From Digital Infrastructure to Transformation

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October 7th, 2020
Digital Age Characteristics

- Exponential
- Digital
- Combinatorial
- Disruptive

Sources:
McQuivey, J. (2013). Digital Disruption – Unleashing the Next Wave of Innovation
Brynjolfsson & McAfee (2014). The Second Machine Age
Digital Age productivity surge?

Source: Brynjolfsson et al; National Bureau of Economic Research
Distance and Innovation

“Average distance between all inventors listed on a patent has tripled between 1975 and 2015”

Source: Matt Clancy
Transformations ...

1950s
Transformations …

1970s
Transformations ...

1980s
Transformations ...
True remote collaboration?
Increasing digitization

Increased adoption of online tools and digital services for businesses across rural America could create more than 360,000 jobs in the next three years.

Online tools and technology have the highest potential impact on rural small businesses with revenue under $100,000.

Source: C TEC

9.0% of U.S. GDP or $1.8 trillion in 2018

6.8% average annual growth from 2006 to 2018
Outpaced overall U.S. economic growth of 1.7%

8.8 million jobs in 2018
5.7% of total U.S. employment
$105,473 Average annual compensation per worker

Source: Bureau of Economic Analysis

bea.gov/data/special-topics/digital-economy
Increasing benefits

- Broadband DOES matter for a whole host of social & economic outcomes!
  - Household income
  - Employment levels
  - Firm attraction
  - Farm profits
  - Civic engagement
  - Increased housing values

- Adoption is (arguably) more important than simple availability

- 100 Type 2 Diabetes patients recruited in Georgia
  - A1c levels down 2.5% after 6 months
  - $3,855 per patient per year in savings
  - Increased quality of life among participants

Source: CoBank; FCC
Homework gap impacts ...

• 1 in 4 teens have limited broadband access
• 81% need fast internet for homework yet 43% struggle to complete homework
• 86% teens found jobs online
• 66% vs. 79% of teens without/with broadband → more income than parents

“Students with no access at home or dependent on cell phones alone performed lower on digital skills, homework completion, and grade point average.”

Source: Microsoft

Source: Michigan State University Quello Center
Houston, we have a problem …

"Farms that contribute $80 billion to the U.S. GDP run on limited internet connections."

Source: United Soybean Board
Mobile only is not the solution …

On average, U.S. households used **344 GB per month** during 2019

For a rural user on a fixed LTE service at the highest data tier this would cost **$3,190/month due to overages**

And users with an **unlimited plan** would be throttled to **0.6 Mbps for 95% of the month**

Source: OpenVault; Twitter user Ben Fineman (bfineman)
Community Development
Key Concepts

Communities carry out important activities and functions to serve its residents.

Institutions are rules and organizations, including informal norms, that coordinate human behavior and affect linkages.

Linkages are the capacity of communities to carry out major functions and these depend on the nature and strength of local institutions.

Horizontal linkages happen between institutions (and people) at the local level achieved through partnerships and collaborations that help bring down silos.

Vertical linkages happen between local institutions and external higher level (state, regional, national).

Source: Christenson & Robinson (1989); Robinson & Green (2010); Anglin (2011)
Community Development Definition

“Group of people in a locality initiating a social action process – i.e. planned intervention – to change their economic, social, cultural, and/or environmental situation.”

Christenson & Robinson (1989)
CARE Model

Create: entrepreneurship primarily
Attract: recruit external businesses
Retain: keep existing businesses
Expand: help existing businesses grow
Community Capitals

Jane Q. wants a walking trail in her community...

<table>
<thead>
<tr>
<th>Description</th>
<th>Capitals Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takes leadership development class, learns new skills</td>
<td>Human</td>
</tr>
<tr>
<td>Partners with local hospital that wants to implement wellness campaign</td>
<td>Social</td>
</tr>
<tr>
<td>Works with local parks &amp; recreation to identify land</td>
<td>Natural</td>
</tr>
<tr>
<td>State senator informs of grant that can be used</td>
<td>Political &amp; Financial</td>
</tr>
<tr>
<td>Local tourism board likes the idea and provides additional funding</td>
<td>Financial</td>
</tr>
<tr>
<td>City and county build trail infrastructure</td>
<td>Built</td>
</tr>
<tr>
<td>Local historical society adds historic markers</td>
<td>Cultural</td>
</tr>
</tbody>
</table>

Source: Jacobs (2007)
Digital Capital

The accumulation of digital competencies (information, communication, safety, problem-solving) and digital technology (devices, connectivity, support, etc.)

Different levels influence quality of digital experience which in turn affect other capitals (economic, social, etc.)

Source: Ragnedda (2018)
What is Digital Inclusion?

Refers to the adoption of broadband technologies and its meaningful use for social and economic benefits.

Source: Community Developments Investments Magazine, November 2018

First-level divide: access yes/no
Second-level divide: differences in internet use
Third-level divide: economic, cultural, social, & personal outcomes
2019 M-Lab Speed Test Results by County Type (Mbps)

Source: M-Lab
The digital divide index score (DDI) ranges between 0 and 100, where a lower score indicates a lower divide. The infrastructure adoption score and the socioeconomic score contribute to the overall DDI.

### Infrastructure/Adoption Score

- **11.5%** of people without access to fixed broadband of at least 100 Mbps down and 20 Mbps up.
- **13.1%** of households with no internet access (not subscribing).
- **9.7%** of households without a computing device.

### Socioeconomic Score

- **15.0%** population ages 65 and older.
- **7.0%** ages 25 and older with less than a high school degree.
- **10.1%** of individuals in poverty.
- **10.8%** noninstitutionalized civilian population with a disability.

Source: ACS 2014-2018

pcrd.purdue.edu/ddi
Digital Equity: % Homes with no Internet Access by Income and County Type

Source: ACS 2014-2018
2010 Share of Low, Middle, and High Digital Skill Jobs by County Type

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Middle</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>27.8</td>
<td>44.4</td>
<td>27.8</td>
</tr>
<tr>
<td>Minnesota</td>
<td>27.2</td>
<td>45.7</td>
<td>27.1</td>
</tr>
<tr>
<td>Urban</td>
<td>29.0</td>
<td>44.8</td>
<td>26.2</td>
</tr>
<tr>
<td>Small City</td>
<td>20.7</td>
<td>48.6</td>
<td>30.7</td>
</tr>
<tr>
<td>Rural</td>
<td>19.4</td>
<td>49.6</td>
<td>31.1</td>
</tr>
</tbody>
</table>

Source: Brookings; EMSI
2019 Share of Low, Middle, and High Digital Skill Jobs by County Type

Source: Brookings; EMSI
Community Digital Transformation Components

• Mindset
• Leadership
• Capacity building
• Empower residents
• Relevant applications
• Improve communication
Community Implications

1. Industrial age assumptions no longer hold; look inward
   - Diversify priority areas (e.g. manufacturing)
   - Digital Entrepreneurial Ecosystem

2. Make digital inclusion a priority
   - Gather relevant data (infrastructure, skills, use)
   - Ensure existing businesses can compete in digital economy
   - Proactively manage community’s online reputation

3. Placemaking (minimum viable millennial product or MVMP)
   - Historic/cultural assets
   - Walking/bike trails, libraries, coffee shops
Community Implications (cont’d)

4. Telework friendly policies

5. Repurpose workforce development
   - Continuous learning
   - Soft skills
   - Remote work skills

6. Make community more responsive and engaging
   - Don’t make residents get in line for something that can be done online

7. Improve leadership pipeline; engage youth
Telework friendly community

• **Existing businesses**: incentivize existing business to hire teleworkers

• **Business attraction (not physically!)**: incentivize out of state businesses to hire teleworkers in your state

• **Workforce development**: provide remote working skills to workers

• **Broadband availability and affordability**: improve connectivity and offer subsidies to remote workers

Source: Gallardo & Whitacre (2018)
What is PCRD/Extension doing?

Community Engagement

- Comprehensive Digital Inclusion Plan
- Digital Divide Index
- COVID Mitigation Vulnerability
- 4 Intelligent Community checklists completed
- 2,500+ household data validation survey completed
- 5 interactive maps
- 4 state of broadband reports completed
What is PCRD/Extension doing?
Digital Ready Businesses

• From April 2018 through September 2019
• 22 extension educators trained; 16 counties; 89 workshops; 100+ businesses
• Online version & certification
• Android/iOS app study guides

https://cdext.purdue.edu/dr
What is PCRD/Extension doing?
Remote Work Certification

• Four-week online course
• Provides skills to remote work
  • W-2
  • Freelancer
  • Self-employed
• Workflow
• Productivity & time management
• Teams
• Critical thinking
What is PCRD/Extension doing? Digital Ready Community

- Objective: improve civic engagement and responsiveness
- Improve or expand community’s online presence
- Identify and create a digital asset group (DAG)
- Design & implement a digital engagement plan
Essential Digital Employability Skills (EDES)

Provide employability digital skills through online modules

- Connect and collaborate effectively
- Communicate effectively
- Project management
- Purdue-backed badge/certificate
What is your community’s online reputation?
• Partnership with Lamb School of Communication & Agricultural Communication
• Conduct online audit/assessment
• Develop/implement plan

https://pcrd.purdue.edu/ifrontdoor
Is your community digital inclusive?
How can we help?

Purdue Center for Regional Development

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Facebook: /purdueCRD