pairing researchers with entrepreneurs
    - Using technology locally or regionally
  - New kinds of long-term collaborative R&D relationships with shared intellectual property and "collaborative patents"

Entrepreneurial, Engaged University:
A New Invention

- Kauffman Foundation just-published study
- 25 years of university entrepreneurship research; 173 articles
- Found four streams of research:
  - Entrepreneurial research university
  - Productivity of technology transfer offices
  - New firm creation
  - Environmental context including networks of innovation

Source: Rothaermel, Agung, and Jiang, Georgia Institute of Technology, Kauffman Foundation, 2007

An Innovation Enterprise Life Cycle:
Implant, Capture, Grow, Re-Seed

Basic Science / Research Support

Pre-Commercial Applications

Commercialization / Company Formation

Early-Stage Growth Companies & Products

Growth Companies Maturing Markets

Mature Companies and their Spin-Offs

Reinvestments in Research

Innovation Deployment

A Regional Innovation System:
It's Messy and Still Being Defined

EKA

SEEDS

University Research
Niches

Collaborations
Ways to Enhance

Corporate R&D
Policy Incentives

CULTIVATION

IP Policies—
New focus on development

Risk Capital Gaps—
$ for Concept, Pre-Seed, Seed Investments

Business Development—
Many forms of support

Knowledge Work Force—
New Education & Training Solutions

Creating an Innovation Economy

Niches of Competence

Infrastructure for Innovation

Human Capital

Human Capital:
Population Matters

- Opportunities for innovation and entrepreneurship increase with population size

- Great portion of innovation is concentrated in large MSAs:
  - Large companies
  - Many young companies
  - Major universities
  - "Thick markets"
  - "Knowledge spillover"

In the US, the top 10 states account for almost two-thirds of R&D expenditures (NSF) and 50% of R&D is in 7 states.

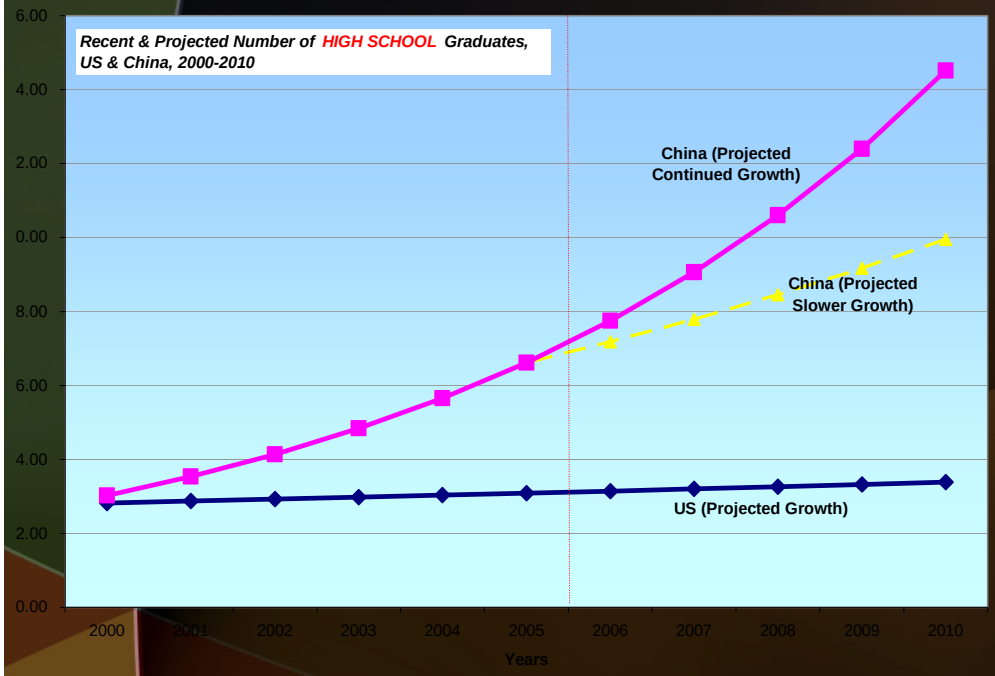
US "Megapolitans:"
10 Areas of 10 Million+ by 2040

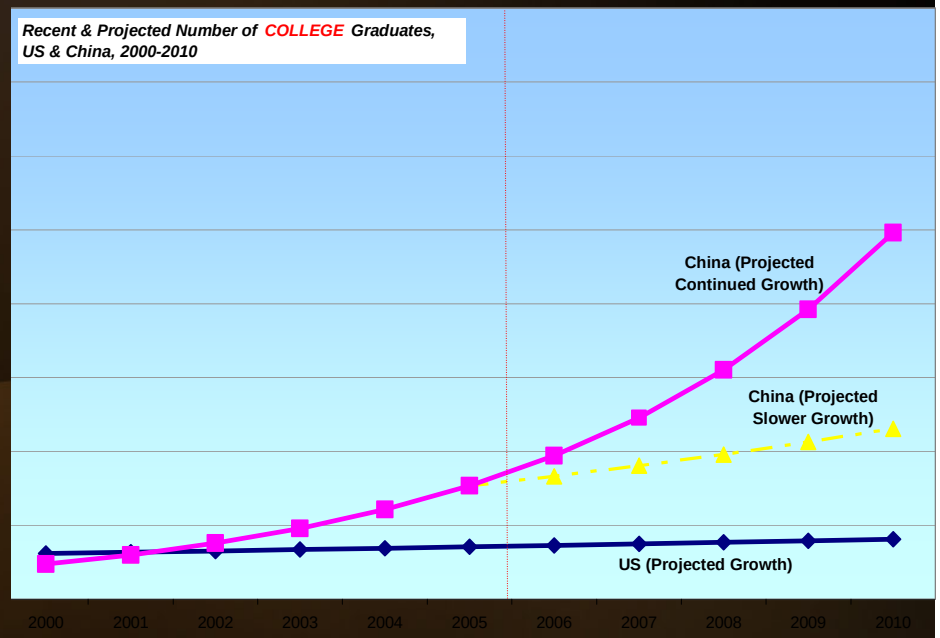
Canada, like the US, has population concentrations—where the action will be.

Source: Lang and Dhavale, Metropolitan Institute at Virginia Tech University, 2005

Global Competition May Turn On:
Education Results Above All

High School & College Graduates in the US & China, 2000-2010





China rapidly overtaking the US in sheer numbers of educated people.

Are comparisons for Canada similar?

The Trend is Clear:
More Education Attainment Required

EKA

USA Projected Employment By Education Level

Educational Band	*Employment 2007*	*Net New Jobs (2007-2017)*	*Average Earnings 2007*	*% Total Employment (2007)*	*% New Jobs (2007-2017)*
Advanced Degree	6,442,947	1,559,103	$88,639	3.7%	5.2%
4-year College Degree	28,672,368	6,171,171	$80,623	16.5%	20.6%
Tech-Some Post	14,680,694	3,319,873	$49,305	8.4%	11.1%
GED Some Experience	23,161,040	3,352,418	$50,040	13.3%	11.2%
GED/Entry	37,931,763	5,300,947	$38,055	21.8%	17.7%
Below GED	63,244,115	10,312,306	$25,275	36.3%	34.4%
Total	***174,132,926***	***30,016,818***	***$44,837***	***100.0%***	***100.0%***

Source: Forecasts from Regional Dynamics, calculated by Center for Regional Economic Competitiveness

Creating an Innovation Economy

Niches of Competence

Infrastructure for Innovation

Human Capital

Smart Communities

In the Internet Age…
Why Does Place Matter?

- Because Innovation and Innovations Systems are local
- "Knowledge transfers between universities and their partners are highly personalized and, as a consequence, often highly localized. This underscores the significance of geographical proximity for the process of knowledgeable transfer and innovation."
- "Proximity effect of knowledge transfer provides a strong clue as to why universities are increasingly seen as an essential element in the process of local and regional economic development, especially in knowledge – intense industries , such as ICT and Biotech."

Source: David Wolfe, Ph.D, U of T

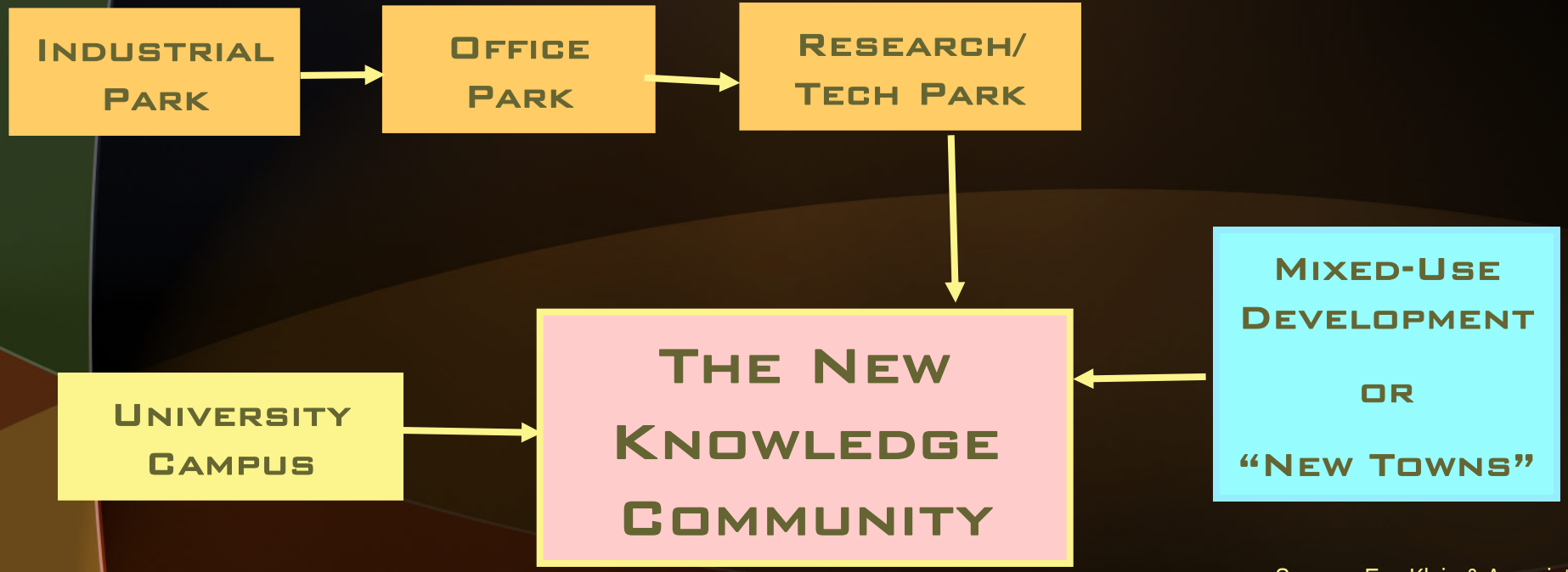
- "In the modern economies locational advantage in the capacity to innovate is ever more dependent on the agglomerations of specialized skills, knowledge, institutions, and resources that make up the underlying technological infrastructure"

Source: Feldman & Florida 1994 – The Geography of Innovation

New Idea of "Place:"
Research Parks are Old News

Evolution from industrial park subdivisions into research parks…

Now influenced by concepts of university campus and urban places.



Source: Eva Klein & Associates

New Places:
Integrated Knowledge Communities

- Urbanism
- Mixed uses
- Sustainability
- Connection of university campuses with associated business sites and neighborhoods

Creating an Innovation Economy

Niches of Competence

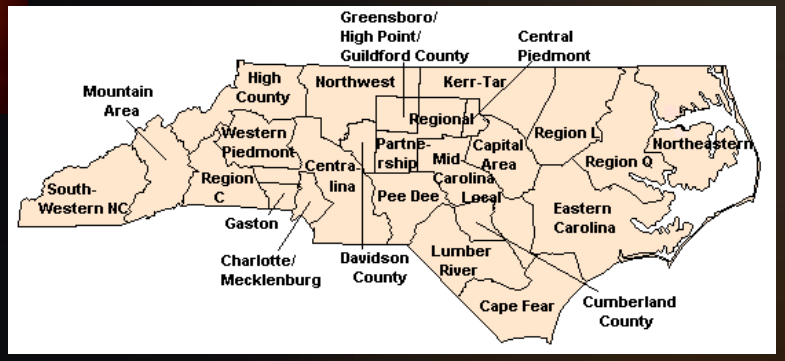
Infrastructure for Innovation

Human Capital

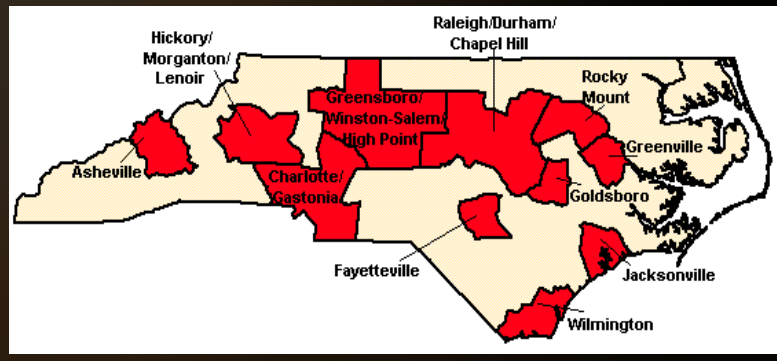
Smart Communities

Regional Leadership & Strategy

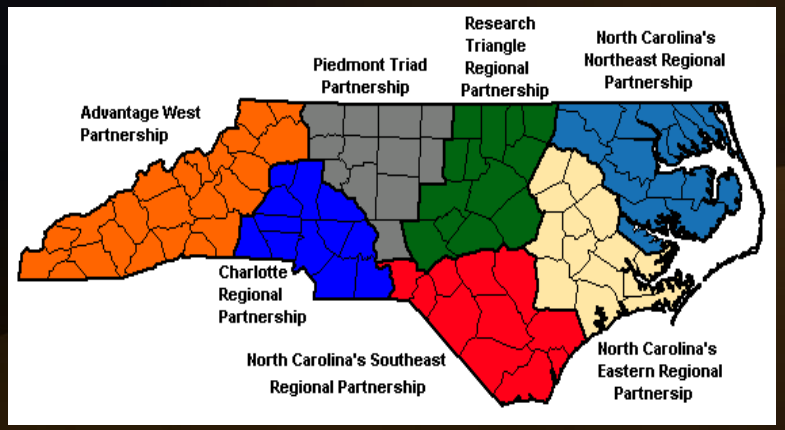
Regions:
Hard to Define



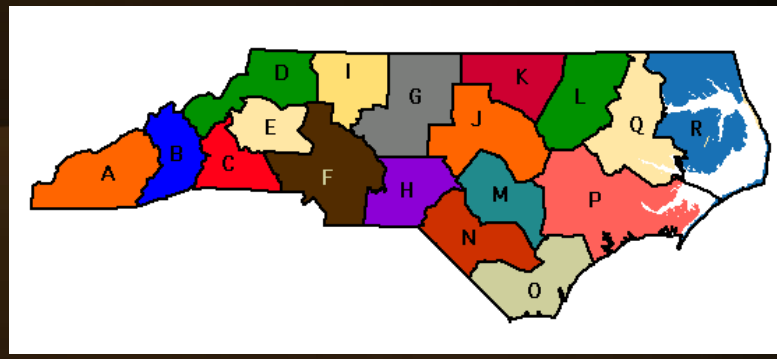
NC Workforce Development Board Regions



NC Census-Designated MSAs



NC Economic Devpt Partnership Regions



NC Councils of Government Regions

Plus, North Carolina has 100 counties; 59 community colleges/service areas; and 16 public universities—several of which are "regional."

Regions:
Toward Pragmatic Definitions

- A region IS defined by:
  - Natural economic dynamics in an age of high-speed travel and communications
    - Commuting distances
    - Media markets
    - Major industry concentrations

- A region is an area, including rural areas, roughly bounded along an axis of urban center(s) and major knowledge institution(s)

- If all other definitions fail… A region is:

  …an area safely larger than the last one to whose problems we found no solution (Jacobs)

- In reality, *any* definition of *economic region* will have "fuzzy boundaries"

Regions:
Even More Difficult to Mobilize

EKA

Botetourt Chamber

Vinton Chamber

Roanoke Valley Econ. Development Partnership

Roanoke Econ. Development

Roanoke Co. Econ. Development

Roanoke Valley Business Council

Downtown Roanoke Inc.

Franklin Co.

Botetourt County

Salem/Roa. Co. Chamber

New Century Tech Council

Center for Innov. Leadership

Salem

Convention & Visitors Bureau

Roanoke Valley Alleghany Regional Commission

Vinton

Arts Council of the Blue Ridge

New Century Venture Center

Small Business Devpt. Center

Workforce Investment Board

VA 5th Regional Alliance

Greater R.V. Dev. Fdn.

Community Bus. Dev. Initiative

W. VA Trade Office

C.I.T.

Downtown Roanoke Fdn.

SW Va. Film Office

T.A.P. Entrep. & Loans

SW. Comm. Dev. Fund

VA Highlands Film Office

Radford U. Minority Business Devpt. Program

Roanoke Regional Chamber

KEY
Locality
Valley-Wide
Super Regional/Statewide

Our Greatest Challenge:
New Forms of Alliance Organizations

- Alliances
  - Multi-institutional
  - Academic-public-private sectors
  - EFFECTIVE Multiple stakeholder organizations
- Networks
  - Research
  - Commercialization and entrepreneurship
  - Data and computing
- Globalization vs Regionalism
  - Strategy occurs on local/regional level
  - National and provincial governments playing key policy and investment roles
  - Find a solution to the problem of TOO MANY LAYERS

Creating an Innovation Economy:
Needs Comprehensive Strategy

Source: Eva Klein & Associates

Creating an Innovation Economy

Conclusions

Economic Development:
Industrial Economy

EKA

Manufacturing

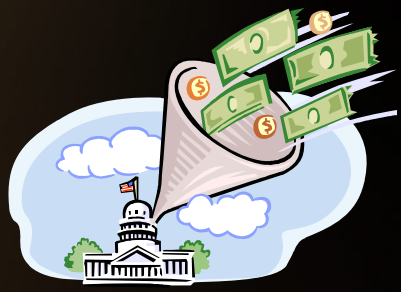
Sites

Business Recruitment and Incentives

Jobs

Measuring Outcomes:
Familiar Industrial Economy Metrics

- # of Jobs "Created"
  - Even if only moved; not really "new"



- Growth in Ratables (Revenues)
  - Very important to local government

- $ Levels of Capital Investment
  - Usually not reported as "net" of incentives provided
- SF of Space Leased or Occupied
  - Can be short-lived accomplishment—companies do not always stay

Economic Development:
Innovation Economy

EKA

Innovation & Intellectual Capital

Quality of Place

Energizing Innovation and Building Knowledge Assets

Knowledge Work Force

Measuring Outcomes:
New Innovation Economy Metrics

- Human Capital
  - Population size
  - Skills levels
  - Youth
- Innovation and Entrepreneurship
  - New company formations and growth
  - Systems in place to nurture innovation
- Regional Competence
  - Focused R&D investment strategy—clusters
  - Overall growth in knowledge asset base
  - World-class competitiveness in something
- Leadership
  - Vision
  - Willingness to invent and take/manage risks
  - Sharing credit for success

At the Heart of the Transformation:
The 21st Century Research University

- More niche-building and world-class programs
- New integrated models in research
- Restructuring of degree & non-degree programs
- Explicit variation in delivery modes & locations
- True accommodation of varied learner constituents, *especially adults*
- Enlarged roles of faculty as professional problem-solvers
- More open and mixed-use campus environments
- Different & business-friendly academic culture

At the Heart of the Transformation:
Toppling the Ivory Tower

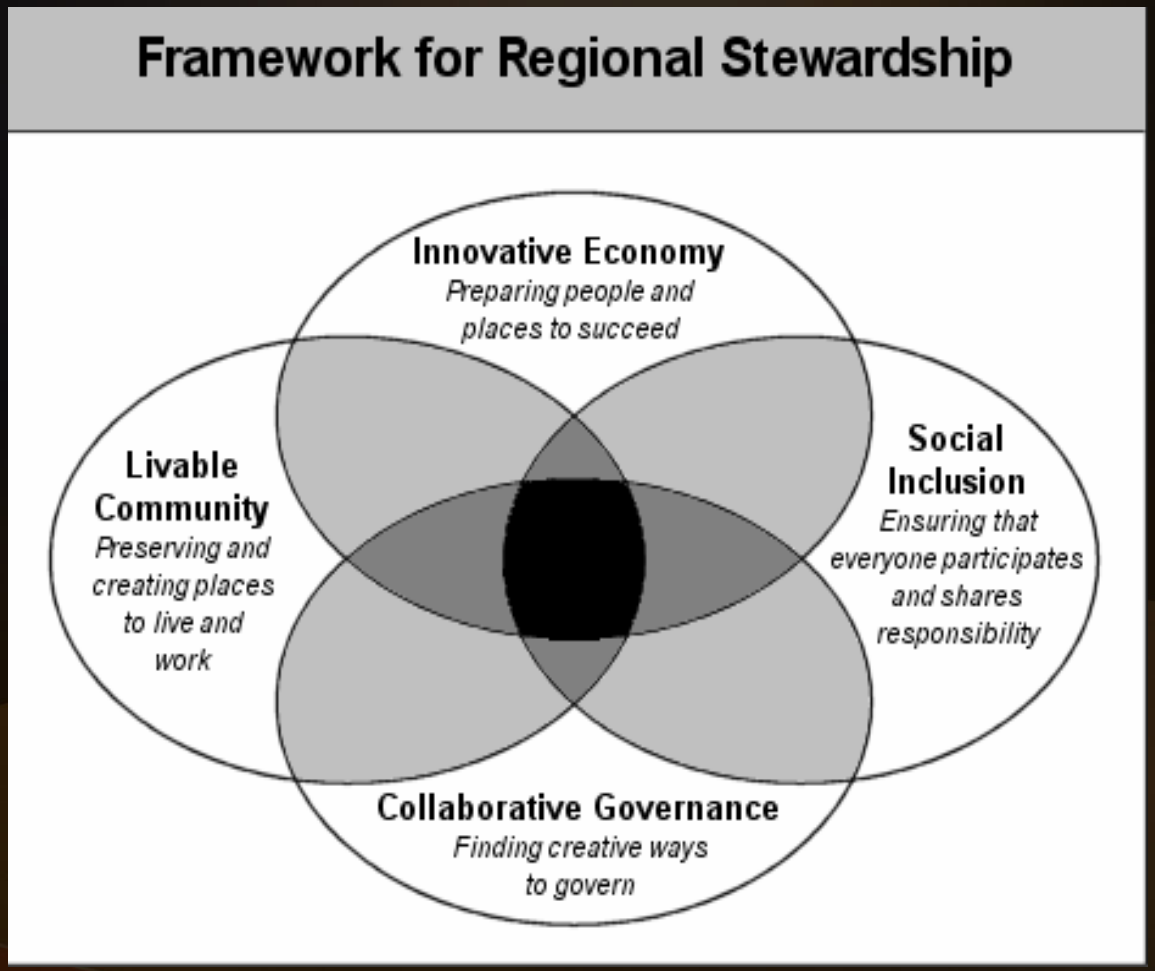
EKA

Knowledge Producer Sector ⟷ **Knowledge User Sector**

Thus, it is conceivable that the economic advantage of particular places is in turn dependent on the networks and capacities that build up between knowledge producers and knowledge users in particular localities. These capacities do not just have a territorial significance, but they help to position each sector better within its own global networks; thus by undertaking regional engagement work, universities receive more core funding which can be invested in improving their own international reputation and esteem. Likewise, by working with regional-engaged universities, businesses are able to innovate more effectively, learn more quickly, and help produce better and more competitive products improving their own competitive strength.

Source: Understanding the Regional Contribution of Higher Education Institutions: A Literature Review, OECD, p. 48

At the Heart of the Transformation:
Universities as Regional Stewards



Source: American Association of State Colleges and Universities

And One Last Word:
There are No Cookbooks (Yet)

Take the transformation challenge seriously .
AND—Recognize the need to invent and test new solutions.

- When hunters/gatherers took up farming, we invented:
  - Land ownership laws
  - Communities (and government)
  - Agricultural tools and processes
- When farmers took up manufacturing, we invented:
  - Assembly line
  - Public education
  - Labor and business law
- As we take up innovation, what will we invent?
  - New solutions to world problems
  - New sources of wealth and prosperity
  - New forms of social, political, economic, & education institutions

Je vous remercie de m’avoir invitée a cette réunion.

Je vous souhaite un avenir de réussites et de prosperité.