INNOVATION-LED ECONOMIC DEVELOPMENT IN HOWARD COUNTY

Using Cluster Analysis, Network Analysis and Spatial Analysis to Identify Economic Development Strategies
• Introduction
• Traditional Economic Analysis Methods
• Spatial Analysis
• Network Analysis
• Company and Cluster Profiles
• Recommendations & Conclusion
INTRODUCTION
RESEARCH QUESTION

How do we spur innovation-led economic growth in Howard County?

Goals

1) Analyze the innovation and entrepreneurial ecosystem in Howard County using multiple methods

2) Identify potential Innovation Led Economic Development opportunities based on the analyses

3) Develop detailed actionable ILED strategies around the opportunities identified
MULTIPLE METHODS

Demographic Analysis
Cluster Analysis
Spatial Analysis
Network Analysis
INNOVATION LITERATURE

INTRODUCTION

TRADITIONAL METHODS

SPATIAL ANALYSIS

NETWORK ANALYSIS

PROFILES

RECOMMENDATIONS
NATURE OF INNOVATION

Innovation...

- Creates value
- Is implementable & impactful
- Can change with context

Innovation is the result of:

- Diversity of people, ideas, and expertise
- Trust, connection, communication
- Trial & error
- Capital & investment
- Suitable regulatory environment (few barriers)
INNOVATION AS AN ECONOMIC DRIVER

• Innovation alone does not contain $$$
• Innovation often requires economic incentives
• Innovation is not a linear process
• Character of innovation is industry-based and reactive to economic climate
MEASURING INNOVATION

Input
- R&D Spending
- Grants

Output
- Research ➔ Publication Count
- Invention ➔ Patents
- Prototyping ➔ SBIR/STTR Phase I
- Commercialization ➔ SBIR/STTR Phase II

Process
- Entrepreneurship ➔ Start-Ups
- ➔ Early Stage Investment
- ➔ Incubator & Accelerator Participation

Outcome
- Economic Impacts ➔ Solow Residual

INTRODUCTION TRADITIONAL METHODS SPATIAL ANALYSIS NETWORK ANALYSIS RECOMMENDATIONS PROFILES
TRADITIONAL ECONOMIC ANALYSIS
Quick Facts

Total population (2014): 299,269
Median Age: 38.6
Median Household Income: $110,133
Number of Business Establishments: 8,946

Innovation Index

Source: ACS 2010-2014 ACS estimates, U.S. Census Bureau, 2013 County Business Patterns

Commuting Flows

Source: http://onthemap.ces.census.gov

Howard County Profile

Labor Force Participation Rate

Source: U.S. Census Bureau, 2011-2013

Residents with Bachelors Degree

Source: U.S. Census Bureau, 2011-2013

County Jobs Held by Residents

Source: MD Department of Planning and Maryland DBED, 2009-2013
Top Clusters by Location Quotient vs. Top Clusters by Employment

- **Top Clusters by Location Quotient**
  - Business Services: 25.5k
  - Communications: 2.08k
  - Education: 10.9k
  - Environmental Services: 395
  - Leather Products: 175
  - Marketing: 7.81k
  - Performing Arts: 728
  - Recreational Goods: 152

- **Top Clusters by Employment**
  - Business Services
  - Distribution and Electronic Commerce
  - Education and Knowledge Creation
  - Marketing, Design, and Publishing
  - Insurance Services
  - Communications Equipment and Services
  - Financial Services
  - Information Technology and Analytical Instruments
  - Hospitality and Tourism
  - Food Processing and Manufacturing

**Results**

- **Introduction**
- **Traditional Methods**
- **Spatial Analysis**
- **Network Analysis**
- **Profiles**
- **Recommendations**
Several clusters are influenced by one or two strong subclusters:

**Business Services**
- Computer Services
- Corporate Headquarters
- Business Support Services
- Engineering Services
- Consulting Services
- Employment Placement Services
- Architectural and Drafting Services
- Ground Passenger Transportation

**Education and Knowledge Creation**
- Research organizations
- Training Programs
- Colleges, Universities, etc
- Educational Support Services
- Professional Organizations

Employment (in thousands), 2013
### StatsAmerica

**Top Industry Clusters by Employment Location Quotient (2012)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Employment</th>
<th>LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Info. Tech. &amp; Telecommunications**</td>
<td>20,555</td>
<td>3.37</td>
</tr>
<tr>
<td>Defense &amp; Security</td>
<td>22,936</td>
<td>2.62</td>
</tr>
<tr>
<td>Business &amp; Financial Services</td>
<td>29,312</td>
<td>2.08</td>
</tr>
<tr>
<td>Energy (Fossil &amp; Renewable)*</td>
<td>14,295</td>
<td>1.99</td>
</tr>
<tr>
<td>Advanced Materials</td>
<td>9,326</td>
<td>1.81</td>
</tr>
<tr>
<td>Computer &amp; Elect. Product Mfg</td>
<td>1,371</td>
<td>1.1</td>
</tr>
</tbody>
</table>

*Cluster may be a false positive - industry may not have a significant presence in the County.
**Skewed by strong subclusters

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### U.S. Cluster Mapping

**Top Traded Clusters by Employment Location Quotient (2013)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Employment</th>
<th>LQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing, design and publishing</td>
<td>7,805</td>
<td>3.1</td>
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<tr>
<td>Environmental services</td>
<td>396</td>
<td>2.31</td>
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<tr>
<td>Communications equipment and services</td>
<td>2,000</td>
<td>2.16</td>
</tr>
<tr>
<td>Recreational and Small Electric Goods</td>
<td>528</td>
<td>1.71</td>
</tr>
<tr>
<td>Education and knowledge creation</td>
<td>10,018</td>
<td>1.69</td>
</tr>
<tr>
<td>Business Services</td>
<td>35,828</td>
<td>1.64</td>
</tr>
</tbody>
</table>

Data Source: www.statsamerica.org

Data Source: www.clustermapping.us

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### Cluster Analysis Comparison

- **StatsAmerica U.S. Cluster Mapping**
- **Introduction**
  - Traditional Methods
  - Spatial Analysis
  - Network Analysis
  - Profiles
  - Recommendations
SPATIAL ANALYSIS
**Background**

- Innovation Cluster Mapping and Identification
- Spatial Point Pattern Analysis

**Methodology**

- Identify clusters of innovative firms
- Evaluate locations based on current conditions and company mix
- Select cluster for location based strategy development
HOT SPOT ANALYSIS BASED ON LONGITUDINAL EMPLOYER-HOUSEHOLD DATA (LEHD)

INTRODUCTION

TRADITIONAL METHODS

SPATIAL ANALYSIS

NETWORK ANALYSIS

PROFILES

RECOMMENDATIONS
HOT SPOT ANALYSIS OF INNOVATIVE BUSINESSES

Howard County Industrial, Commercial, and Office Zoning

Howard County Industrial & Commercial Land Use

Land Use
- Commercial
- Industrial
- Undeveloped Commercial
- Undeveloped Industrial
- Howard County Boundary
INNOVATIVE COMPANY LOCATIONS

INTRODUCTION

TRADITIONAL METHODS

SPATIAL ANALYSIS

NETWORK ANALYSIS

PROFILES

RECOMMENDATIONS
KERNEL DENSITY ANALYSIS RESULTS
COLUMBIA GATEWAY INNOVATION DISTRICT: EXISTING CONDITIONS

Innovation District Land Use and Kernel Density

Innovation District Building Footprints and Parking

INTRODUCTION TRADITIONAL METHODS SPATIAL ANALYSIS NETWORK ANALYSIS RECOMMENDATIONS
<table>
<thead>
<tr>
<th>Company</th>
<th>Property Owner</th>
<th>Land Value</th>
<th>Assessed Value</th>
<th>Acres</th>
<th>2015 Property Tax</th>
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</thead>
<tbody>
<tr>
<td>Science &amp; Engineering Services Inc</td>
<td>AAK LLC</td>
<td>$7,187,400</td>
<td>$13,509,133</td>
<td>15</td>
<td>$202,048</td>
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<tr>
<td>Universities Space Research</td>
<td>Universities Space Research</td>
<td>$4,039,300</td>
<td>$10,779,867</td>
<td>8.43</td>
<td>$101,223</td>
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<td>Masstech</td>
<td>GATEWAY CROSSING 95 LLC</td>
<td>$3,938,600</td>
<td>$6,357,500</td>
<td>8.22</td>
<td>$95,663</td>
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<tr>
<td>ACELL</td>
<td>6711 GATEWAY LLC</td>
<td>$3,061,800</td>
<td>$14,733,333</td>
<td>6.39</td>
<td>$208,669</td>
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<tr>
<td>Advanced Technology &amp; Research Corp</td>
<td>GATEWAY A 74 &amp; A 76 LLC</td>
<td>$22,650,100</td>
<td>$42,000,000</td>
<td>115.55</td>
<td>$667,125</td>
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<tr>
<td>Envieta LLC</td>
<td>MOR GATE LLC</td>
<td>$5,122,200</td>
<td>$13,382,000</td>
<td>10.69</td>
<td>$194,804</td>
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<td>Osiris Therapeutics</td>
<td>EM CORP UNIVERSITY OF MD MEDICAL</td>
<td>$2,467,600</td>
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<td>5.15</td>
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<td>Agnik LLC</td>
<td>MERRITT-C CP II LLC</td>
<td>$2,607,000</td>
<td>$11,685,067</td>
<td>6.65</td>
<td>$167,885</td>
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<td>Martek Biosciences Corp. (acquired by DSM)</td>
<td>COLUMBIA BUSINESS CENTER GREEN LLC</td>
<td>$844,100</td>
<td>$4,021,300</td>
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<tr>
<td>Raba Equity Partners LLC</td>
<td>MERRITT C CP III LLC</td>
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<td>$19,317,200</td>
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<td>$275,305.93</td>
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<tr>
<td>Ibiquity Digital Corp.</td>
<td>MERRITT C CP V LLC</td>
<td>$2,211,100</td>
<td>$14,955,067</td>
<td>5.64</td>
<td>$212,784.35</td>
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<tr>
<td>Bowles Fluidics Corp.</td>
<td>BROADSTONE BFC MARYLAND LLC</td>
<td>$1,633,500</td>
<td>$5,291,167</td>
<td>6.25</td>
<td>$79,123.92</td>
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<tr>
<td>Next Century Corp.</td>
<td>AAK II LLC MARYLAND LLC</td>
<td>$9,516,100</td>
<td>$21,492,633</td>
<td>19.86</td>
<td>$317,872.89</td>
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</tbody>
</table>

**Introduction**

Traditional Methods

Spatial Analysis

Network Analysis

Profiles

Recommendations
SPATIAL ANALYSIS
RECOMMENDATIONS

• Walkable innovation district at the Columbia Gateway area located south of Snowden River Parkway, west of 175, north of interstate 95 and east of route 32

• Laboratory space for Regenerative Medicine companies

• Warehouse space for startups
For Entrepreneurs By Entrepreneurs

Here at Hatch, we believe in people having the ability to build a path to the future they want. So, we’ve built an ecosystem for entrepreneurs to thrive by creating events, programs, workshops, and courses designed to help people and their companies to flourish.

What stage are you in?

No matter where you are in the startup lifecycle, Hatch can help. We know everything it takes to get you from the very early stages, to making your first sale, hiring your first employees, receiving press, and achieving all of your entrepreneurial dreams.

Idea or Napkin Stage
How do I turn my idea into a company?
I have an awesome hobby, but how do I make money of it?
I don’t even know where to start, what do I need to do to start a company?

Launch Your Company
I just launched my company, now what?
What are some marketing tips for a startup?
How do I tell people about my startup?

Grow Your Business
I want to expand, what do I do?
My startup is growing, but I want more customers.
How do I take my startup to the next level?
NETWORK ANALYSIS
HOWARD COUNTY FULL INNOVATION NETWORK

**Keystones**
- Identify & cultivate keystones in each innovation cluster
- Identify & cultivate capital networks around each innovation cluster

**Workforce Development**
- Develop industry partnerships (EARN) around innovation clusters
- Work with universities & community colleges on talent pipeline

**Universities (JHU, UMCP, UMB, UMBC +)**
- Leads for licensing & research
- Identify key labs for expansion / enhancement
- Identify potential faculty spin outs
- Accelerate student startups & seed them in clusters
- Build long-term sponsored research relationships

**Business Expansion & Expansion (BRE)**
- Focus BRE on growth stage & mature companies
- Develop keystones

**Foreign Direct Investment (FDI)**
- Engage MD DOC on FDI
- Engage foreign-owned companies & expand FDI

**Business Attraction Opportunities**
- Focus on early stage companies with County connection
- Develop relationships with growth stage companies
- Make their next move to Howard County
- Connections to capital

**Accelerate Entrepreneurship**
- Support local startups
- Assist with market development
- Connect to capital & cluster firms
Regenerative Medicine & Nutraceuticals group
- Develop 'keystone companies'
- Promote local sourcing to help build cluster around keystones
- Industry partnerships for workforce dev
- FDI / Business expansion
- Business attraction / supply chain development
- Corporate sponsored research relations with universities

University groups (JHU, UMCP, UMB)
- Follow-up leads for licensing (green ties)
- Identify key labs (dense subgroups) and evaluate for expansion / enhancement
- Identify opportunities for faculty spin outs
- Identify / accelerate potential student startups that can be seeded in this cluster
- Build long-term corporate sponsored research relationships with keystone companies

Drill-down to Company Profiles
- Click to follow link

Targeted Economic Development Strategies At the Cluster Level

Delivery devices groups, ECM group
- Facilitate collaboration
- For ECM - assist with niche market development around wound care
- Business attraction

Stem cell products group
- Commercialization, acceleration, entrepreneurial support
- Business attraction
- Assistance with market development & positioning
Regenerative Medicine & Nutraceuticals groups
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Drill-down to Company Profiles
- Click to follow link
Focus on Regenerative Medicine Cluster

- Regenerative Medicine & Nutraceuticals Group
  - Develop ‘keystone companies’
  - Promote local sourcing
  - Industry partnership for workforce development
  - FDI/ Business Expansion
  - Business attraction and supply chain development

- University Group
- Company Profiles
- Delivery Device Group
- Stem Cell Products Group
• Over 60 individual companies identified
• Criteria include presence in and/or identifiable ties to Howard County
• Individual profiles for each company including information on size, location, activities, customers, innovation activity and key people
• Assigned to 1 of 5 color-coded cluster categories (based on NodeXL results)
TECHNOLOGY PROFILES

- Research & Development
- Nutraceuticals
- Regenerative Medicine
- Defense/Intelligence/Security
- Telecommunications

INTRODUCTION TRADITIONAL METHODS SPATIAL ANALYSIS NETWORK ANALYSIS PROFILES RECOMMENDATIONS
## Comparing Technology & Industry Clusters

<table>
<thead>
<tr>
<th>Industry Cluster (StatsAmerica)</th>
<th>LQ</th>
<th>Employment</th>
<th>Corresponding Technology Cluster</th>
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</thead>
<tbody>
<tr>
<td>Information Technology &amp; Telecommunications</td>
<td>3.37</td>
<td>20,555</td>
<td>Telecommunications</td>
</tr>
<tr>
<td>Defense &amp; Security</td>
<td>2.62</td>
<td>22,936</td>
<td>Defense/Intelligence/Security</td>
</tr>
<tr>
<td>Biomedical/biochemical (Life Sciences)</td>
<td>0.90</td>
<td>15,732</td>
<td>Regenerative Medicine, Nutraceuticals</td>
</tr>
<tr>
<td>Business and Financial Services</td>
<td>2.08</td>
<td>29,312</td>
<td>Research &amp; Development</td>
</tr>
<tr>
<td>Advanced Materials</td>
<td>1.81</td>
<td>9,326</td>
<td></td>
</tr>
</tbody>
</table>
Regenerative medicine is the process of creating living, functional tissues to repair or replace tissue or organ function lost due to age, disease, damage, or congenital defects.
STRATEGIES & RECOMMENDATIONS
RECOMMENDATIONS & CONCLUSIONS

• Traditional Analysis
  • Background and basis for comparison
  • Limited applicability at the local level

• Spatial Analysis
  • Create an innovation district

• Network Analysis
  • Targeted economic development strategies within the Regenerative Medicine Technology Cluster
QUESTIONS & COMMENTS
THANK YOU