



BEAM Collaborative | U3 Advisors

Final Report

Assessing Robotics Supply Chain within Pennsylvania

November 5th, 2025

Methodology

01

Methodology

Robotics Supply Chain Category Structure

4 High Level Groupings

- The core organizing mechanism for this analysis. The four categories are:
 - Direct Materials, Software and Integration, Direct Services, Professional Services

19 Category Groupings

- Mid-level hierarchies that organize similar detailed categories into easily communicated groupings. The presentation will include **dashboards for each of these 18 groupings**, that also depict the relevant detailed categories within each.

86 Detailed Categories

- Core supply chain categories we are seeking to analyze. Though the presentation will be structured around the category groupings for the sake of efficiency, the **recommendations will be tailored to these specific category areas.**

Methodology

Robotics Supply Chain Category Structure

Direct Materials Software, Integration, and Direct Services Professional Services

| Category Grouping | Detailed Category |
|---|--|
| Chips, Processors, Controllers | AI Chips, Microcontrollers, PCBs, Processors, Semiconductors |
| Networking and Storage Equip | Cabling and Connectors, Data Storage, Networking Equipment |
| Navigation Equipment | Global Positioning Systems, Radars, Radios and Com Equipment |
| Sensing Equipment | Accelerometers, Encoders, IMUs, Optical Sensors, Other Sensors, Vision Processors |
| Elastomers | Elastomeric Polymers, Electroactive Polymers, Hydrogels, Silicone Rubber |
| Plastics and Polymers | Thermoplastics, Nylon, Poly-Carbonates, Polyether Ketone, Polyurethane |
| Control Systems | Actuators, Automation and PLCs, Effectors and Manipulators, Reduction Gears |
| Mobile Robotic Vehicles | Drones, Ground Vehicles, Marine Vehicles |
| Power and Energy Storage - Robotics | Drive Sys, Accumulators, DC-DC Converters, Lithium-Ion/Polymer Batteries,, Supercapacitors |
| Power and Energy Storage - Data Centers | Power Transformers, PDUs, Cooling Systems, Emergency Generators, Server Racks, Surge Protection Devices |
| Enabling and Emerging Materials | Copper, Nano Technology, Nickel |
| Functional and Smart Materials | Advanced Ceramics, Magnetics, Shape Memory Alloys, Silicon Carbide |
| Structural and Composite Mat | Aluminum, Carbide, CFRPs, GFRPs, Steel, Titanium |
| AI, ML, and Robotics Software | AI Algorithms, Machine and Computer Visioning, ML Models, Conversational Interfaces, Gesture Control, Motion Detection |
| Fabrication and Machining | Fabrication / Machining by Materials (Enabling, Structural/Composite, Ceramic, Plastic) |
| Assembly and Integration | Contract Manufacturing and Prototyping, Electromechanical Assembly, Robotics Integration |
| Calibration, Testing, Validation | End of Line Testing, SIL/HIL Testing, Sensor Calibration, Safety Certification |
| Legal Services | Practice Areas: Data/AI, Government Contracts, IP, ITAR/EAR Control, Product Safety and Liability, Talent/Immigration |
| Human Resources and Staffing | Technical Recruiting, Global Workforce Sourcing, Robotics Workforce Training |

Methodology

Finding and Downloading Business Data



reference
solutions

The primary resource we used to gather business data is **Data Axel / Reference Solutions**. A directory of 18M+ businesses from across the country. We manually searched and downloaded over 22,000 businesses from Pennsylvania that were within NAICS codes aligned with the supply chain categories.



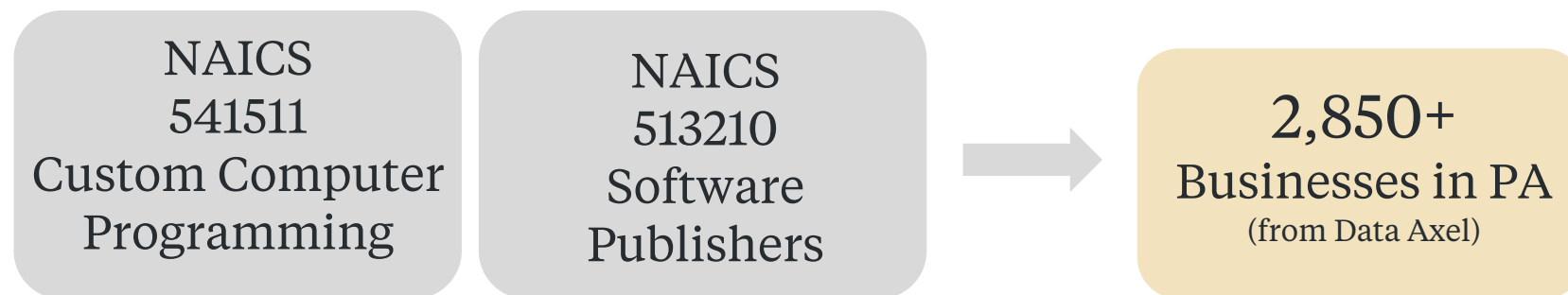
Aligning NAICS Codes: To identify the 22,000 businesses to evaluate, we assigned 75 NAICS codes across all the robotics supply chain categories (full list of all NAICS codes will be included with the materials provided to TeamPA).

Though we originally intended to use PA DGS to build our directory, we found that Data Axel was a more useful and efficient tool. The DGS directory was used to plug gaps in some categories we could not find through Data Axel

Methodology

Problem: Refining and Deepening NAICS Data

Using two NAICS codes to demonstrate the need for this additional step



These two NAICS could capture the following Robotics / AI supply chain categories:

- AI and Machine Learning Models
- COTS Robotics Software
- Robotics System Integration
- AI / Machine Learning Integration

For each Robotics / AI / Data Center supply chain category, we created a lookup table of all possible NAICS codes that could align with each category.

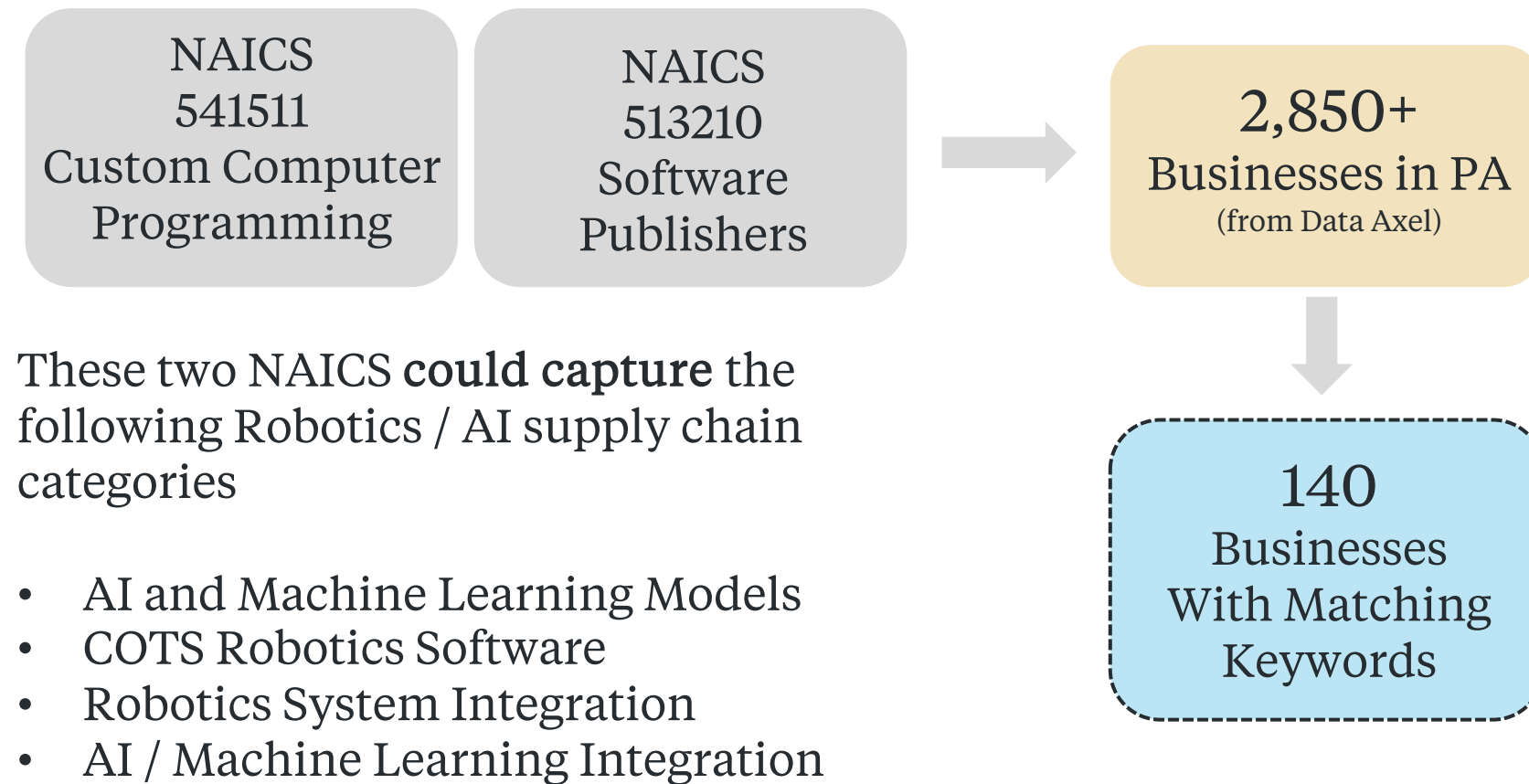
This provided a “**universe of potential options**” for each category. But there are **limitations to relying only on NAICS codes**.

- Some NAICS codes are too broad for specific types of goods or services (i.e. software example)
- In higher tech categories, NAICS codes **have not caught up with the specialization** required for some categories (i.e., machine learning, lithium-ion batteries, etc)
- Some 8-digit NAICS codes can provide direction but produce false matches (i.e. an Aluminum Foundry may include companies manufacturing castings purely for construction)

Problem Statement: We needed a methodology to narrow the businesses found through NAICS code to ensure stronger alignment with the robotics supply chain categories

Methodology

Solution: Scraping Business Websites



Solution: BEAM built a **customized web-scraaper** to **search websites for hundreds of keywords**, customized to each robotics procurement category. A table with all keywords searched will be provided to TeamPA. A sample of keywords for the example to the left includes:

- Ai algorithms
- Machine learning models
- Pre trained model
- Ai software library
- Computer vision software
- Object detection
- Facial recognition
- +90 others

Interpreting Results: Businesses matching keywords will be classified as Relevant Businesses and form the core of our analysis. It should be thought of as a **“minimum number of businesses likely offering this good or service,”** as the scraper, though essential to this analysis, has limitations (some websites prohibit access or may be structured in a way to limit scraping, some don’t have websites listed on Data Axel, etc)

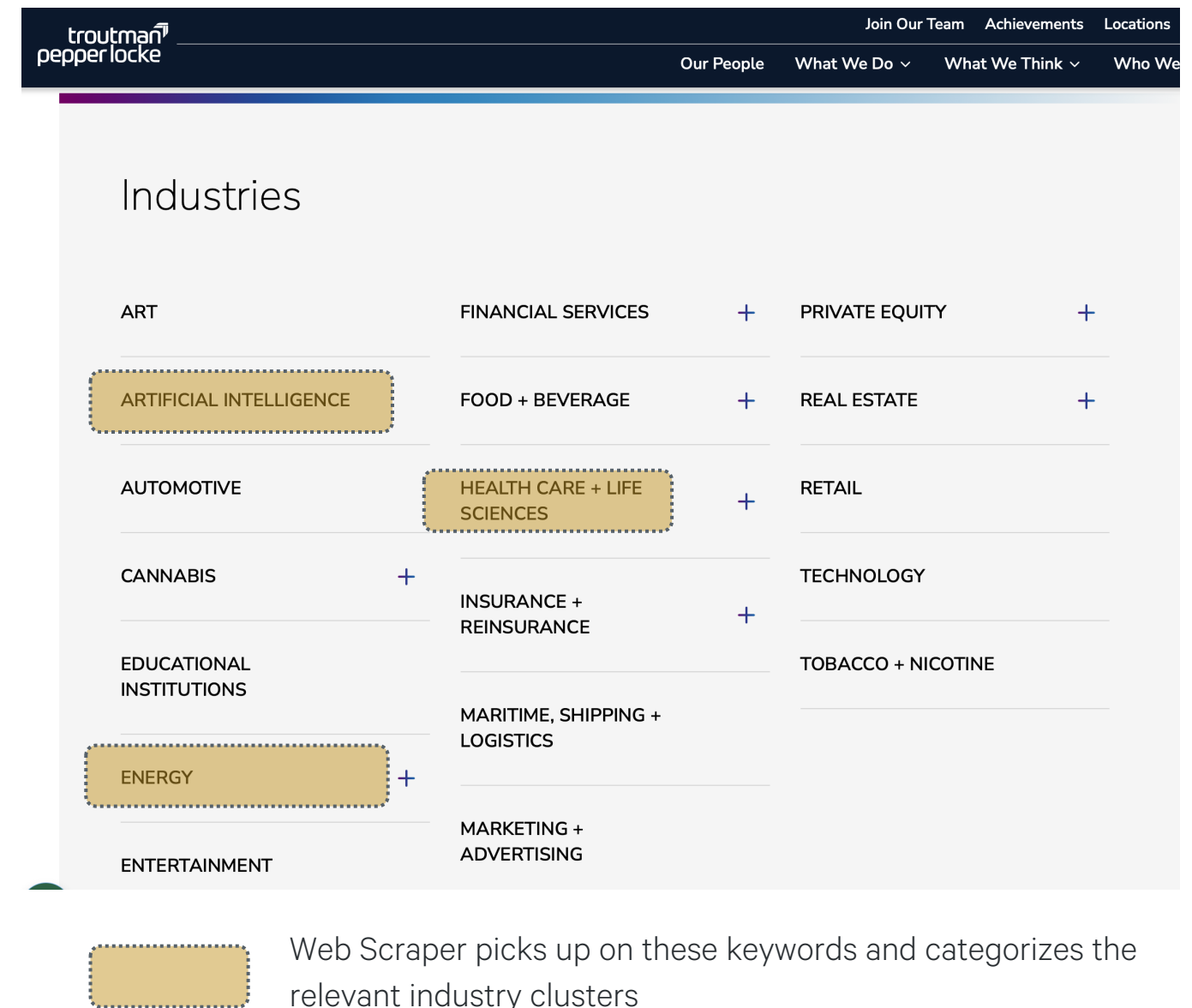
Methodology

Defining Industry Clusters

- We also needed a methodology to identify companies that are **working within Robotics / AI / Automation or similar industry clusters**.
- We directed the web-scraper* to search business websites for mentions of specific industries, sectors, and clients.
- In addition to robotics / automation / AI, we searched for the following similar industries
 - Aerospace
 - Alternative and Renewable Energy
 - Biomedical and MedTech
 - Defense and Military
 - Electronics Manufacturing / Semiconductor
 - Nuclear

Example

Troutman Pepper Locke – Law Firm
Offices in Philadelphia and Pittsburgh



* We also customized the search based on the Robotics Supply Chain category. For example, “Defense” was not a trigger word we used when searching Lawyers, as this could misread “Defense Attorney.” Though some may misclassified, a directionally sound approach to estimate industry experience and alignment

Methodology

Innovation Resources: Universities and Incubators

Conducted desktop research to identify **32 PA-based universities** that specify research or focus on robotics AI and **7 PA-based incubators** that explicitly specify research/focus on robotics/AI or that are involved in similar projects

Universities

- Identified **three** types of university robotics offerings:
1) degree programs, 2) independent short courses, and 3) robotics research labs.
- Identified **five** university robotics research focus areas:
1) Autonomy & Navigation 2) Perception & Sensor Fusion 3) Learning-Based Robotics 4) Manipulation, Mechatronics & Soft Robotics 5) Human-Robot Interaction & Collaborative

Incubators

- Identified **three** types of BSOs* explicitly focusing on robotics development in PA:
1) Accelerators & Venture Studios 2) Public-Private Institutes 3) Facility-Based Incubator/Coworking
- Identified **five** areas of business support where services are offered:
1) Capital & Investment 2) Founder Programming 3) Prototyping/Labs 4) Market Access Support 5) Space/Community & Shared Services

* While their services may be useful to robotics companies, this list excludes general business support organizations unless they explicitly state a focus on robotics.

Key Findings

02

Categories – Big Picture

Direct Materials

Key Findings

- Several categories of metals and alloys (steel, copper, aluminum) are among the most represented in Pennsylvania of all direct materials categories. These numbers increase when incorporating machined components made from these materials (discussed on next slide)
- PLC, DC-DC Converters, Cabling, and Optical Sensors are the electronics categories with the highest representation in Pennsylvania.
- Semiconductor and PCB manufacturers have some representation within Pennsylvania. However, almost half of the semiconductor businesses are not headquartered within the state.
- Only a few category areas have significant (>30%) experience within Robotics (PLCs, Cabling, Optical Sensors, Actuators)

** Experience with Data Centers for these two categories*

Chart: direct materials supply chain categories in which we found >10 businesses through the web-scraping process

| | Relevant Businesses | Experience Robotics / Automation | Experience Similar Industries |
|---|---------------------|----------------------------------|-------------------------------|
| Aluminum Alloys / Materials | 42 | 10% | 52% |
| PLCs / Automated Systems | 34 | 65% | 32% |
| DC-DC Converters | 33 | 18% | 48% |
| Copper Alloys / Materials | 30 | 7% | 57% |
| Steel Alloys / Materials | 30 | 3% | 43% |
| Printed Circuit Boards | 30 | 13% | 60% |
| Semiconductors | 23 | 26% | 57% |
| Cabling and Connectors | 23 | 39% | 68% |
| Nickel Alloys / Materials | 18 | 6% | 56% |
| Optical Sensors | 18 | 44% | 61% |
| Power Transformers (Data Centers) | 16 | 38%* | 50% |
| Actuators | 15 | 60% | 47% |
| Silicon Carbide | 14 | 14% | 79% |
| Titanium Alloys / Materials | 14 | 0% | 79% |
| Power Distribution Units (Data Centers) | 13 | 69%* | 38% |
| Poly-Carbonates | 13 | 8% | 46% |
| Thermo-Plastics | 12 | 8% | 42% |
| Global Positioning Systems | 11 | 27% | 45% |

Categories – Big Picture

Services – Direct and Professional

Chart: direct and indirect service categories in which we found >20 businesses through the web-scraping process

Key Findings

- Fabrication and Machining, especially of structural materials (aluminum, steel, and titanium), is the **category with the most businesses within Pennsylvania**. There is an opportunity to better align these suppliers to the Robotics industry, as only 12% have direct robotics experience but 43% serve similar industries.
- Contract Manufacturing and Electromechanical Assembly are two categories with strong foundations of existing PA businesses that could be strengthened.
- There are 100+ legal firms in Pennsylvania with practice areas that align with the needs of robotics / AI companies. The most common alignment areas are IP/Freedom to Operation, Immigration, and Data/AI.

| | Relevant Businesses | Experience Robotics / Automation | Experience Similar Industries |
|---------------------------------|---------------------|----------------------------------|-------------------------------|
| Direct Services | | | |
| Fab and Machining – Structural | 384 | 12% | 43% |
| Fab and Machining – Plastics | 78 | 6% | 32% |
| Contract Manufacturing | 74 | 30% | 69% |
| Fab and Machining – Enabling | 41 | 10% | 46% |
| Electromechanical Assembly | 39 | 26% | 64% |
| Robotics Integration | 23 | 96% | 52% |
| Professional Services | | | |
| Legal – IP / Freedom to Operate | 117 | 12% | 32% |
| Legal – Talent/Immigration* | 42 | 17% | 33% |
| Legal – Data / AI | 41 | 29% | 56% |
| Legal – Product Safety | 26 | 31% | 50% |
| Legal – ITAR / EAR / Exports | 20 | 35% | 60% |
| Technical Recruiting | 18 | 44% | 72% |

Categories – Big Picture

Software / AI / Machine Learning

Key Findings

- Businesses offering Machine Learning and AI Model development and integration are **strongly represented in Pennsylvania**, with over 60% having experience within robotics, automation, or broader AI industries. However, it is difficult to discern the difference between COTS vs more customized model development with the tools available.
- Software offering predictive analysis is the other category with high representation in Pennsylvania. However, more work will be needed to further refine this to true robotics
- No other robotics-software type has more than 30 businesses, with machine and computer visioning being the strongest remaining with 29 businesses

Chart: all software supply chain categories

| | Relevant Businesses | Experience Robotics / Automation | Experience Similar Industries |
|------------------------------------|---------------------|----------------------------------|-------------------------------|
| Machine Learn Models / Integration | 134 | 60% | 46% |
| Predictive Analysis Software | 85 | 56% | 48% |
| AI Algorithms / Integration | 81 | 67% | 44% |
| Machine and Comp Vision Software | 29 | 62% | 59% |
| Motion Detection Software | 24 | 63% | 58% |
| Conversational Interfaces | 14 | 50% | 43% |
| Gesture Control Software | 5 | 67% | 33% |

Geography – Big Picture

Geographic Clusters

Interpreting the Tables: Depicted as the # of businesses found through web-scraping and the % of all businesses found within Pennsylvania, in that respective category

Southeast

| Direct Materials | Services / Software |
|---|--|
| PLCs (16 / 47%), Aluminum (12 / 29%), PCBs (12 / 40%), Semiconductors (9 / 39%), Optical Sensors (8 / 44%), Actuators (8 / 47%), Power Distribution Units (8 / 62%) | Machining – Structural (97 / 25%), Legal – IP (76 / 65%), Machine Learning (65 / 49%), AI Algorithms (40 / 49%), Predictive Analysis Software (37 / 44%), Legal – Data/AI (29 / 71%), Contract Manufacture (32 / 43%), Electromechanical Assembly (19 / 46%) |

Southwest

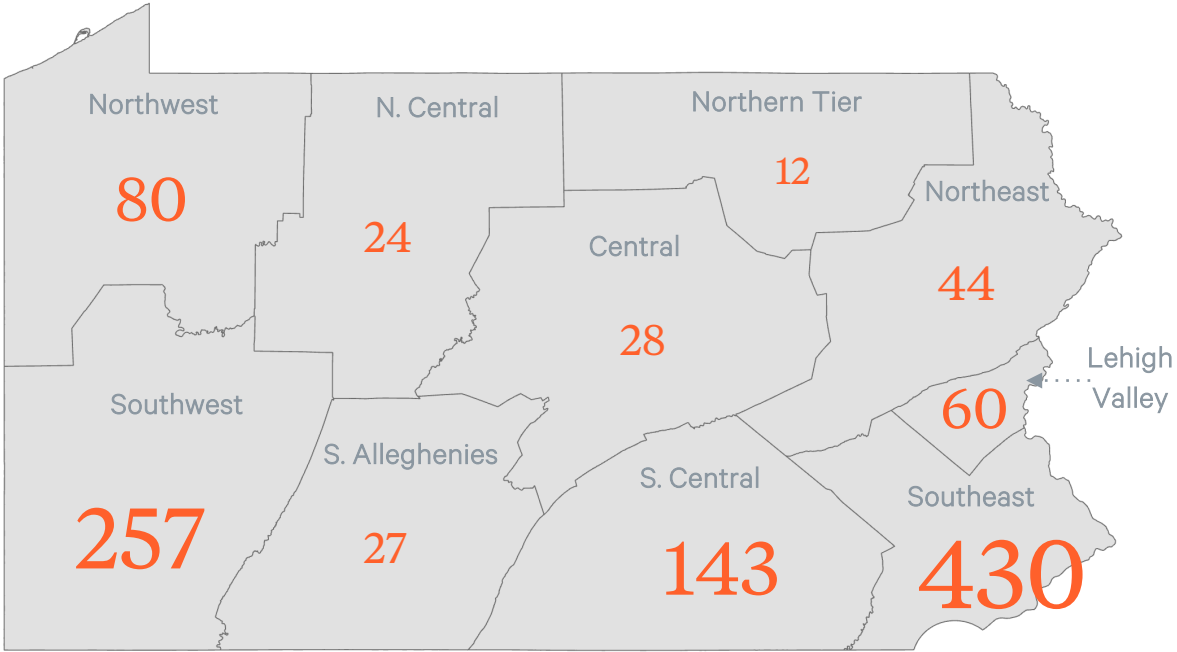
| Direct Materials | Services / Software |
|---|---|
| Steel (13 / 43%), Copper (12 / 40%), Aluminum (10 / 24%), DC-DC Convs (9 / 28%), Titanium (9 / 64%), Actuators (9 / 40%), PLC (8 / 24%), Transformers (7 / 44%) | Machining – Structural (89 / 23%), Machine Learning (34 / 25%), Predictive Analysis Software (26 / 31%), Legal – IP (19 / 16%), Robotics Integration (12 / 52%) |

South Central

| Direct Materials | Services / Software |
|--|--|
| Aluminum (12 / 29%), Cabling (9 / 39%), PLCs (8 / 21%) | Machining – Structural (56 / 15%), Contract Manufacturing (19 / 26%), Machine Learning (14 / 10%), |

PREP Region Summary

of Businesses Across All Categories



Map: This map depicts the # of businesses found across all supply chain categories

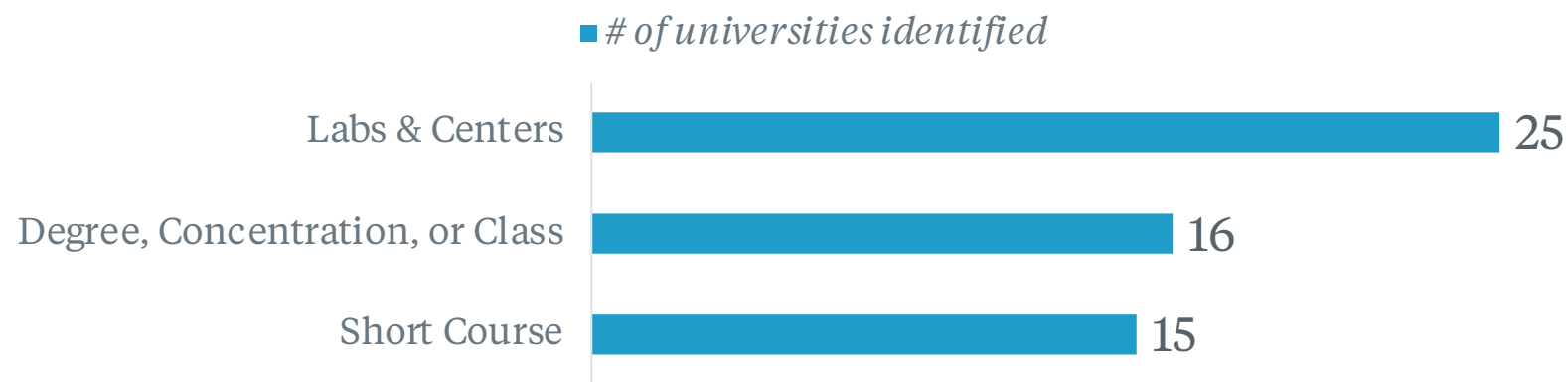
Key Findings

Southeast, Southwest, South Central are the only regions with significant clusters across multiple industry types (depicted to the left). Lehigh Valley has a small cluster of DC-DC Converter / Power Systems (8 businesses), which represents 22% of all found within the state. Northwest has concentrations of Machining – Structural and Machining – Plastics, but these are common across all geographies.

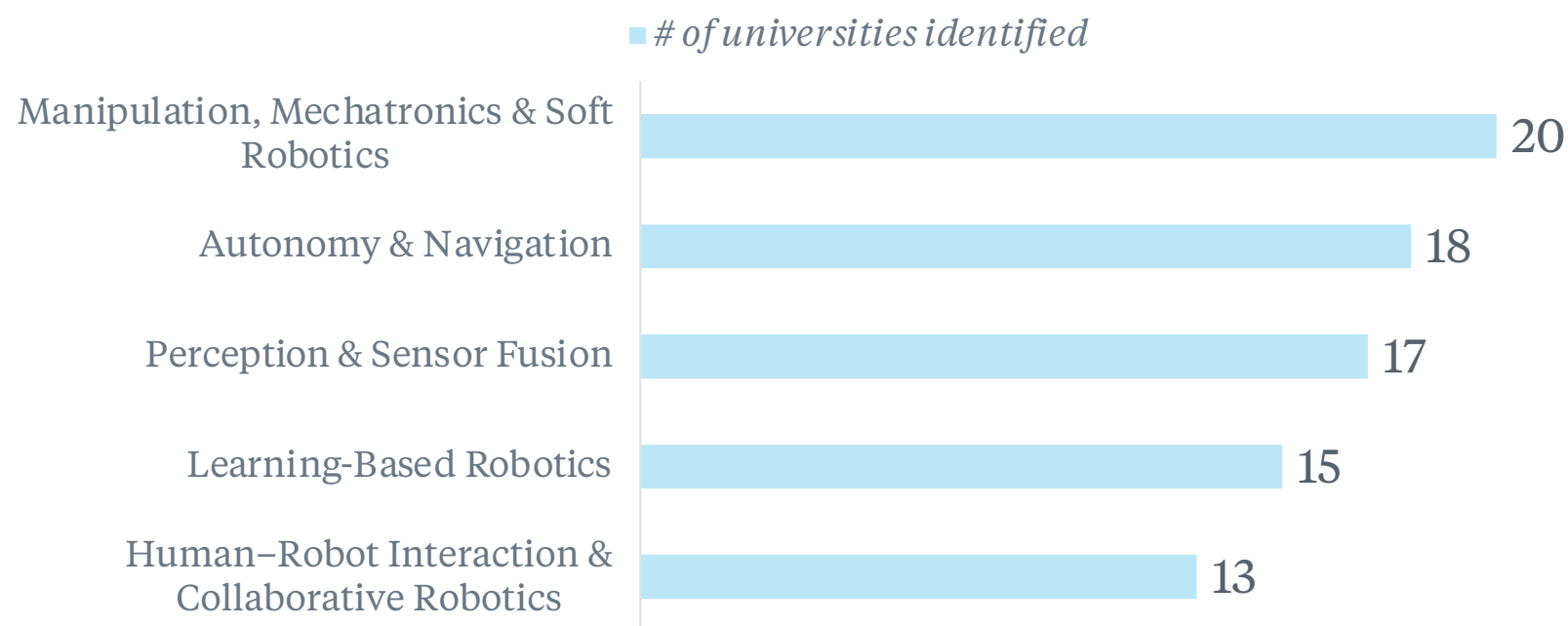
Innovation Resources

Universities

Types of services at leading PA robotic-serving universities



Research focus at leading PA robotic-serving universities



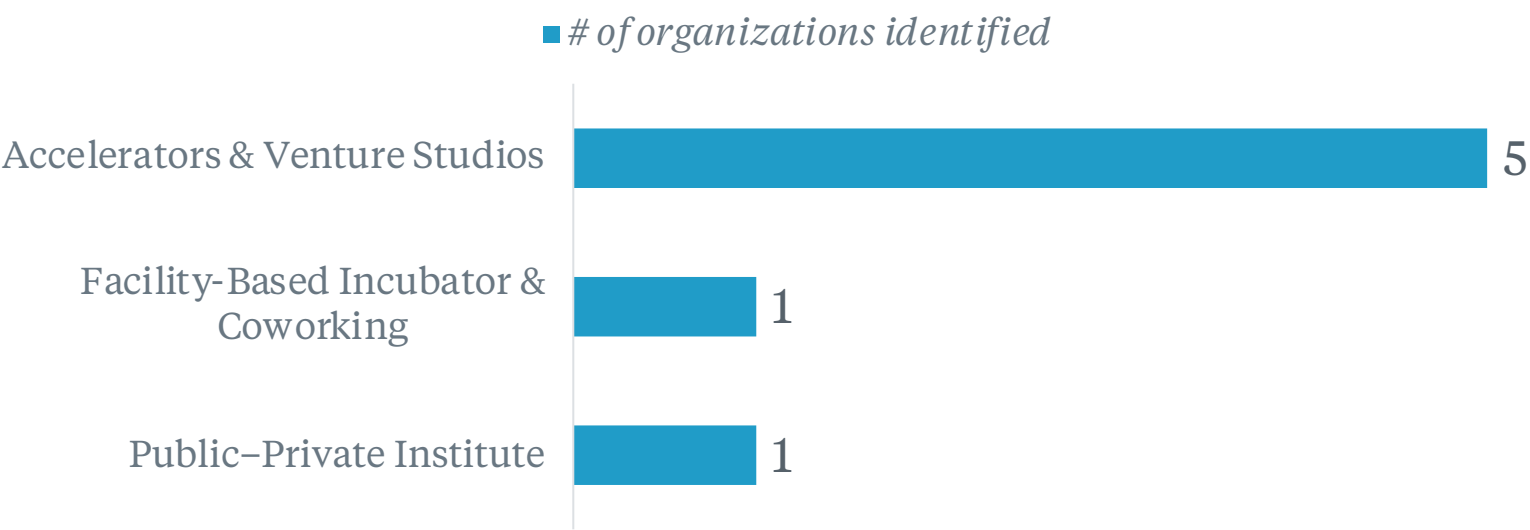
Insights

- Two major anchors (CMU, Penn) drive national-level robotics; a strong second tier (Penn State, Lehigh, Temple, Pitt) provides breadth and regional coverage.
- Many smaller colleges contribute teaching labs and select projects.
- Learning-Based Robotics and Human-Robot Interaction / Collaborative Robotics appear less frequently than other areas.
- Pennsylvania’s university landscape is strongest in hardware/mechatronics and classical autonomy, and comparatively thinner where modern AI is essential (learning-based methods, HRI, and some perception)

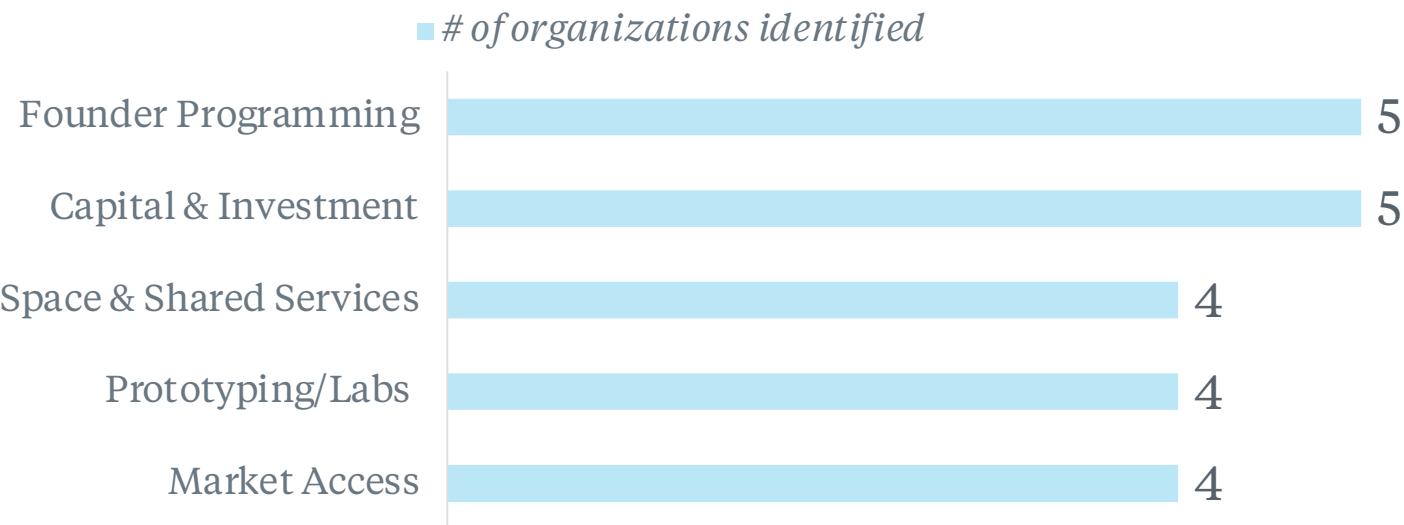
Innovation Resources

Incubators / BSOs

Types of business support organizations



Types of business support services offered



Insights

- Strong coverage for cohort programming and workspace; fewer orgs offer pilots/POCs (mainly corporate accelerators and the ARM Robotics Manufacturing Hub).
- Prototyping access is concentrated in a handful of sites not robotics-specific (e.g., makerspaces).
- Capital is available but uneven; most visible at Innovation Works/AlphaLab,
- Many general incubators in PA are sector-agnostic; explicit robotics/AI positioning is concentrated in a smaller set.
- Activity clusters in Southwest (Pittsburgh) and Southeast (Philadelphia);

Category Dashboards

02

How to Interpret the Dashboards

Beneath the title we will list the NAICS codes we searched and the # of businesses we found before applying the web scraper

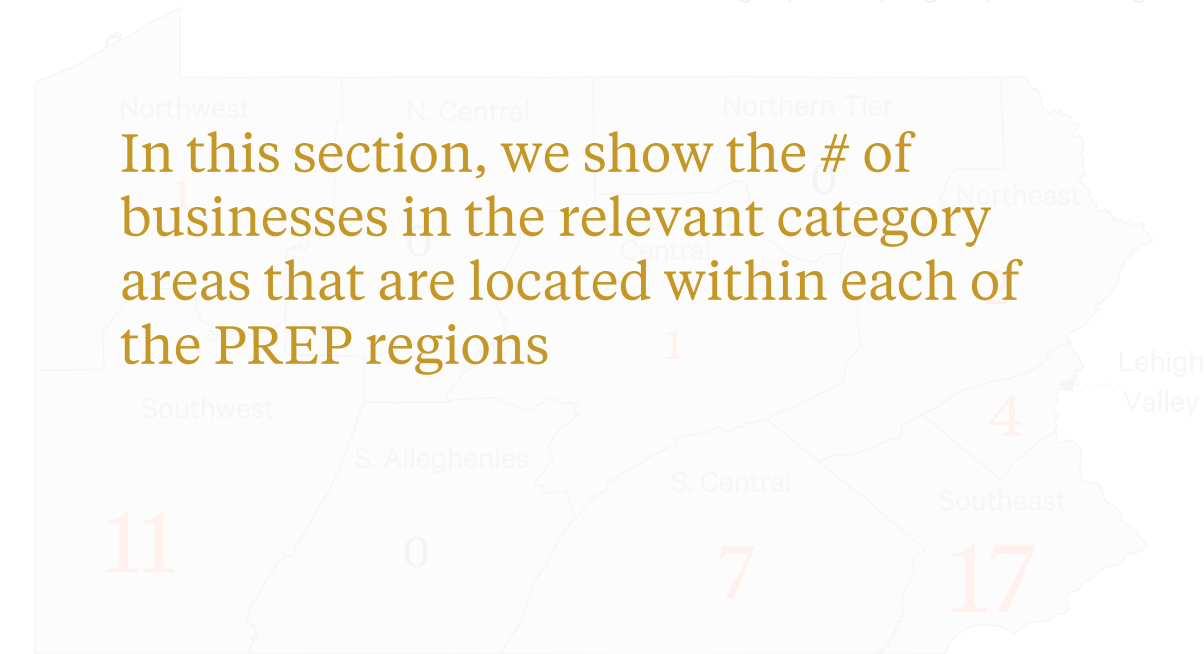
In this section we summarize the big picture. This includes the total number of overall businesses within the category grouping, the # HQ in PA, and the # that serve robotics or similar industry clusters

Detailed Category Profile



PREP Region Summary

In this section, we show the # of businesses in the relevant category areas that are located within each of the PREP regions



Category Insights

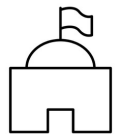
- In this section, we discuss key insights within each category grouping, including the supply chain categories we think are most opportunistic as well as any thoughts on geographic clusters
- of both industries, though in the Southeast 30% of businesses are not HQ in PA

Chips, Processors, and Controllers

NAICS Codes Searched: 334412, 334413, 334416, 334418, 334419, 33242, 541715

162 Potential businesses found when searching NAICS codes

52
Relevant
Businesses



43 HQ in PA



9 Serve Robotics / Automation Industries

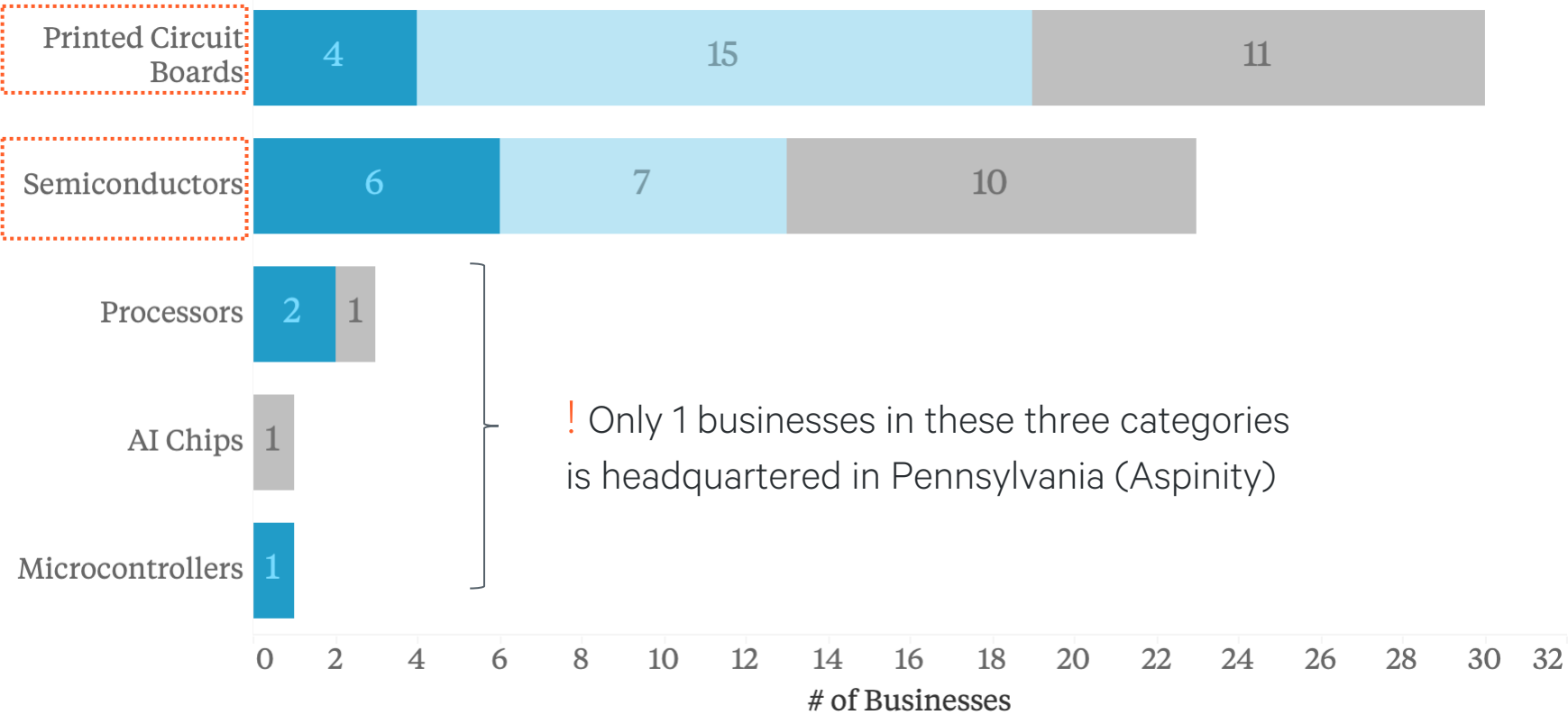


30 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

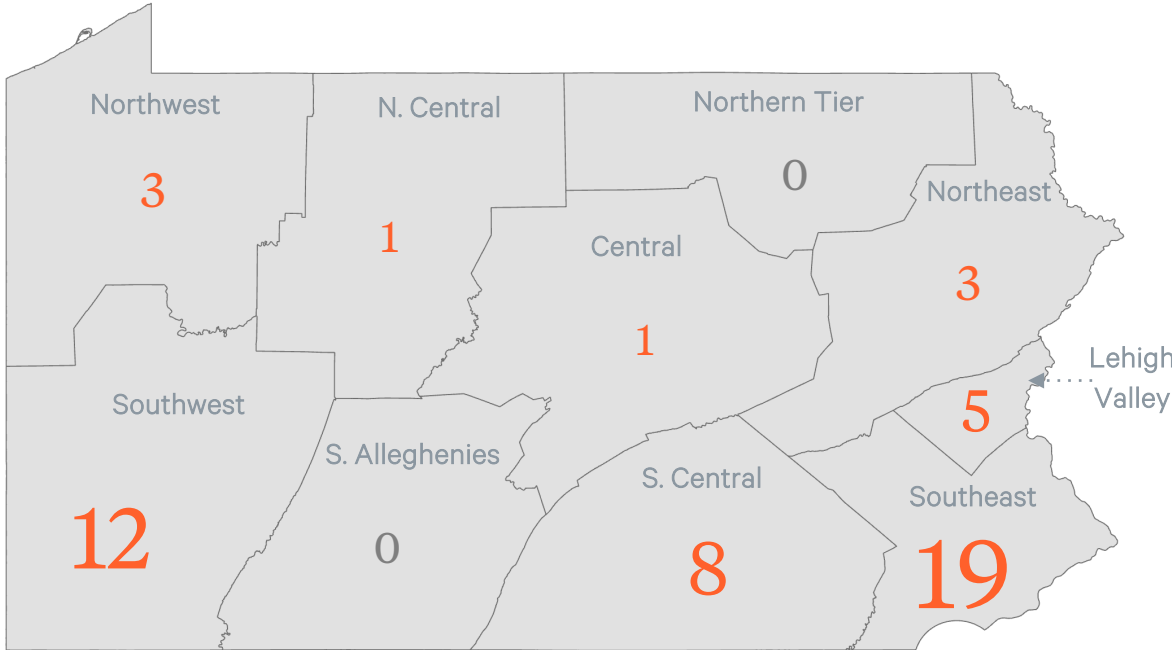
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- High number of **Semiconductors** and **PCBs** businesses, relative to other direct materials. 56% have industry alignment in robotics or similar industries.

Geography

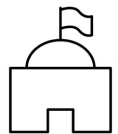
- **Southeast** and **Southwest** have meaningful clusters of both industries, though in the Southeast 30% of businesses in the Semiconductor space are not headquartered within PA

Networking and Storage Equipment

NAICS Codes Searched: 334112, 334210, 334418, 335921, 334417

52 Potential businesses found when searching NAICS codes

25
Relevant
Businesses



18 HQ in PA



9 Serve Robotics / Automation Industries

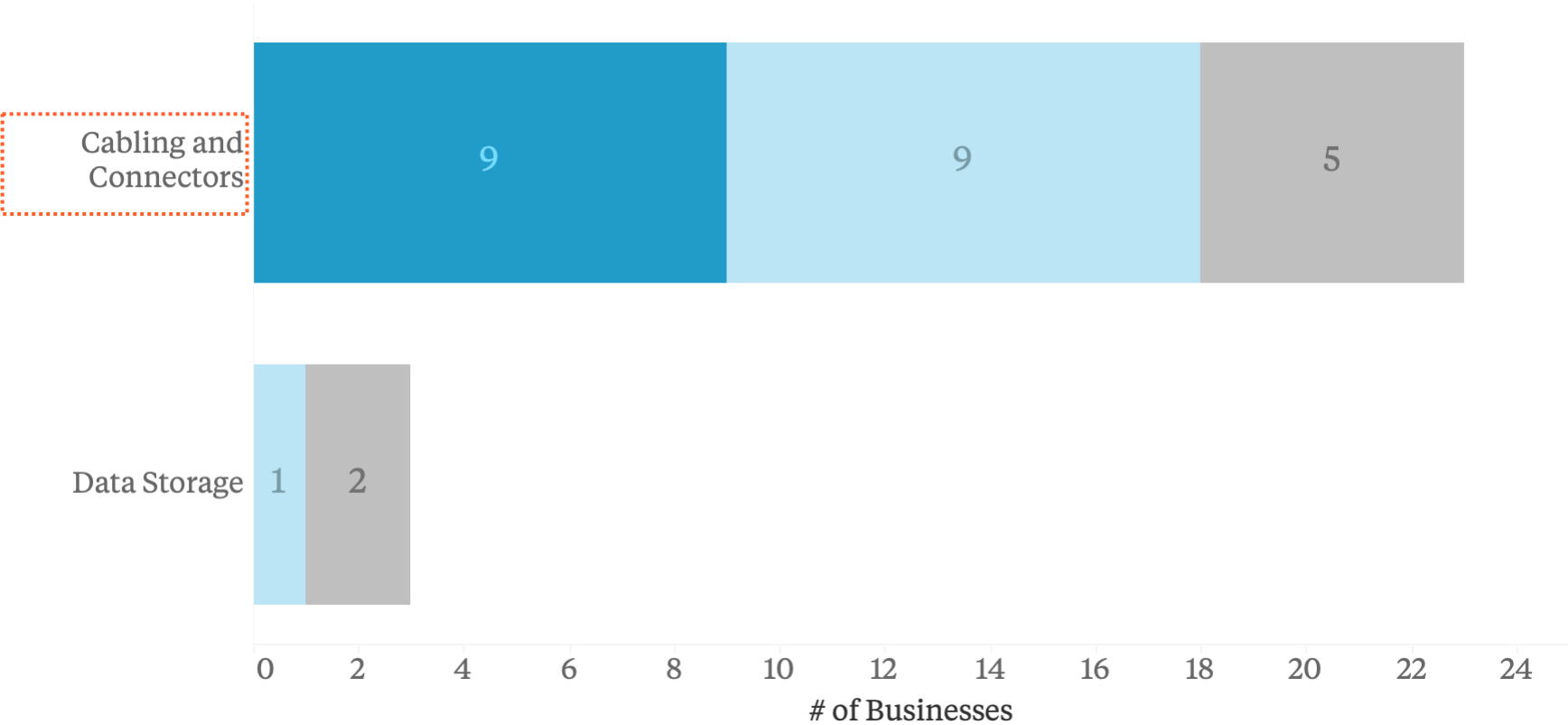


16 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

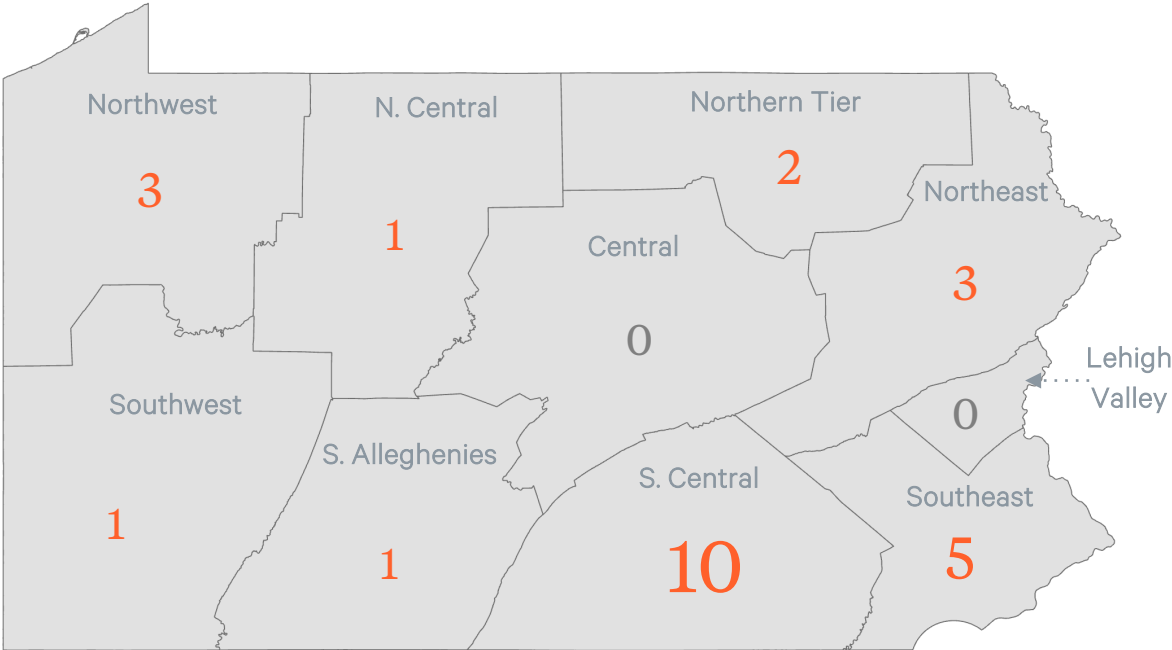
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderately high number of **Cabling and Connector** businesses (especially wire harnesses), relative to other direct materials. 77% have experience in robotics or similar industries.

Geography

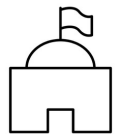
- South Central** has a meaningful cluster of Cabling and Connector businesses. though 40% of are not HQ in PA

Navigation Equipment

NAICS Codes Searched: 334210, 334220, 334511, 334515

185 Potential businesses found when searching NAICS codes

17
Relevant
Businesses



10 HQ in PA



4 Serve Robotics / Automation Industries

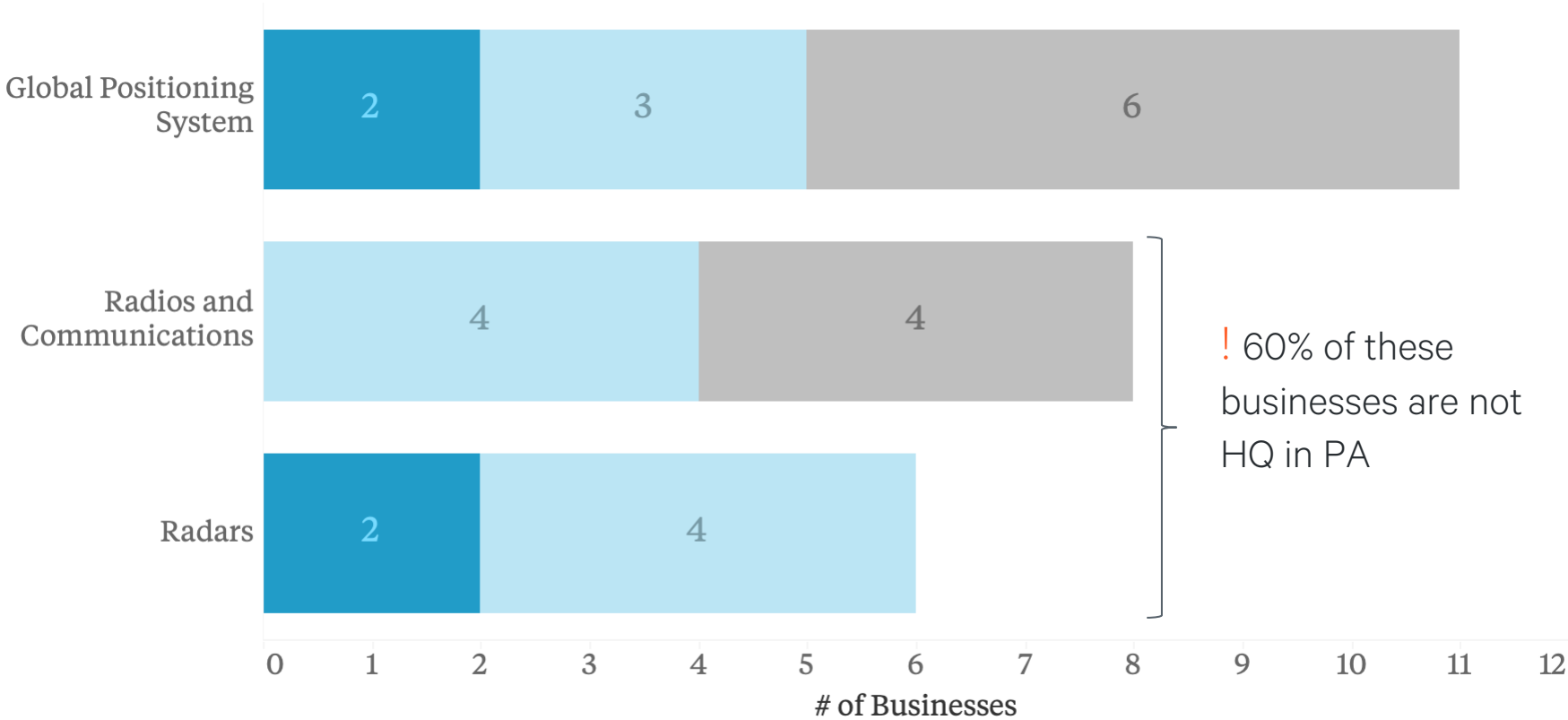


9 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

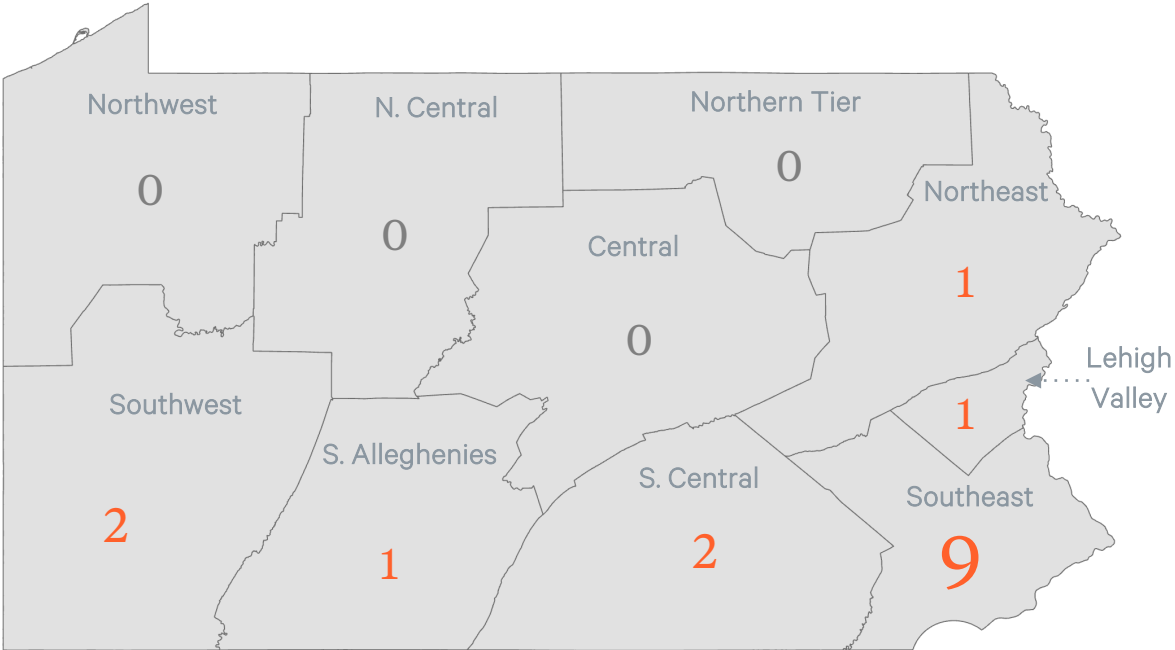
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Limited Opportunity

Detailed Categories

- Moderate number of **GPS** businesses, relative to other direct materials. But less than <50% have experience in robotics or similar industries.

Geography

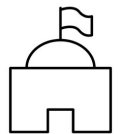
- Southeast** appears to have a cluster, but 60% of the businesses within this geography are not headquartered in PA

Sensing Equipment

NAICS Codes Searched: 334118, 334220, 334413, 334511, 334513, 334515, 334516, 334519, 335314

441 Potential businesses found when searching NAICS codes

33
Relevant
Businesses



29 HQ in PA



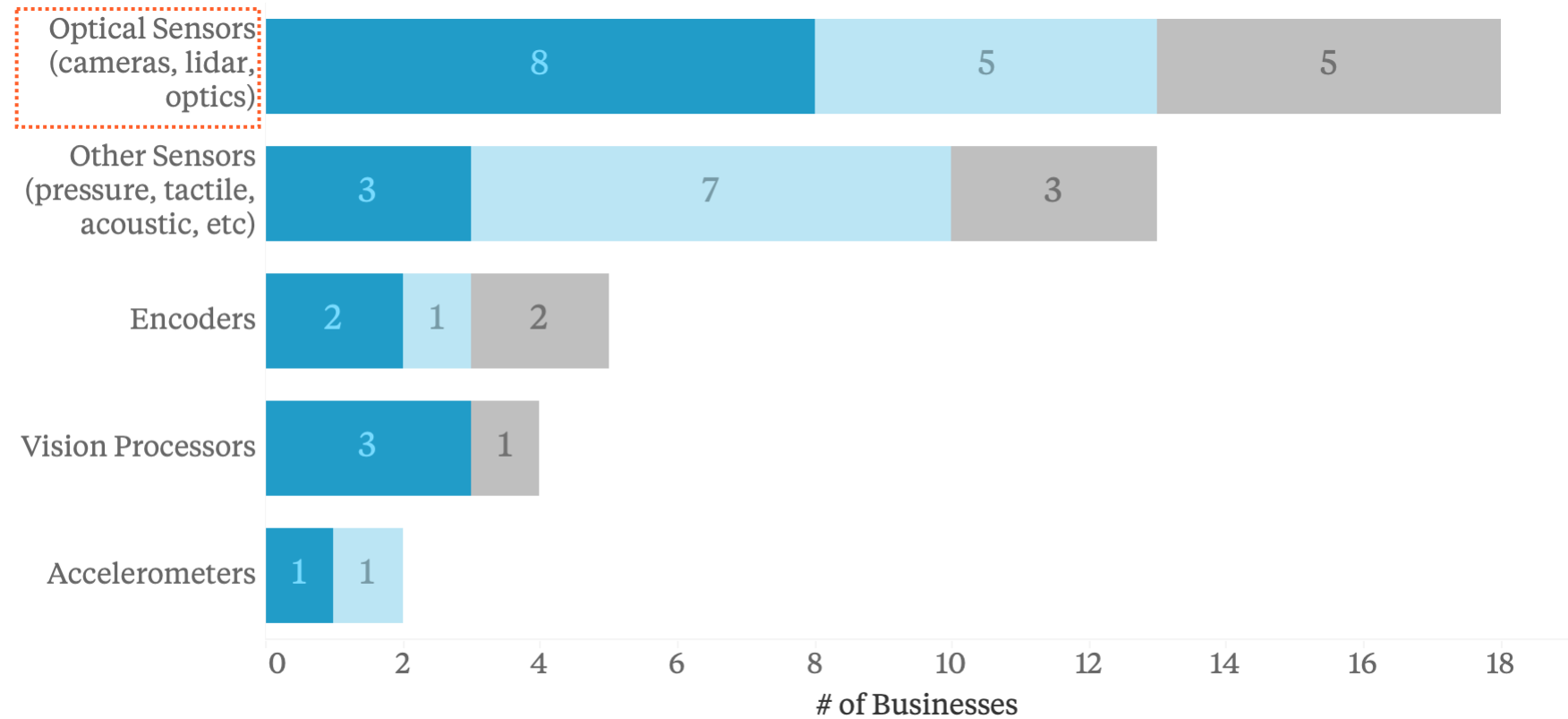
11 Serve Robotics / Automation Industries



20 Serve Similar Industry Clusters*
*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

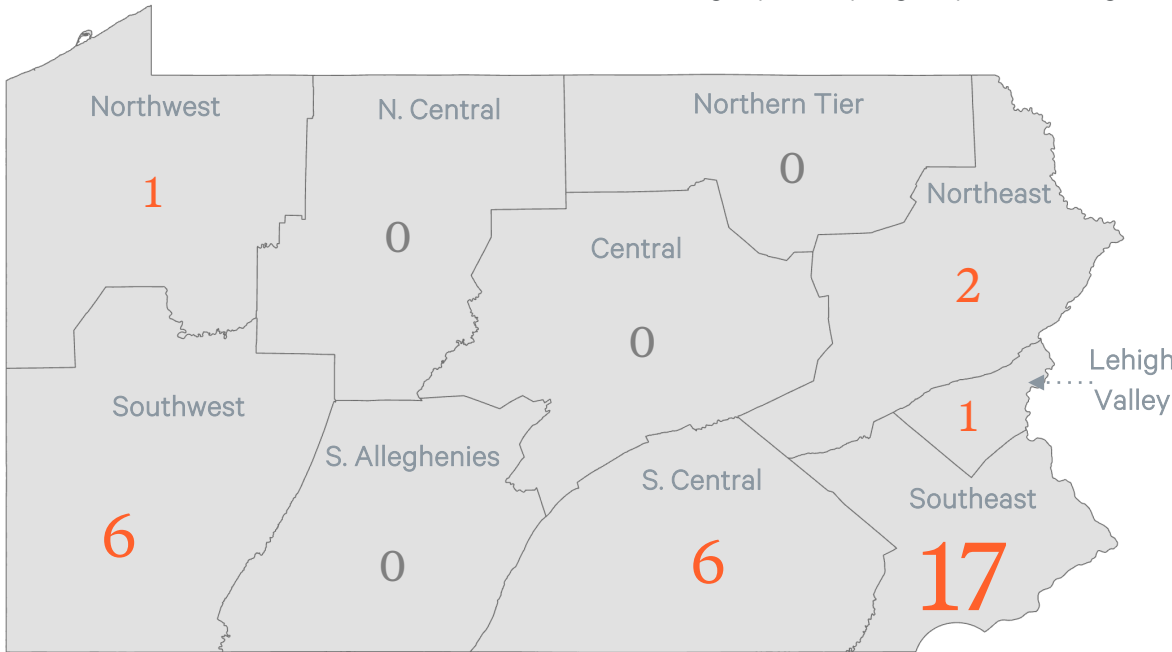
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderately high number of **Optical Sensor** businesses relative to other direct materials. However, they are not clustered within one subcategory (i.e camera, optics, lidar, etc).

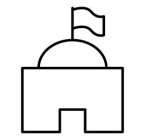
Geography

- Southeast** has a meaningful clusters of Optical Sensor businesses (10), and 90% are HQ in PA

Elastomers

NAICS Codes Searched: 325211, 325212, 325220, 325613
66 Potential businesses found when searching NAICS codes

14
Relevant
Businesses



9 HQ in PA



1 Serve Robotics / Automation Industries

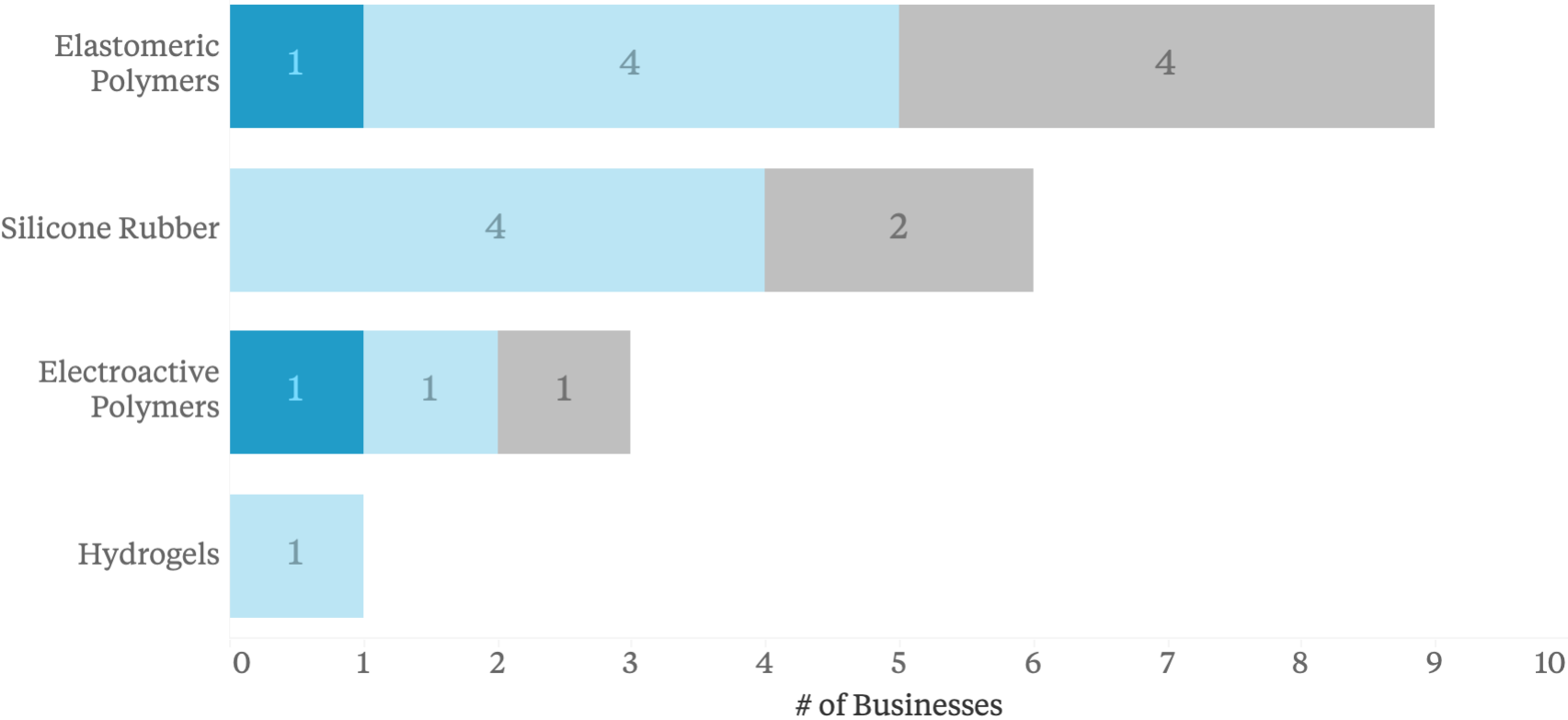


8 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

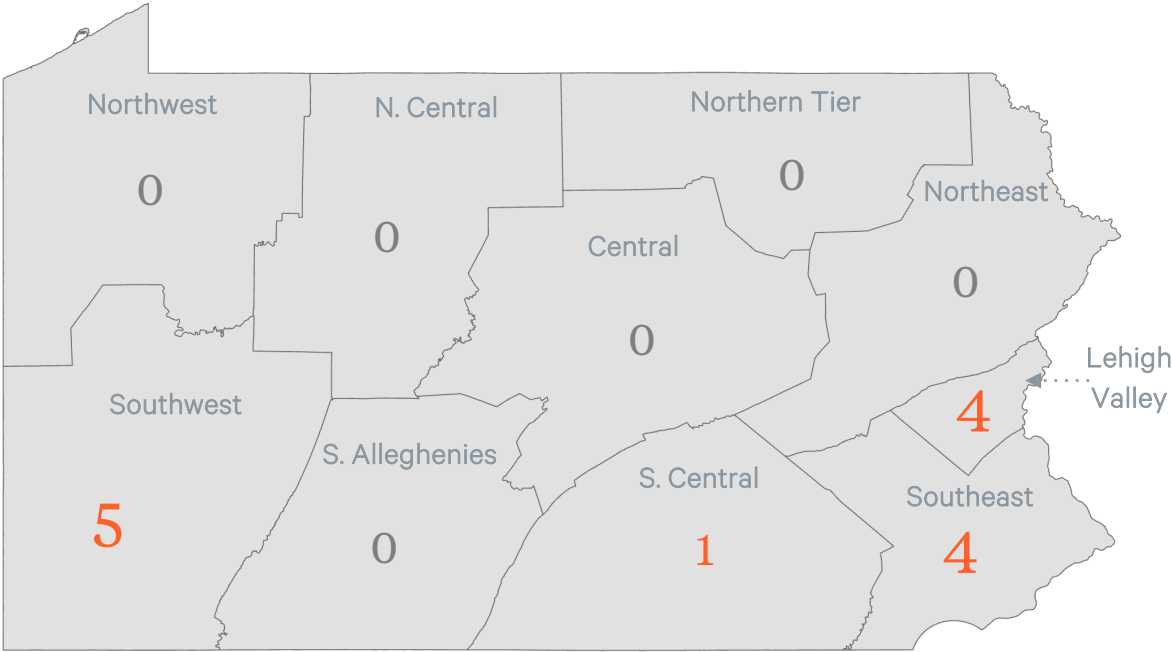
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Limited Opportunity

Detailed Categories

- Moderate number of **Elastomeric Polymer** businesses, relative to other direct materials. Few have robotics / automation experience and only 40% have industry experience

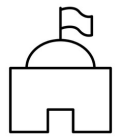
Geography

- N/A - No meaningful geographic clusters

Plastics and Polymers

NAICS Codes Searched: 325211, 325220, 325510, 326150
69 Potential businesses found when searching NAICS codes

20
Relevant
Businesses



13 HQ in PA



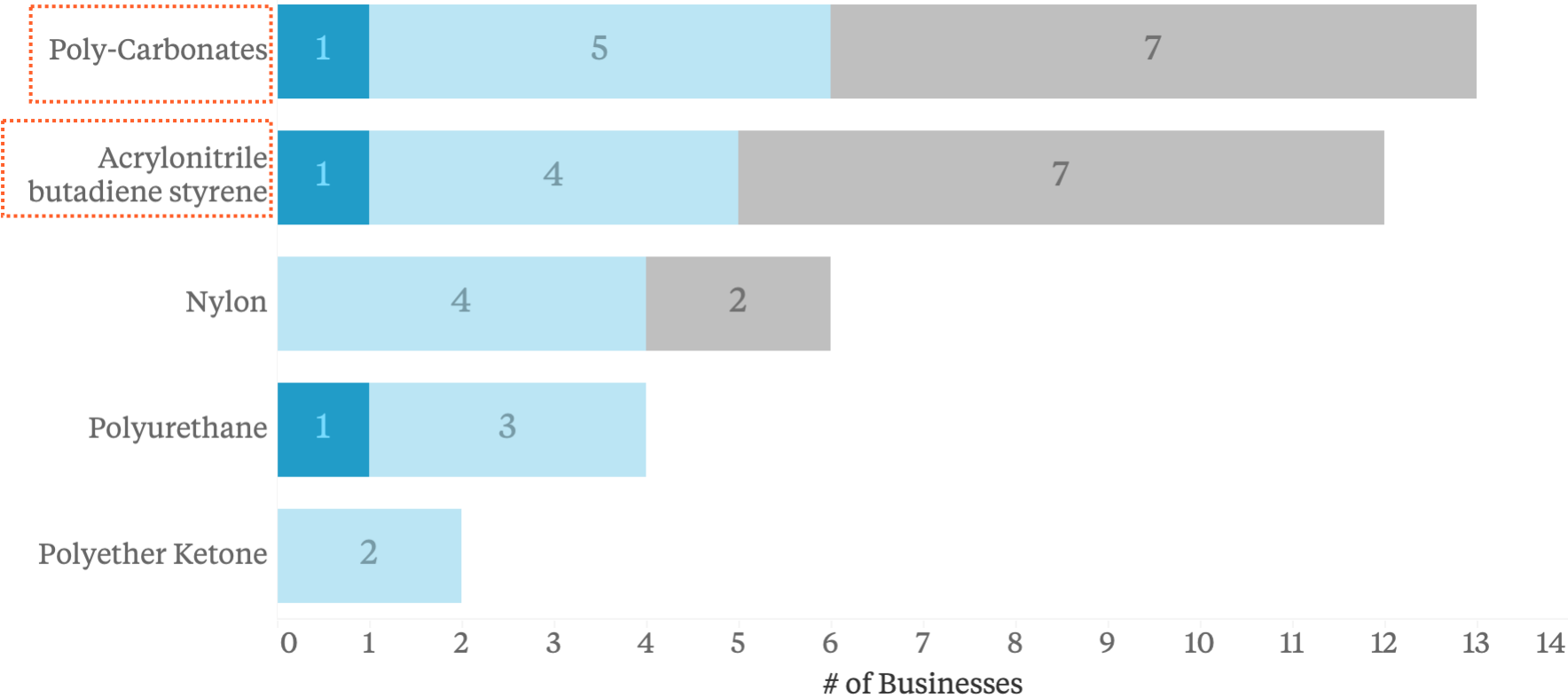
1 Serve Robotics / Automation Industries



11 Serve Similar Industry Clusters*
*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

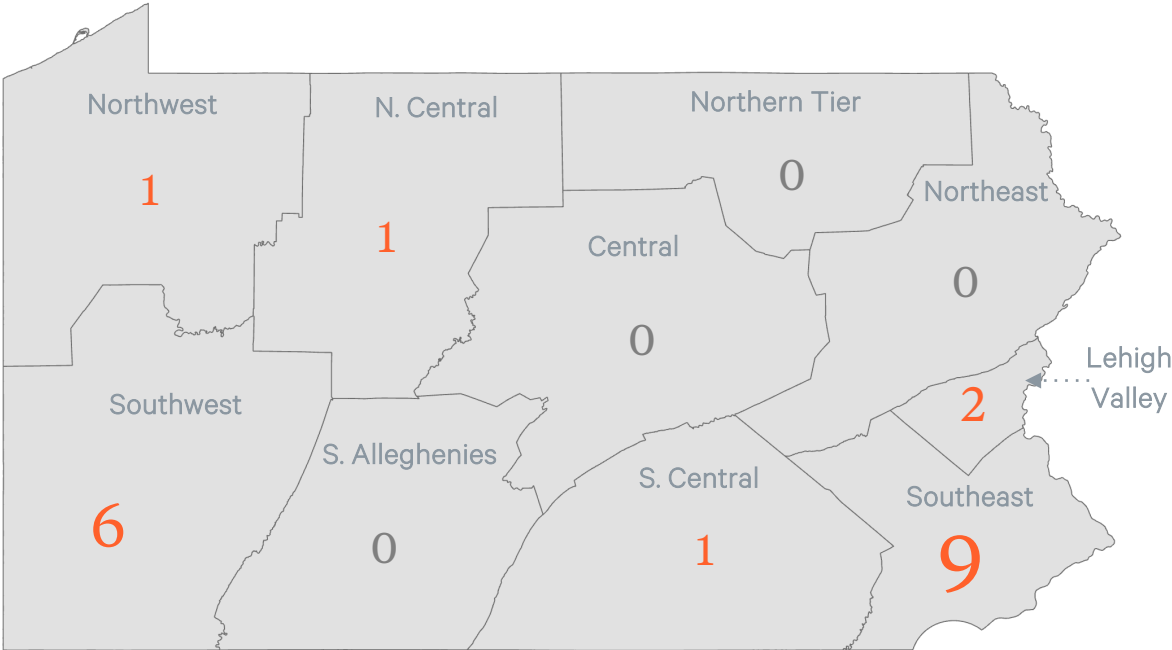
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderate number of **Poly-Carbonate** and **ABS (Thermoplastic)** businesses, relative to other direct materials. 33% have experience in Robotics or similar industries

Geography

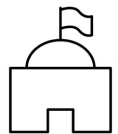
- Southeast** has moderate clusters of both categories, but 5 of the 9 businesses are not headquartered in Pennsylvania

Control Systems

NAICS Codes Searched: 333612, 333924, 333995, 334416, 334513, 335314

366 Potential businesses found when searching NAICS codes

50
Relevant
Businesses



13 HQ in PA



28 Serve Robotics / Automation Industries

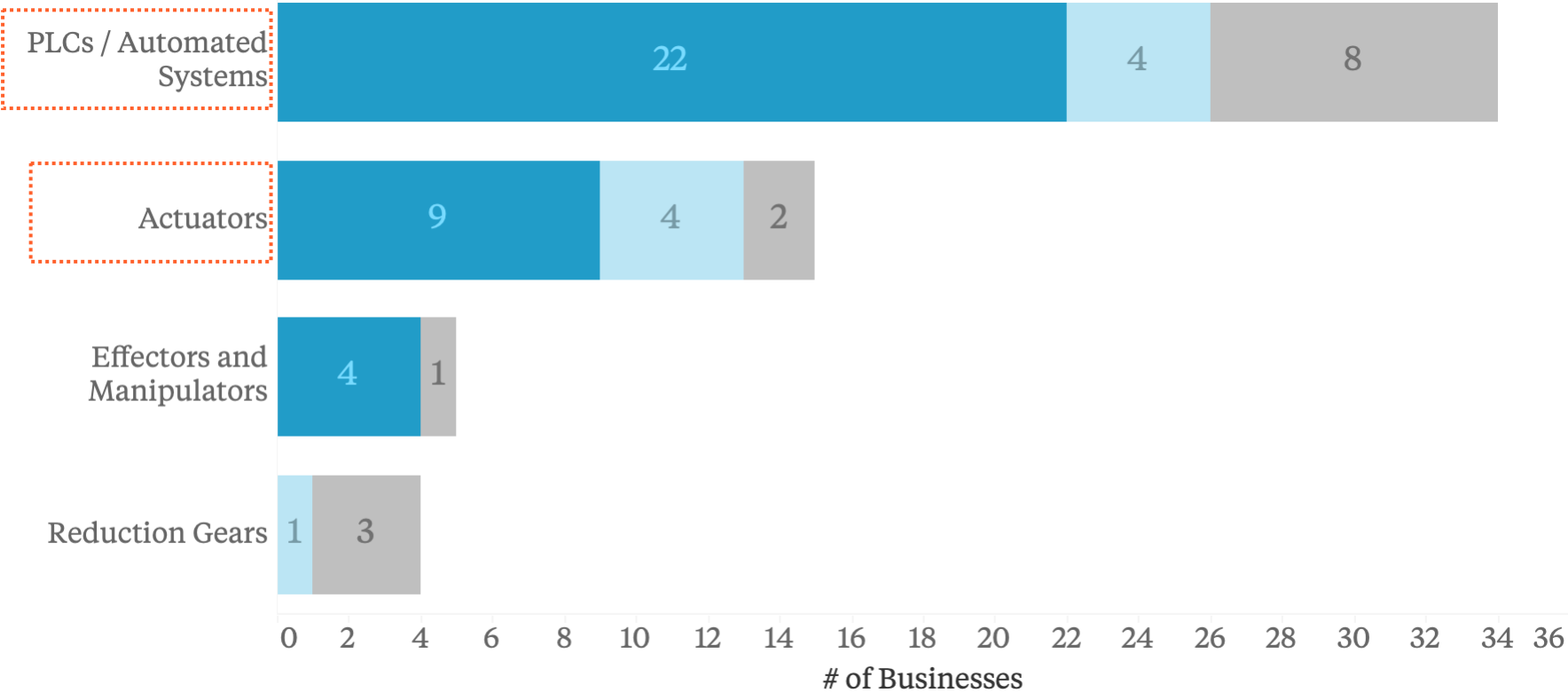


17 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

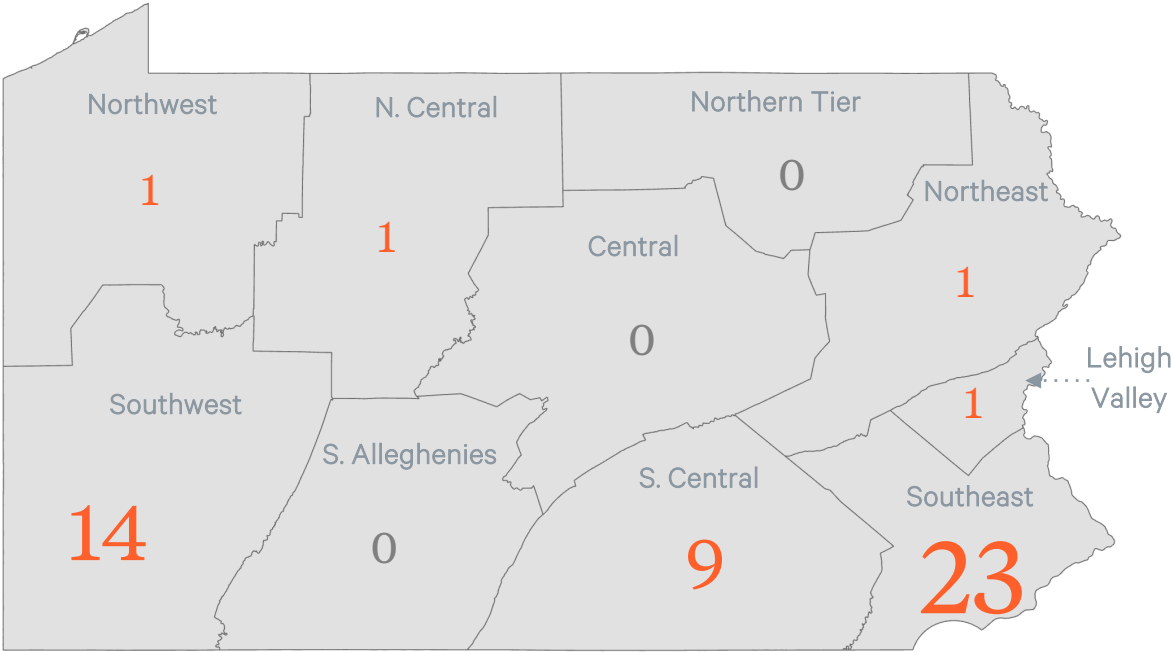
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- High number of **PLCs** and **Actuators** businesses, relative to other direct materials. 75% have experience in robotics or similar industries

Geography

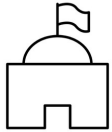
- **Southeast** and **Southwest** have clusters of businesses in both categories and 85% are headquartered in Pennsylvania.


Mobile Robotics Vehicles


NAICS Codes Searched: 336411, 336110, 336612, 336992
88 Potential businesses found when searching NAICS codes

9

Relevant
Businesses

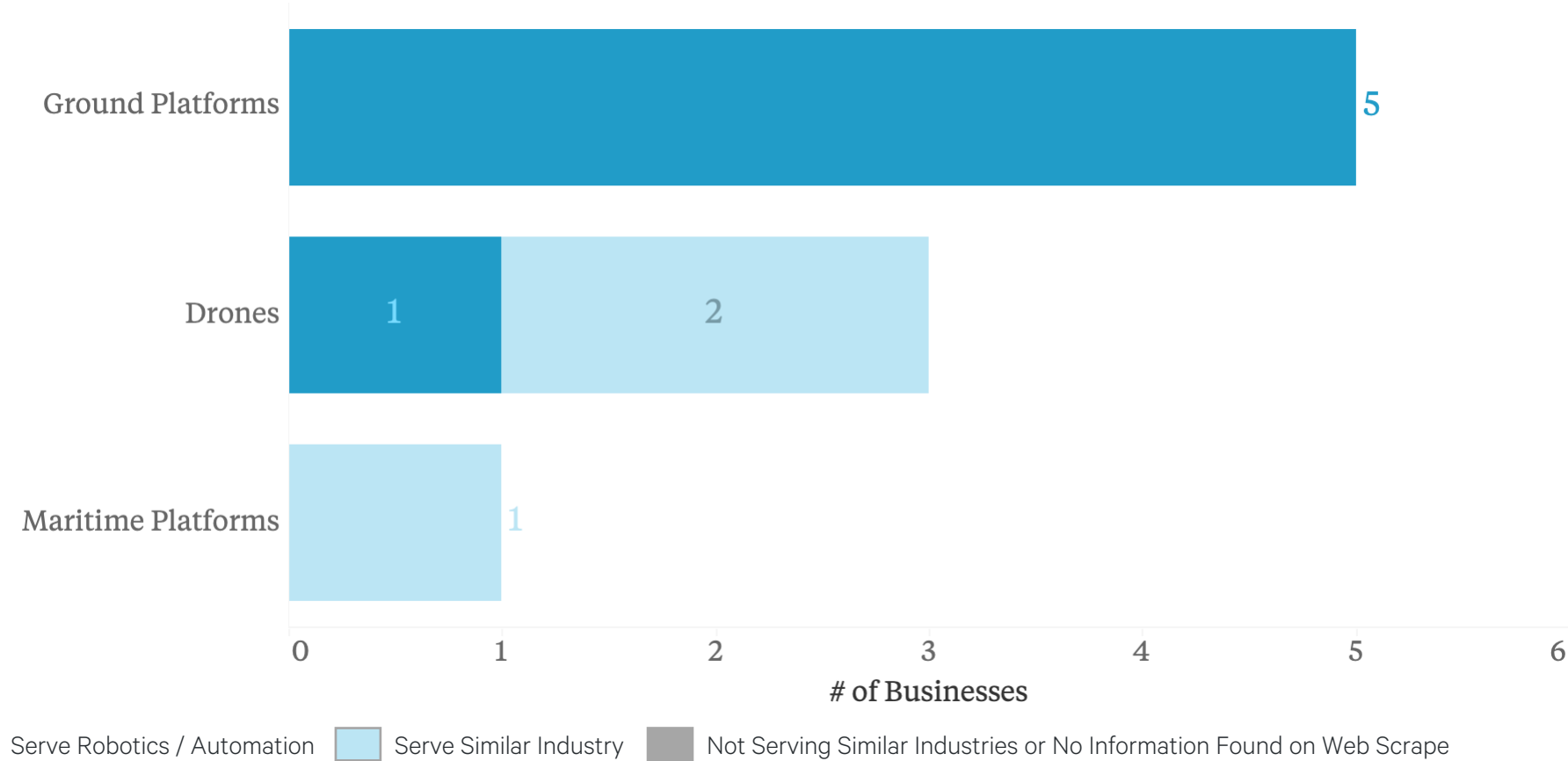
9 HQ in PA

6 Serve Robotics / Automation Industries

5 Serve Similar Industry Clusters*
*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

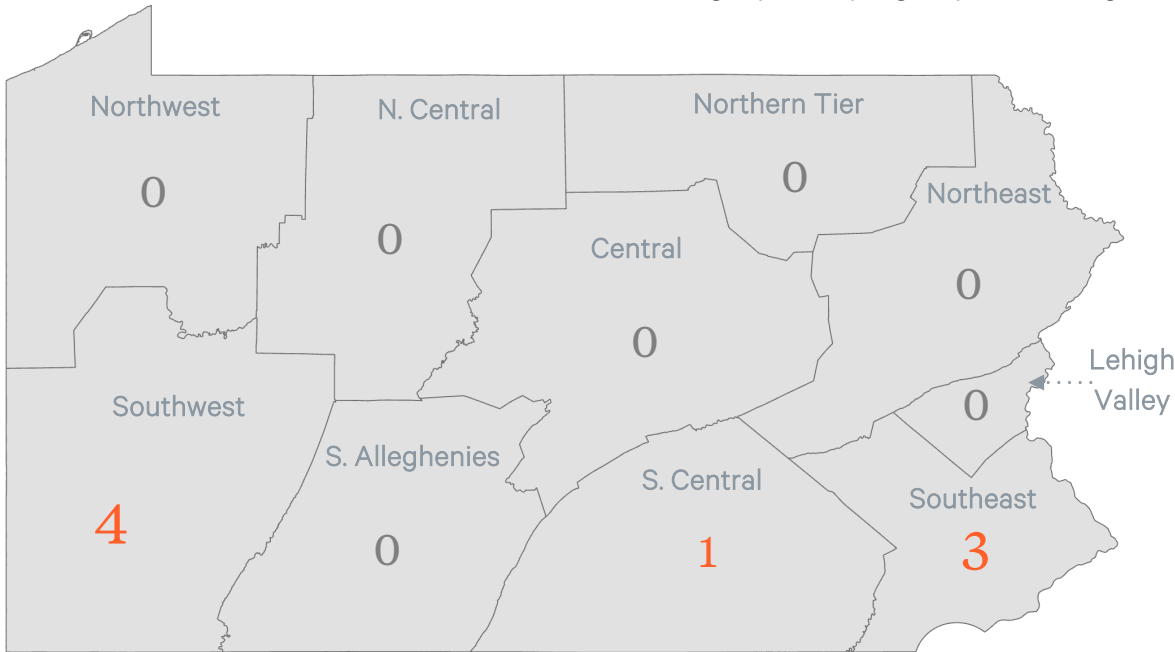
Detailed Category Profile

Sum > total businesses as some businesses feature in more than one detailed category



PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Limited Opportunity

Detailed Categories

- Though there are some Ground Platform / Ground Vehicles manufactured in PA, it is not a significant cluster

Geography

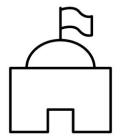
- N/A - No meaningful geographic clusters

Power and Energy Storage - Robotics

NAICS Codes Searched: 333611, 333612, 334416, 335311, 335312, 335910, 335999

179 Potential businesses found when searching NAICS codes

44
Relevant
Businesses



35 HQ in PA



9 Serve Robotics / Automation Industries

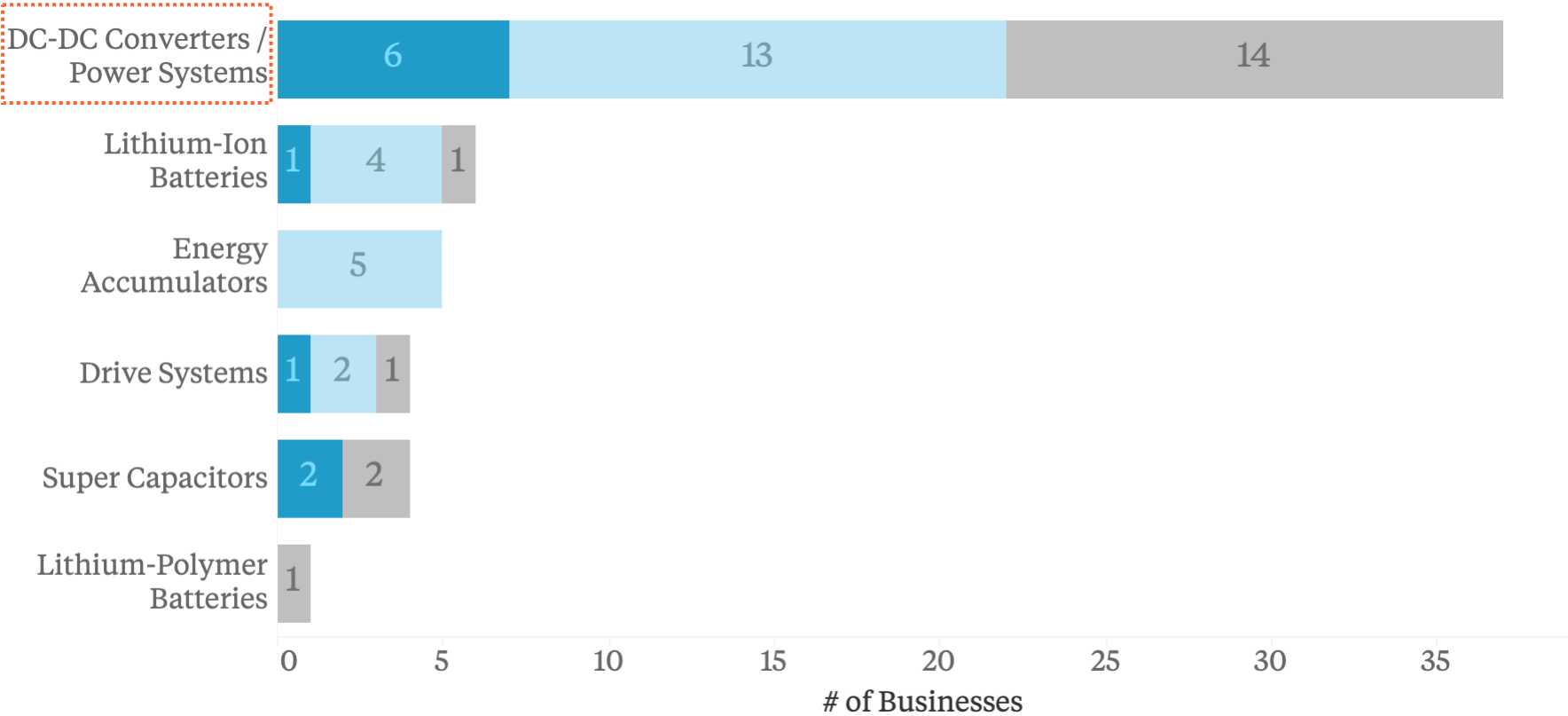


24 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

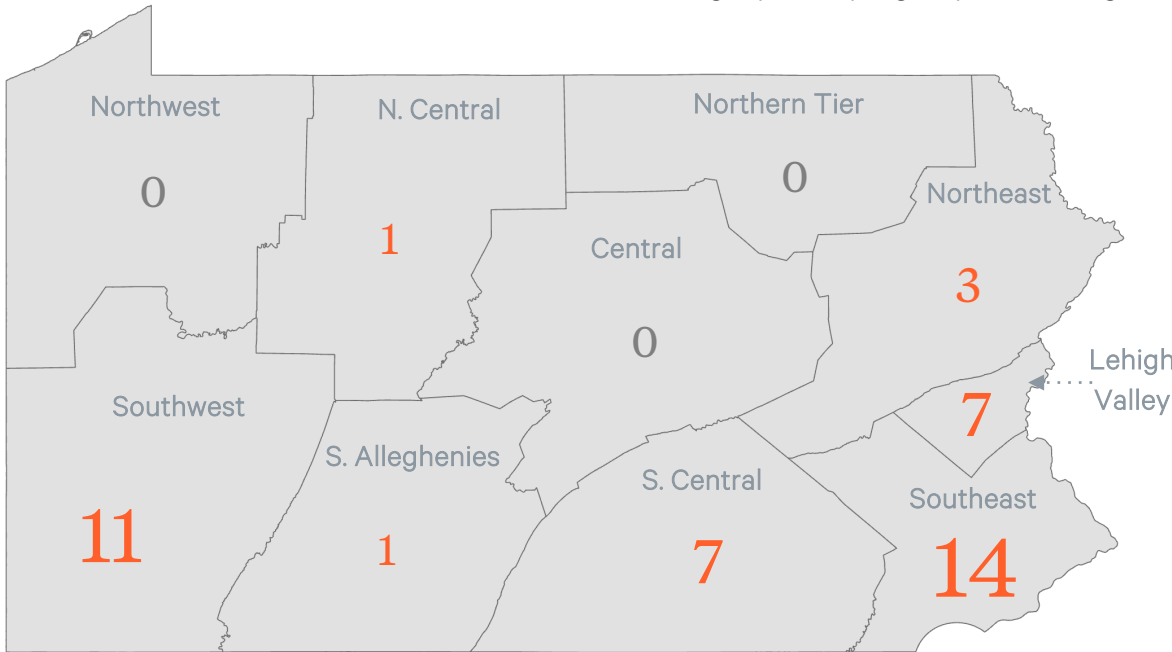
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- High number of **DC-DC/Power Systems** businesses, relative to other direct materials. 18% have experience in robotics and 40% in similar industries

Geography

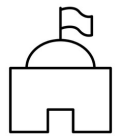
- **Southeast** and **Southwest** have clusters of DC-DC converter businesses, as well as **Lehigh Valley**, relative to its size. ~85% are headquartered in Pennsylvania.

Power and Energy Storage – Data Center

NAICS Codes Searched: 333415, 333413, 333999, 335312, 335999, 335314, 335313, 334112, 334419, 332322, 335311

576 Potential businesses found when searching NAICS codes

41
Relevant
Businesses



32 HQ in PA



9 Serve Data Centers

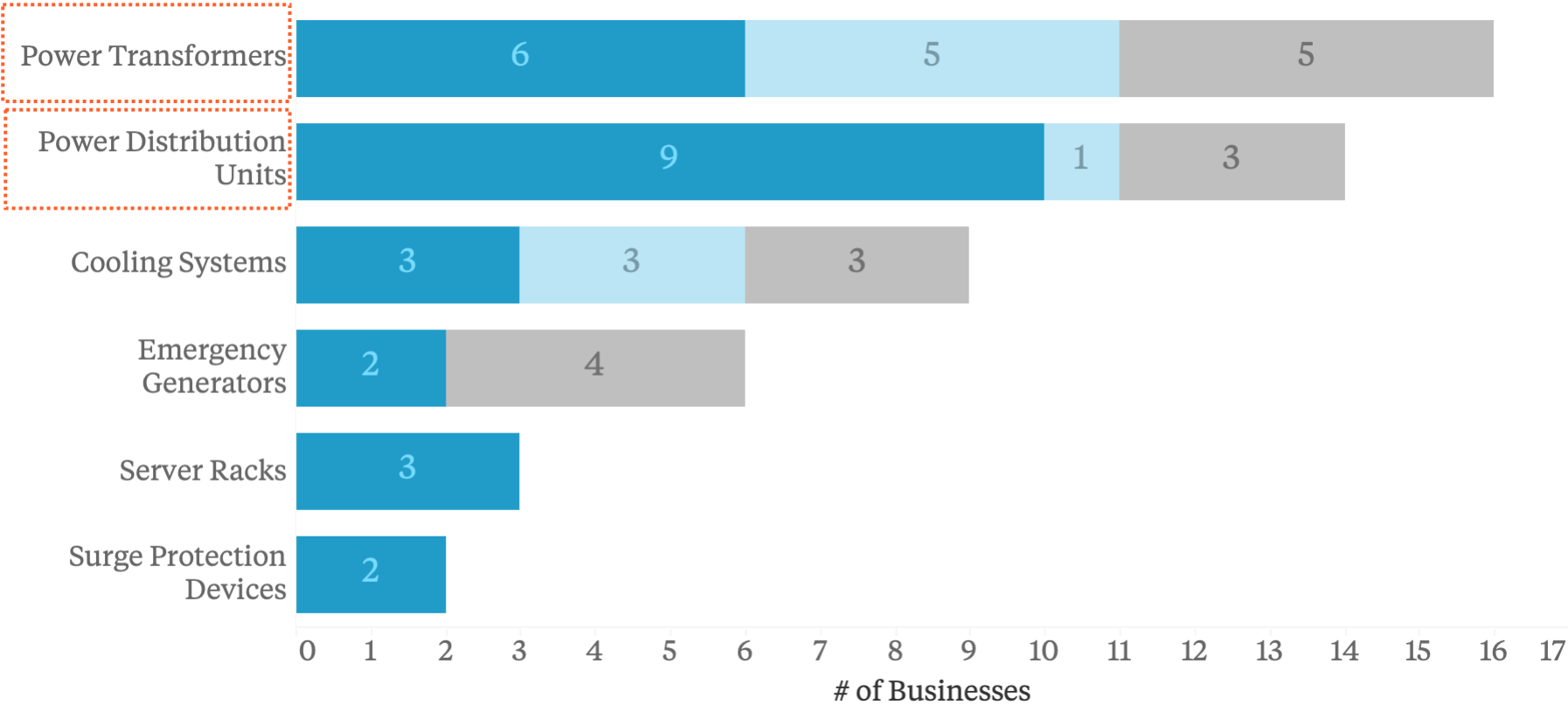


18 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

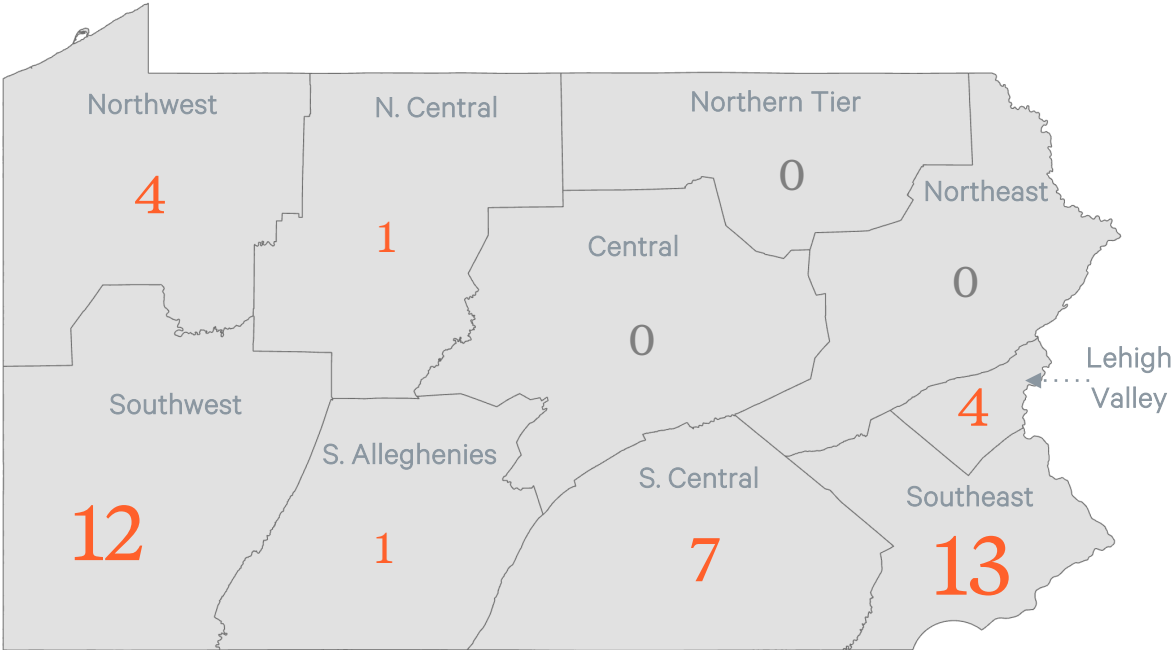
Sum > total businesses as some businesses feature in more than one detailed category



Serve Data Centers Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderate number of **Power Transformers** and **PDUs** businesses, relative to other direct materials. 38% of Transformer businesses and 69% of PDU businesses have experience working with Data Centers.

Geography

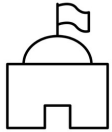
- Southeast** has a cluster of PDU businesses. **Southwest** has a cluster of Power Transformers businesses. About 75% are headquartered in PA

Enabling Metals / Materials


NAICS Codes Searched: 325130, 325810, 325998, 331410, 331420, 331491, 331523, 332117, 332710, 332721, 332999, 333242, 541713

925 Potential businesses found when searching NAICS codes for all metals/materials


39
Relevant
Businesses



34 HQ in PA



3 Serve Robotics / Automation Industries

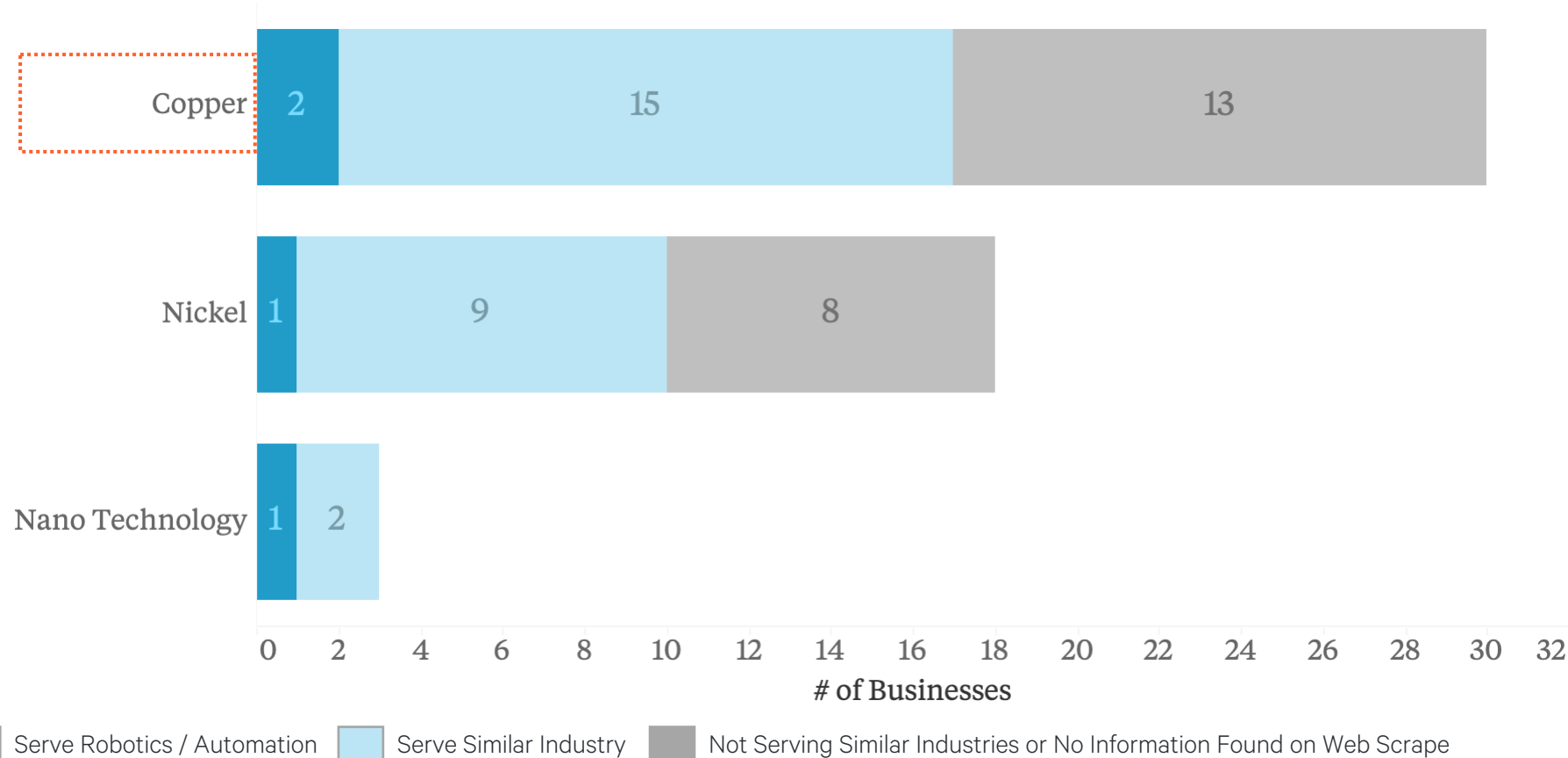


22 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

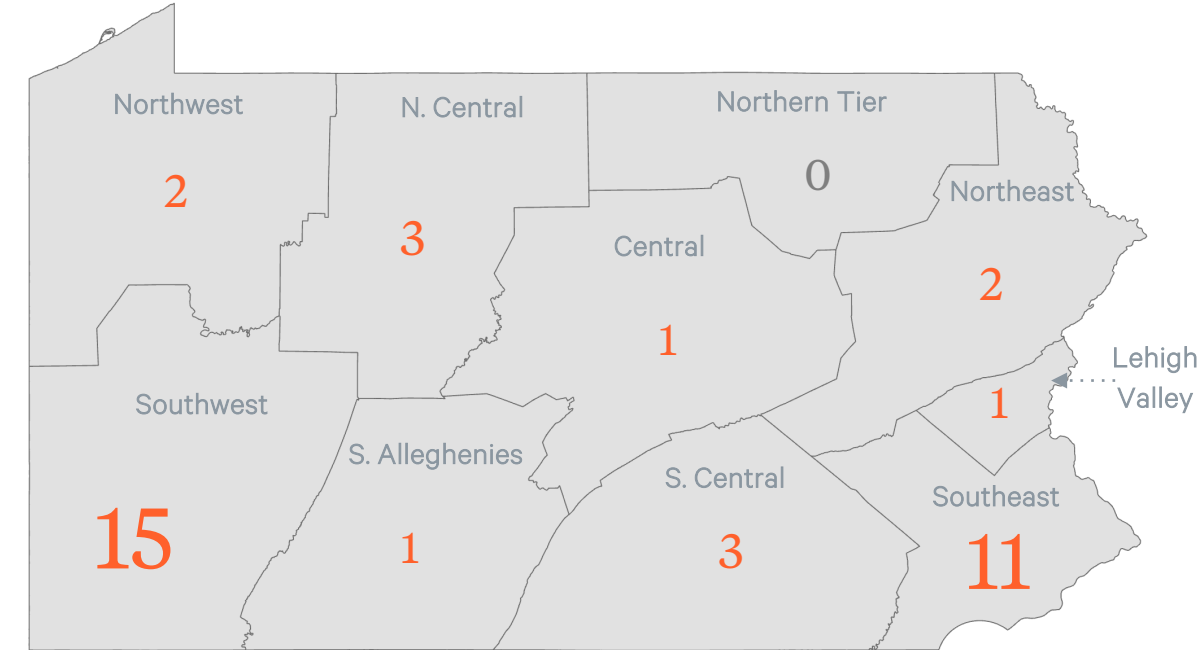
Sum > total businesses as some businesses feature in more than one detailed category



Category grouping only includes alloys, castings, or other metal used directly in robotics manufacturing. Machined components of these materials are covered in the Fabrication / Machining section

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- High number of **Copper** material businesses, relative to other direct materials. Few serve robotics directly and additional work needed fully assess applicability

Geography

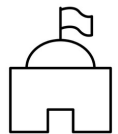
- Southeast** and **Southwest** have clusters of businesses offering direct copper supplies (alloys, castings, etc.). 89% are headquartered in Pennsylvania.

Smart Metals / Materials

NAICS Codes Searched: 325180, 325998, 327110, 327120, 331318, 331420, 331491, 331492, 331523, 331529, 332117, 334413, 334416, 335999, 541713, 541715

925 Potential businesses found when searching NAICS codes for all metals/materials

26
Relevant
Businesses



17 HQ in PA



2 Serve Robotics / Automation Industries

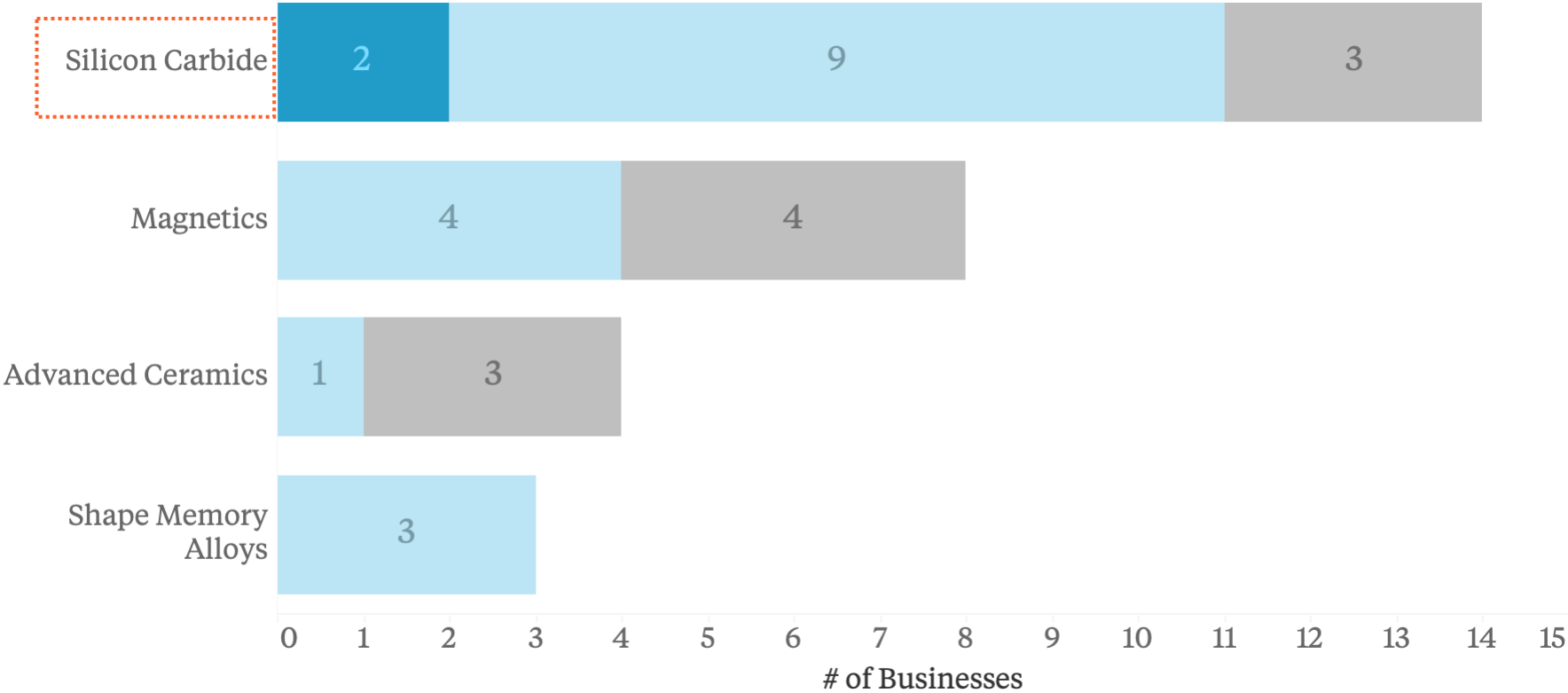


17 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

Sum > total businesses as some businesses feature in more than one detailed category

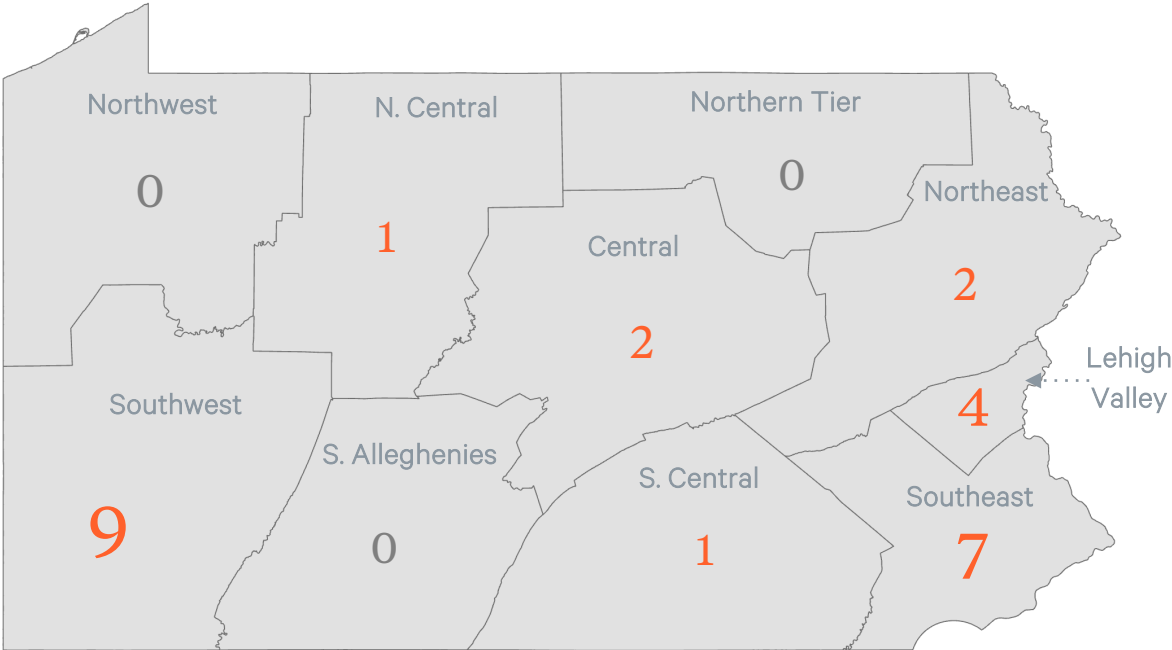


Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

Category grouping only includes alloys, castings, or other metal used directly in robotics manufacturing. Machined components of these materials are covered in the Fabrication / Machining section

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderate number of **Silicon Carbide** material businesses, relative to other direct materials. Few serve robotics companies directly.

Geography

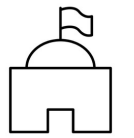
- Southwest** is a cluster, but only for Functional and Smart Materials broadly. Though Silicon Carbide is the most numerous category, it does not have any regional clusters

Structural Metals / Materials

NAICS Codes Searched: 313220, 325130, 325180, 325199, 325211, 325314, 326199, 331110, 331221, 331315, 331318, 331324, 331491, 331523, 332710, 332721, 335991

925 Potential businesses found when searching NAICS codes for all metals/materials

67
Relevant
Businesses



51 HQ in PA



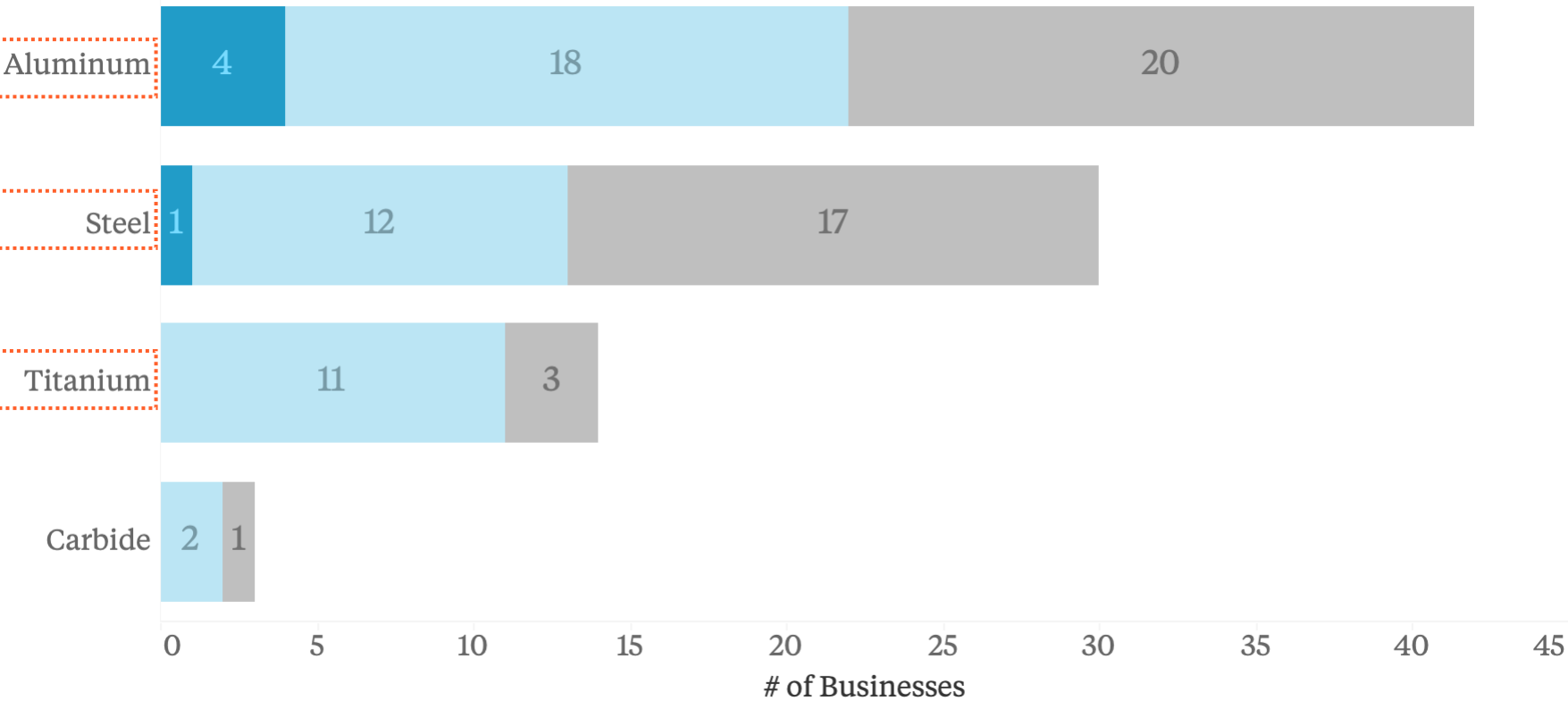
4 Serve Robotics / Automation Industries



37 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

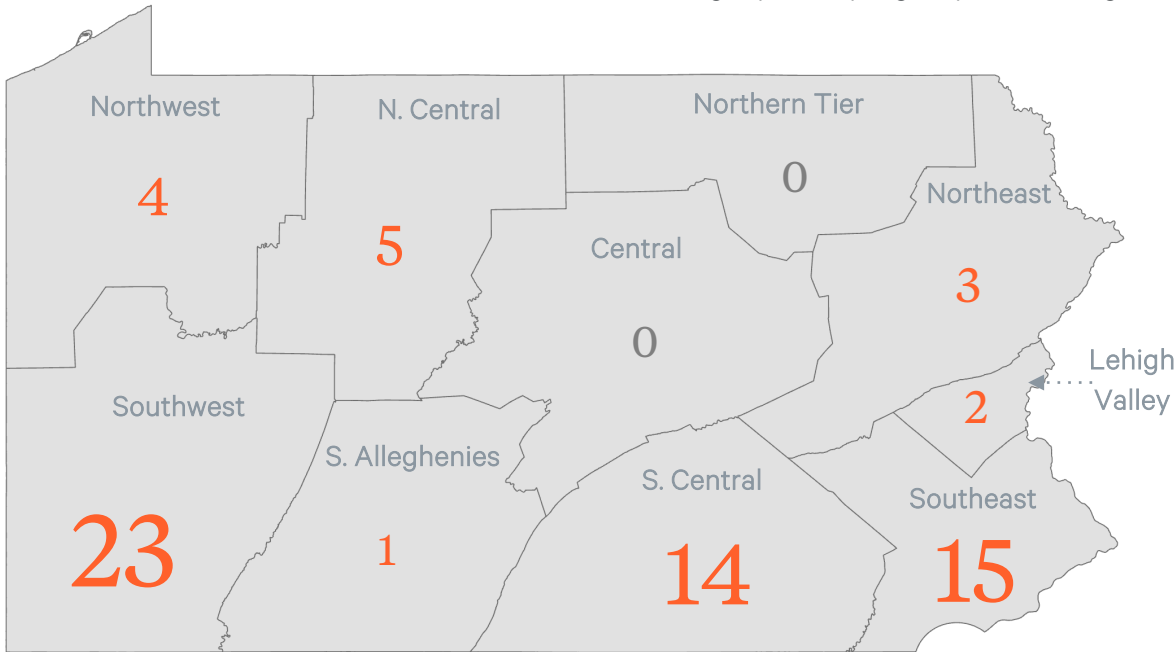


Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

Category grouping only includes alloys, castings, or other metal used directly in robotics manufacturing. Machined components of these materials are covered in the Fabrication / Machining section

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- High number of **Aluminum and Steel** material businesses (and moderate **Titanium**) relative to other direct materials. Few serve robotics directly and additional work needed fully assess applicability

Geography

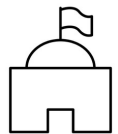
- Southeast, Southwest, S Central** have clusters of businesses offering direct steel, aluminum, and titanium materials (alloys, castings, etc.). 90% are headquartered in Pennsylvania.

AI, Machine Learning, Robotics Software

NAICS Codes Searched: 333998, 513210, 541511, 541512, 541690, 541715

2,890 Potential businesses found when searching NAICS codes

163
Relevant
Businesses



141 HQ in PA



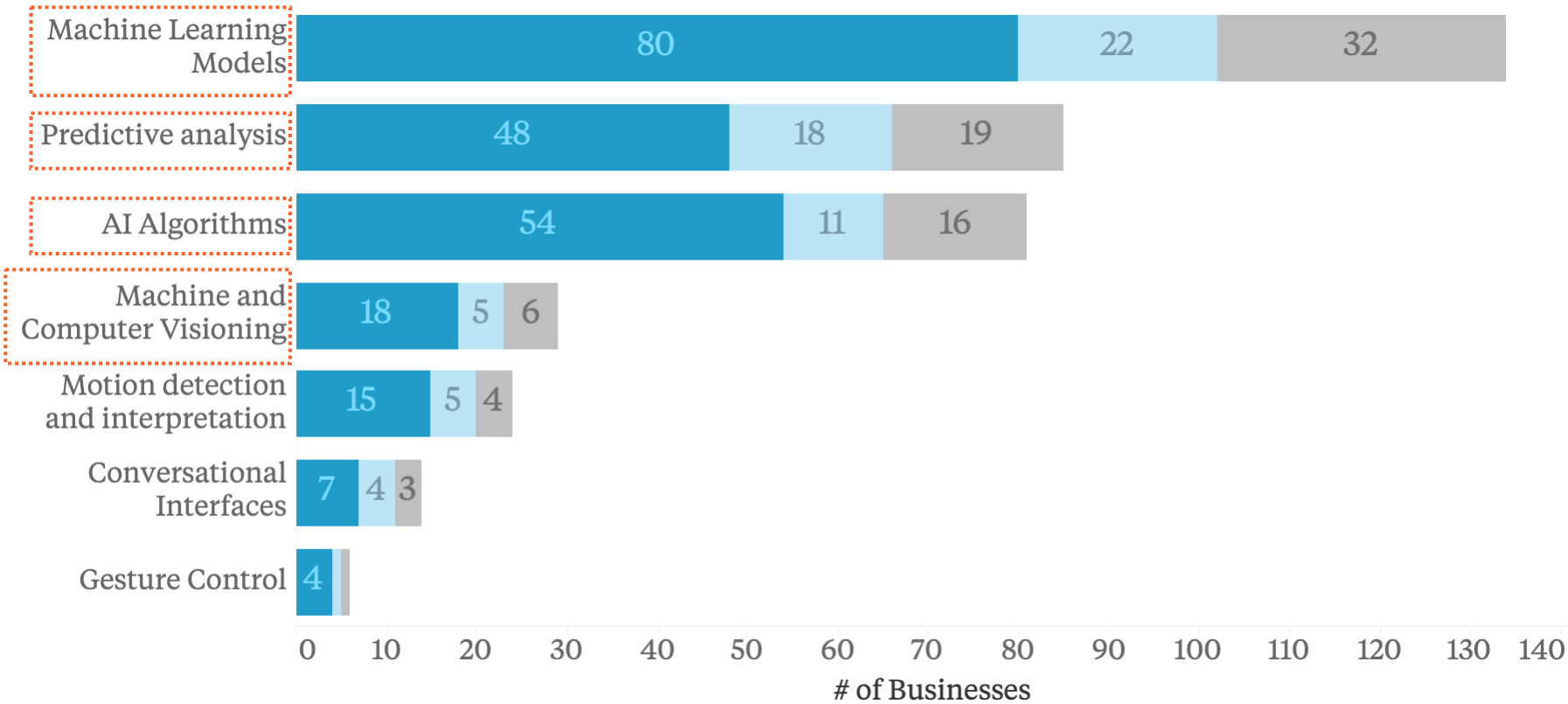
97 Serve Robotics / Automation Industries



73 Serve Similar Industry Clusters*
*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

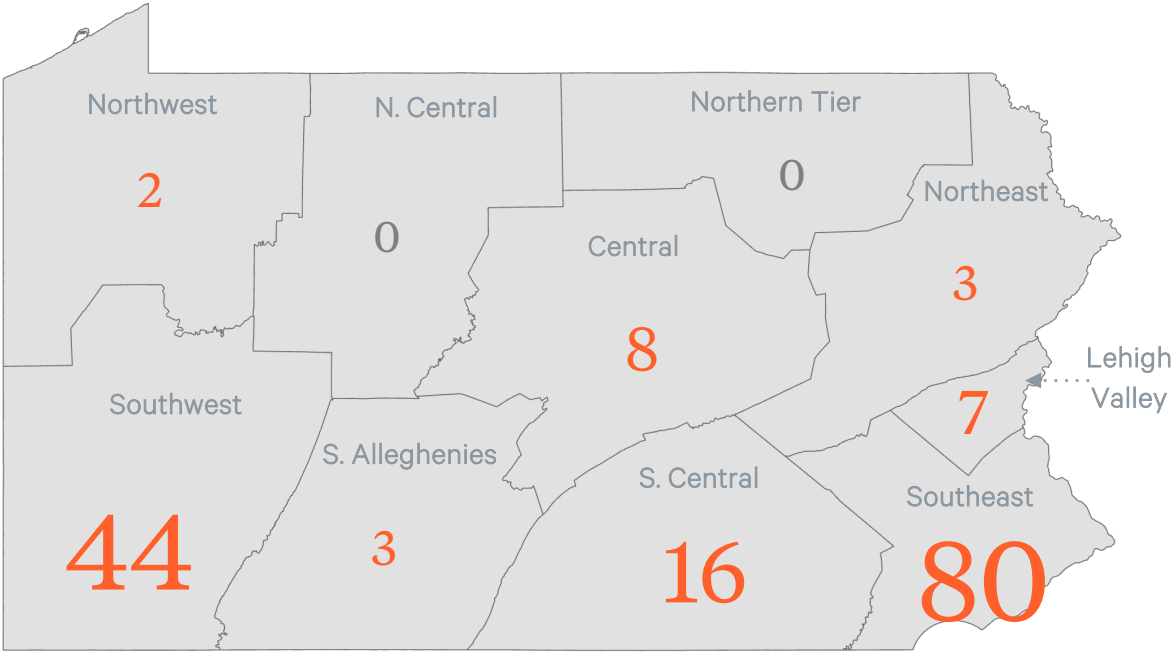
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- Very high number across **multiple categories** (Machine Learning, AI, Computer Visioning, etc). However, is hardest to scrape this category some matches may be false.

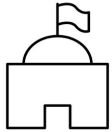
Geography

- **Southeast, Southwest, S Central** have clusters of businesses within these areas, as expected as sites of higher education and state government


Machining and Fabrication

NAICS Codes Searched: 332710, 332322 and all Metal, Material, Plastics NAICS
1,700 Potential businesses found when searching NAICS codes


412
Relevant
Businesses



399 HQ in PA



46 Serve Robotics / Automation Industries

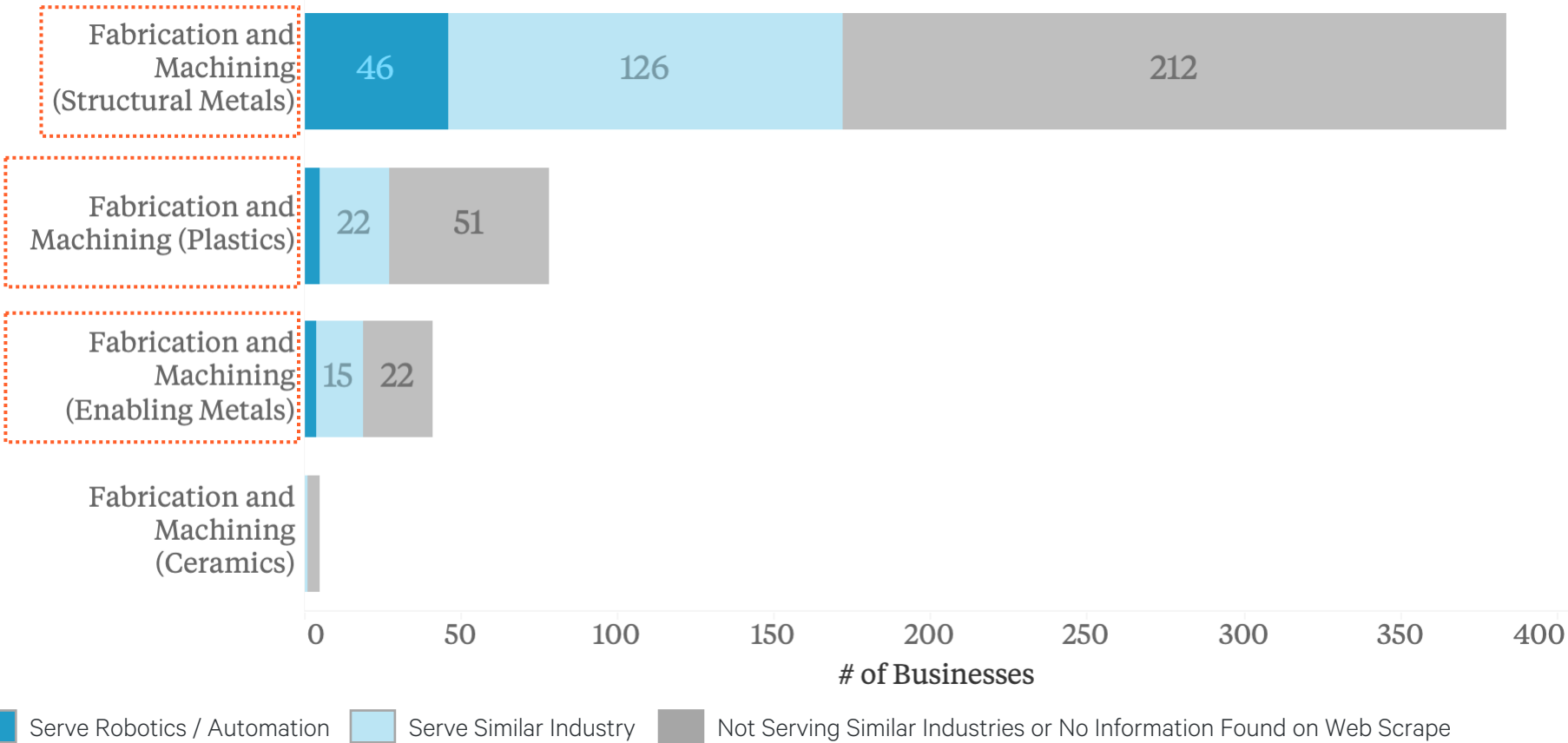


170 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

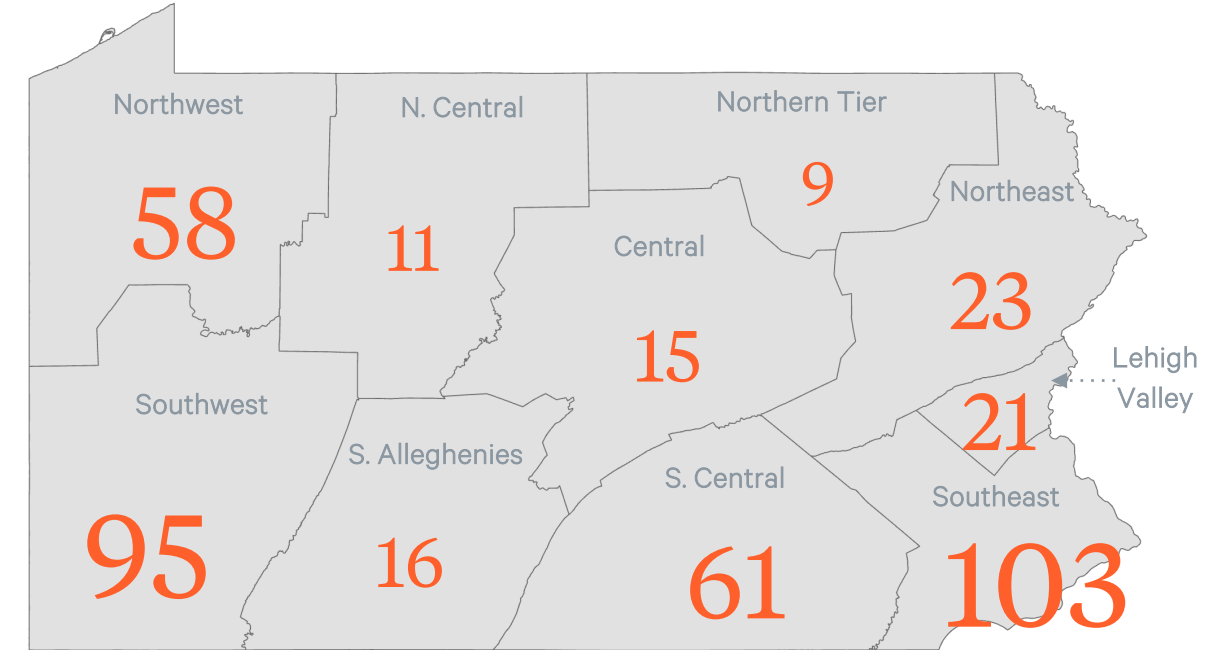
Detailed Category Profile

Sum > total businesses as some businesses feature in more than one detailed category



PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- Very high number across **multiple machining focus areas** (Structural Metals, Enabling Metals, Plastics). About 10% have robotics experience but 40% have experience in similar industries

Geography

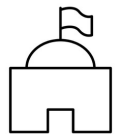
- These businesses **cluster across the state**. Those with Robotics and similar industry experience are found most in Southwest, Southeast, Norwest, and S Central.

Assembly, Integration, Calibration

NAICS Codes Searched: 325998, 332322, 333995, 333998, 334419, 541512, 541715, 334418, 334412, 541380, 541330, 611699

1,050 Potential businesses found when searching NAICS codes

119
Relevant
Businesses



110 HQ in PA



50 Serve Robotics / Automation Industries

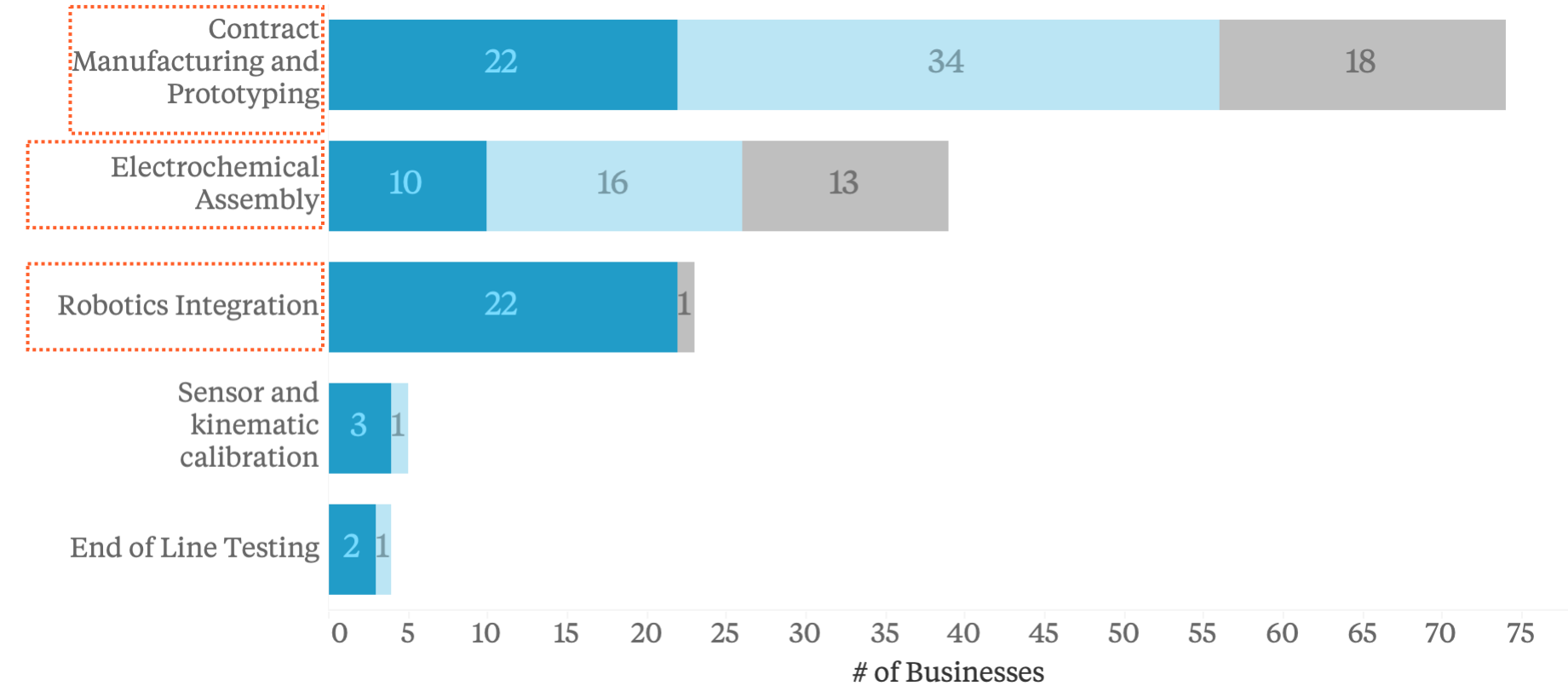


73 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Category Profile

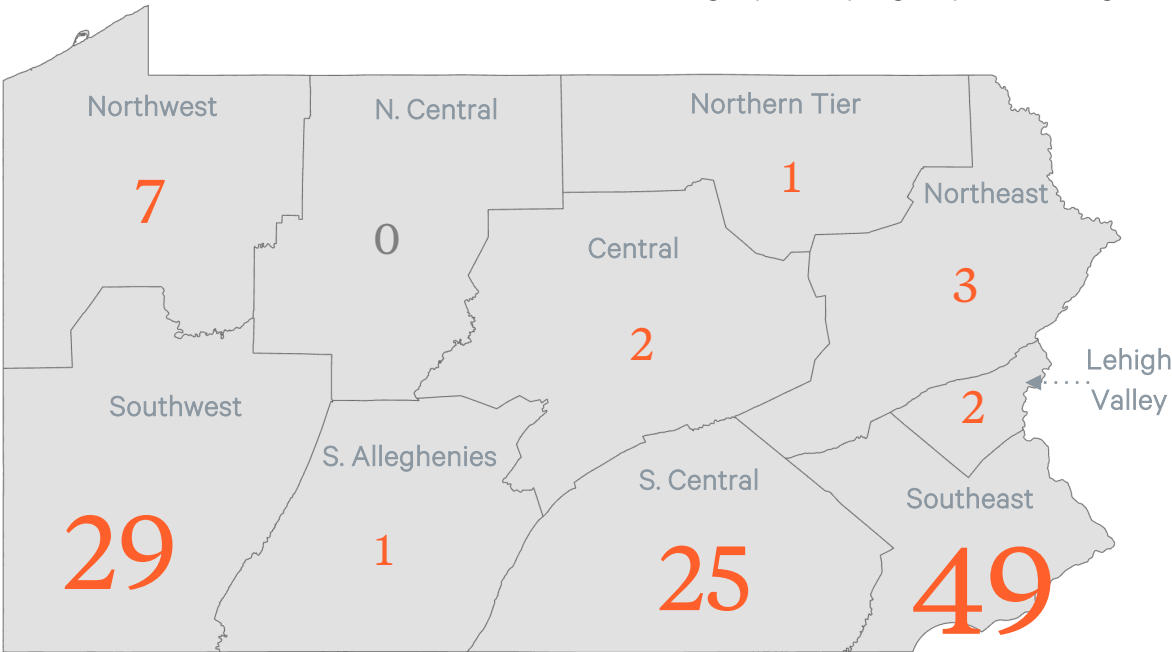
Sum > total businesses as some businesses feature in more than one detailed category



Serve Robotics / Automation Serve Similar Industry Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- High number of **Contract Manufacturing and Electromechanical Assembly, and Robotics Integration** businesses. Across all three ~40% have experience in robotics industry and 63% have experience in similar industries

Geography

- Southeast, Southwest, S Central** have the most significant clusters of these businesses

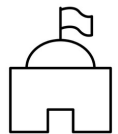
Professional Services: Legal

Robotics / AI Aligned Practice Areas

NAICS Codes Searched: 541110

10,038 Potential businesses found when searching NAICS codes

142
Relevant
Businesses



111 HQ in PA



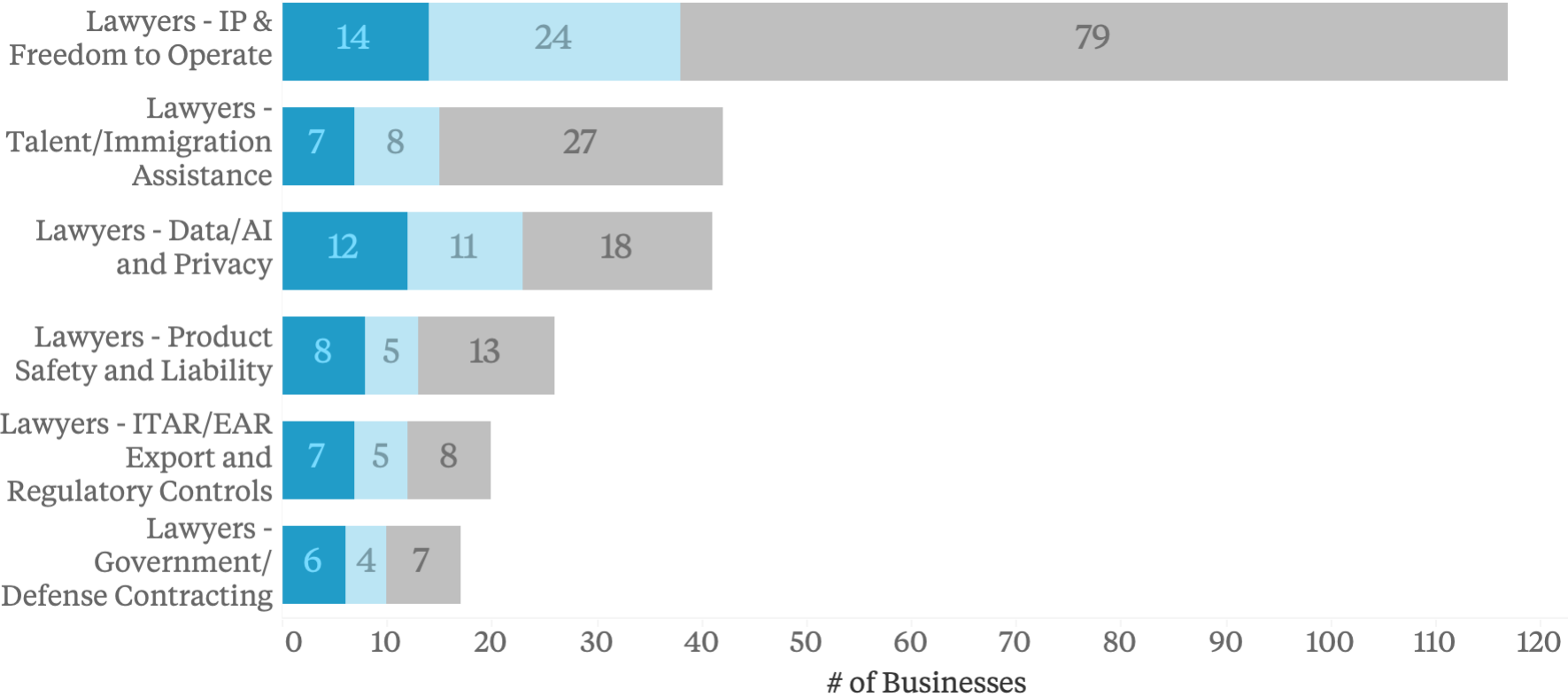
17 Serve Robotics / Automation Industries



43 Serve Similar Industry Clusters*
*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

Detailed Practice Area Profile

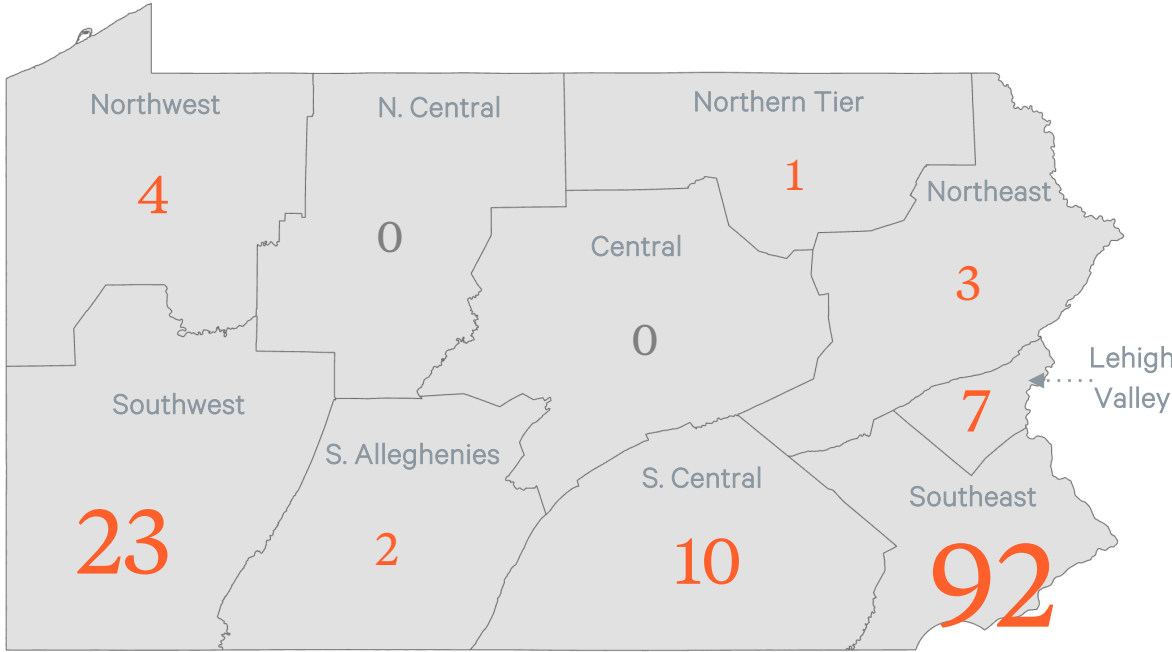
Sum > total businesses as some businesses feature in more than one detailed category



■ Serve Robotics / Automation ■ Serve Similar Industry ■ Not Serving Similar Industries or No Information Found on Web Scrape

PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

High Opportunity

Detailed Categories

- High number of businesses across **Multiple Legal Specialties** especially IP, Immigration, Data/AI. A select few have direct Robotics experience and specialize in multiple practice areas

Geography

- Southeast** is by far the most concentrated geography, though there is a smaller cluster in **Southwest** as well.

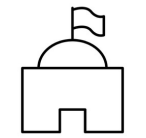
Professional Services: Staffing

Robotics / AI Aligned Practice Areas

NAICS Codes Searched: 561311, 561312, 541612, 561320

984 Potential businesses found when searching NAICS codes

29
Relevant
Businesses



20 HQ in PA



10 Serve Robotics / Automation Industries

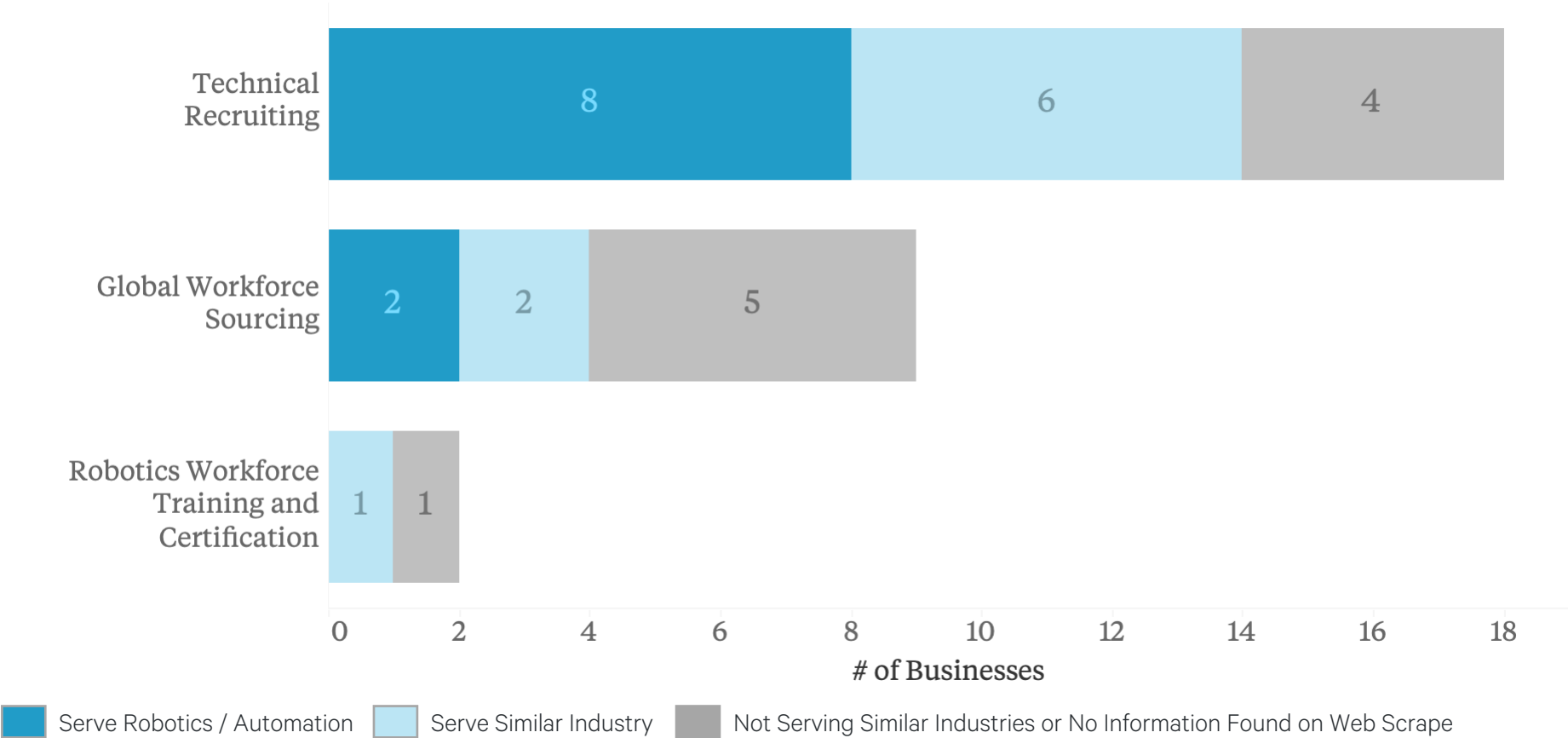


18 Serve Similar Industry Clusters*

*Aerospace, Biomedical, Defense/Military, Electronics, Energy, Nuclear

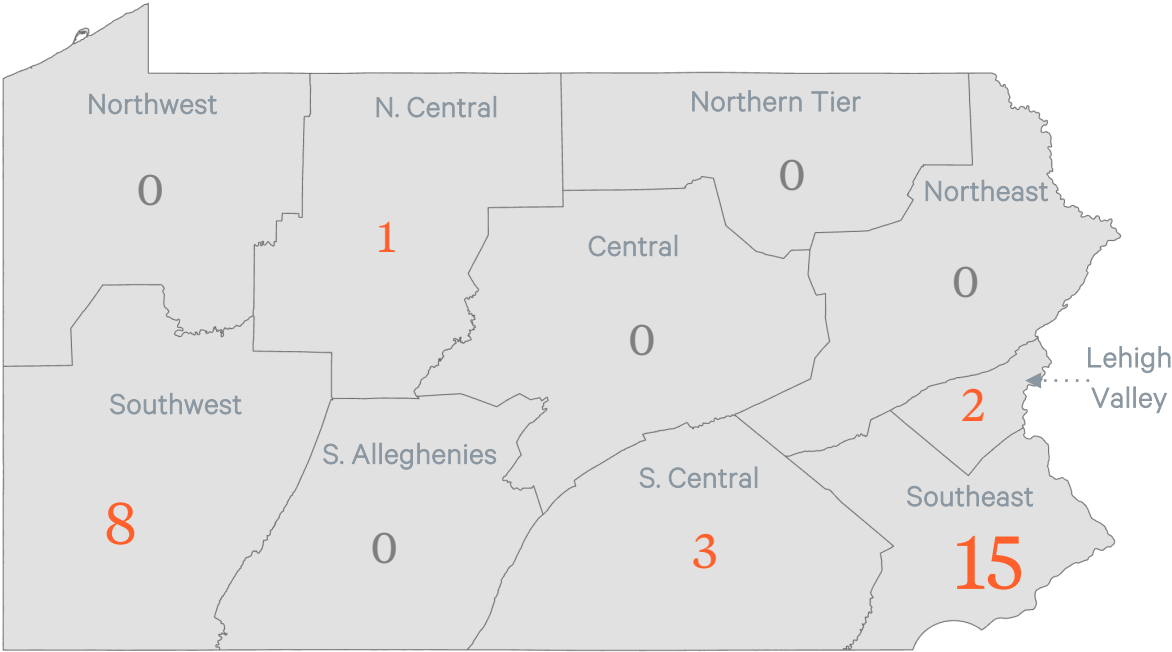
Detailed Practice Area Profile

Sum > total businesses as some businesses feature in more than one detailed category



PREP Region Summary

of Businesses Across All Category Groupings by PREP Region



Category Insights

Some Opportunity

Detailed Categories

- Moderate number of businesses in **Technical Recruiting** (AI technicians, robotics engineers, etc.), though there may be more as position titles may be located deeper on the website where we don't scrape

Geography

- Southeast** and **Southwest** have moderate clusters, as would be expected of Pennsylvania's two largest cities