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How Globalization, Innovation, and Culture Are Changing Arizona’s Economy

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President, ITIF

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The Information Technology and Innovation Foundation is a think tank at the cutting edge of designing innovation policies and exploring how innovation will boost economic growth and competitiveness. ITIF focuses on:

• Innovation processes, policy, and metrics,
• Internet, big data and IT policy,
• IT and economic productivity,
• Science and tech policy, and
• Innovation and trade policy
Today’s Presentation

1. Understanding Economic (R)evolution
2. Geography-Driven (R)evolution
3. Technology-Driven (R)evolution
4. Culture-Driven (R)evolution
5. Taking Advantage of (R)evolution
Arizona Then...
Arizona Now...
Arizona Next...?
Economies: “Engines” That Get Bigger?
Or Systems That Evolve?
During My Talk …

- 25 Patents Will be Issued
- 18 New Products Released
- 18 New Production Processes Adopted
- 150 Firms Will Go Out of Business
- But 166 Firms Will Start Up
Drivers of Economic Evolution

- Geography and movement of firms and people
- Technological innovation
- Culture and demography
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Geography Drives Economic Evolution

Economies are entities that evolve over both time and space.

The U.S. has to generate new industries to replace the ones it loses to low-wage nations.

Competition for “replacement” firms is much stiffer.

Table: Real output loss, 2000 to 2010 for selected U.S. manufacturing industries.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>17%</td>
</tr>
<tr>
<td>Fabricated Metals</td>
<td>20%</td>
</tr>
<tr>
<td>Furniture</td>
<td>26%</td>
</tr>
<tr>
<td>Paper</td>
<td>27%</td>
</tr>
<tr>
<td>Nonmetallic Minerals</td>
<td>30%</td>
</tr>
<tr>
<td>Primary Metals</td>
<td>36%</td>
</tr>
<tr>
<td>Apparel</td>
<td>40%</td>
</tr>
</tbody>
</table>

Source: Bureau of Economic Analysis
Migration of Firms Used to Be National
Now It’s Global
Fewer Relocations to Target

Major Industrial Manufacturing Relocations & Expansions in U.S.
Arizona Has Long Been Lower Cost

Arizona per-capita income as share of US per-capita income (Source: BEA)
But Low Costs are Less of an Advantage
Future of Geographic Evolution

- Continued competition from low cost commodity nations
- Growing competition from innovation-based economies
Routine Production Metros Will Lag Innovation Metros
People Move

Five fastest growing metros (2000-2014):

• San Antonio
• Las Vegas
• Riverside-San Bernardino
• Houston
• Austin
Immigration of U.S. Knowledge Workers

Arizona Ranks
41st (2014)
Score:
2014: 12.2
2012: 12.1
2010: 10
Migration of U.S. Knowledge Workers

Arizona Ranks
34th (2014)
Score:
2014: 13.3
2012: 13.1
2010: 12.9
Technological Innovation Drives Evolution

- New production processes
- New products and services
- New business models
IT Drives Innovation

- 1,200 quintillion transistors in the world: 
  \((1,215,500,000,000,000,000)\)
- Up 14,300 times in the last 15 years
IT Changing Enterprises and the Economy

- Social
- Mobile
- Internet of Things
- Analytics
- Cloud
- Kiosks
## Technology Drives Evolution

### Changes in real industrial output by industry and cause

*1998-2011 data

**Source:** Bureau of Economic Analysis

<table>
<thead>
<tr>
<th>Industry</th>
<th>NAICS Code</th>
<th>Real Gross Output Change 1998-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Growth Due to Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet publishing and broadcasting and Web search portals</td>
<td>519130</td>
<td>1094.2%</td>
</tr>
<tr>
<td>Wireless telecommunications carriers (except satellite)</td>
<td>517210</td>
<td>699.9%</td>
</tr>
<tr>
<td>Support activities for oil and gas operations</td>
<td>21311A</td>
<td>386.1%</td>
</tr>
<tr>
<td>Biological product (except diagnostic) manufacturing</td>
<td>325414</td>
<td>137.4%</td>
</tr>
<tr>
<td>Data processing, hosting, and related services</td>
<td>518200</td>
<td>132.7%</td>
</tr>
<tr>
<td>Software publishers</td>
<td>511200</td>
<td>116.2%</td>
</tr>
<tr>
<td>Environmental and other technical consulting services</td>
<td>5416A0</td>
<td>101.4%</td>
</tr>
<tr>
<td>Computer systems design services</td>
<td>541512</td>
<td>56.7%</td>
</tr>
<tr>
<td>Primary battery manufacturing</td>
<td>511200</td>
<td>111.2%</td>
</tr>
</tbody>
</table>

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<tr>
<th>Industry</th>
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<tr>
<td><strong>Decline Due to Technology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron tube manufacturing</td>
<td>33441A</td>
<td>-54.7%*</td>
</tr>
<tr>
<td>Software, audio, and video media reproducing</td>
<td>334611-2</td>
<td>-51.6%*</td>
</tr>
<tr>
<td>Magnetic and optical recording media manufacturing</td>
<td>334610</td>
<td>-42.4%</td>
</tr>
<tr>
<td>Video tape and disc rental</td>
<td>532A00</td>
<td>-39.0%*</td>
</tr>
<tr>
<td>Electronic and precision equipment repair and maintenance</td>
<td>811200</td>
<td>-33.9%</td>
</tr>
<tr>
<td>Postal service</td>
<td>491000</td>
<td>-30.2%</td>
</tr>
<tr>
<td>Directory, mailing list, and other publishers</td>
<td>5111A0</td>
<td>-26.0%</td>
</tr>
<tr>
<td>Couriers and messengers</td>
<td>492000</td>
<td>-19.6%</td>
</tr>
</tbody>
</table>
Technology is Making Industries That Were Local...
National...
Where’s Technological Evolution Going?
Software Is “Eating the World”
End of Moore’s Law or Robots Taking Over?

Shrinking chips
Number and length of transistors bought per $

Transistor size, nanometres (nm)

Source: Linley Group

Economist.com/graphicdetail
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Changes in Culture Drive Evolution

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<th>Industry</th>
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<th>Real Gross Output Change 1998-2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military armored vehicle, tank, and tank component manufacturing</td>
<td>336992</td>
<td>294.9%</td>
</tr>
<tr>
<td>Tortilla manufacturing</td>
<td>311830</td>
<td>103.4%*</td>
</tr>
<tr>
<td>Wineries</td>
<td>312130</td>
<td>102.7%</td>
</tr>
<tr>
<td>Medical and diagnostic labs and outpatient and other ambulatory care services</td>
<td>6214-5, 6219</td>
<td>78.4%</td>
</tr>
<tr>
<td>Securities, commodity contracts, investments, and related activities</td>
<td>523A00</td>
<td>69.4%</td>
</tr>
<tr>
<td>Fitness and recreational sports centers</td>
<td>713940</td>
<td>62.8%*</td>
</tr>
<tr>
<td>Offices of physicians, dentists, and other health practitioners</td>
<td>6211-3</td>
<td>53.3%</td>
</tr>
<tr>
<td>Home health care services</td>
<td>621600</td>
<td>43.3%</td>
</tr>
</tbody>
</table>

Changes in real industrial output by industry and cause.
*1998-2011

Source: Bureau of Economic Analysis
As Industries Become More Footloose, Culture and Quality of Life Enable Growth
Mid-sized Metros are Growing Faster

Percent employment growth, 2000-2014, top 50 metros (BLS)
Large Metros are Losing Employment Share

Largest Statistical Metro Areas (by 2001 employment data)
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Taking Advantage of Economic Evolution Means Embracing Innovation In...

- Culture
So Now a Region’s Culture and Quality of Life is You Don’t Want This...
You Do Want This
Taking Advantage of Economic Evolution Means Embracing Innovation In...

- Culture
- Institutions

Institutional Innovation: Doing new things in new ways
Taking Advantage of Economic Evolution Means Embracing Innovation In…

- **Economic development policies**
  - Innovation vouchers (German lander)
  - Refundable and collaborative R&D tax credits (Norway, Australia, Ontario)
  - Design assistance (Ontario)
  - “On the spot” new firm registration (Portugal, Chile)
  - Industrial Ph.D. program (Alberta)
Taking Advantage of Economic Evolution Means Embracing Innovation In...

- Culture
- Institutions,
- Economic development policies, and
- Government
Some Useful Questions to Ask About Innovation in Your Government

- Do I know my own innovation track record?
- Do I understand the innovation patterns in governments like mine around the world?
- Do I have a process in place where crazy, out of the box ideas (e.g., innovations) can get a hearing?
- Do I have clear metrics for innovation?
- Do I have effective incentives and rewards for innovating?

*Most governments have no answers.*
www.globalinnovationrace.com
Thank You

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