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Job automation in the U.S. How are we preparing?

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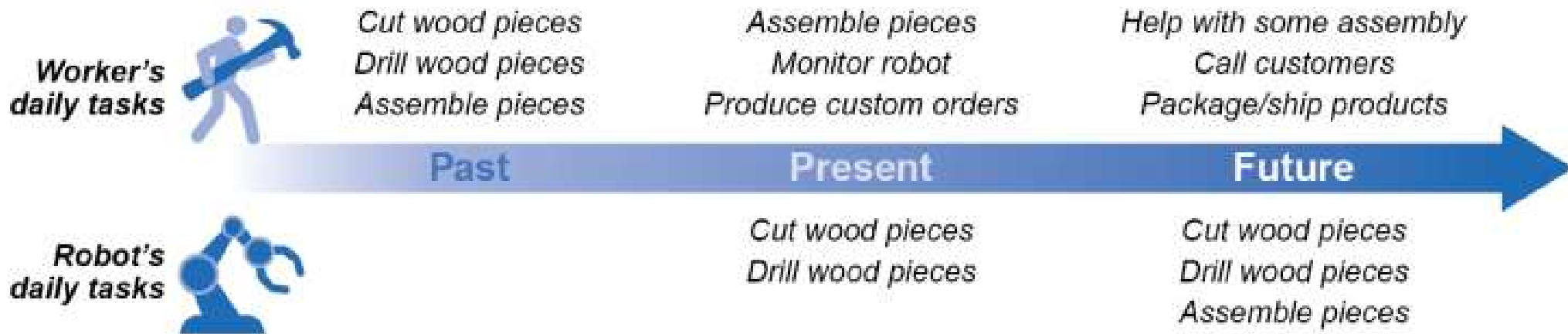
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Objectives

After attending this session, participants will be able to...

1. Discuss vulnerable jobs and industries
 2. Explain the demographic trends of workforce in the U.S.
 3. Provide the estimated number of jobs that will likely be automated
 4. Suggest possible strategies to respond to the job automation
 5. Illustrate practical examples of community college programs
- 



- Example (GAO, 2019):
- Automation “the creation and application of technology to monitor and control the production and delivery of products and services.” (ISA, 2020)
- Job/workforce automation – technology such as Artificial Intelligence (AI), robots, and computer software replace human labor

Job
automation



Service



Health & long-term care



Construction

Automation impacts multiple industries



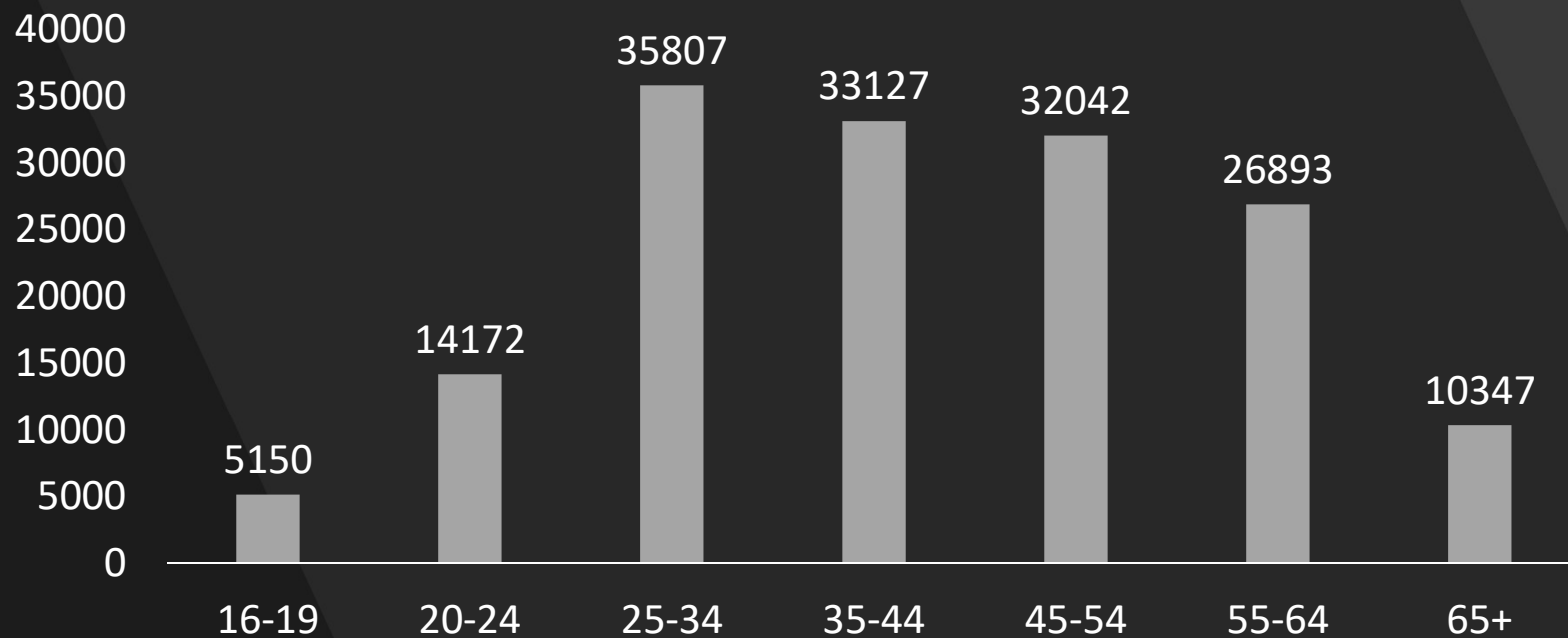
Sales and office



Transportation

Demographic characteristics of workforce

- Median age: 42.3 years old
- 157-158 million workers in the U.S (BSL, 2019)

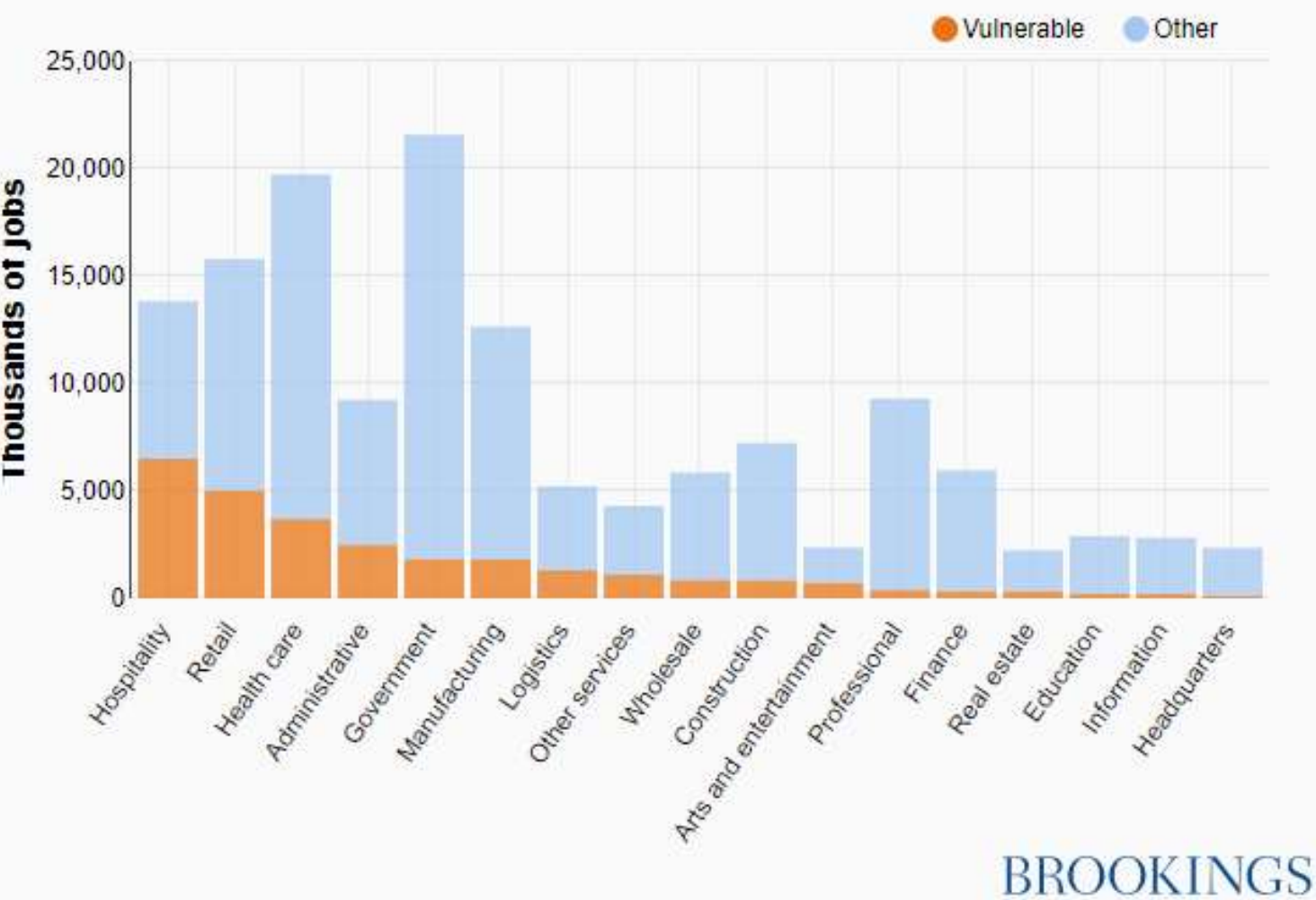


Poll Question #1

In your community, which industry do you think will be most impacted by job automation?

- Real Estate
- Hospitality
- Construction
- Retail
- Finance
- Health care
- Government
- Education
- Administration

Figure 1. Many vulnerable jobs concentrate in the hospitality and retail sectors



| Vulnerable industries | |
|-----------------------|----------------|
| 1 | Hospitality |
| 2 | Retail |
| 3 | Health care |
| 4 | Administrative |
| 5 | Government |



How many jobs will be automated?
By Yamashita & Cummins (unpublished)

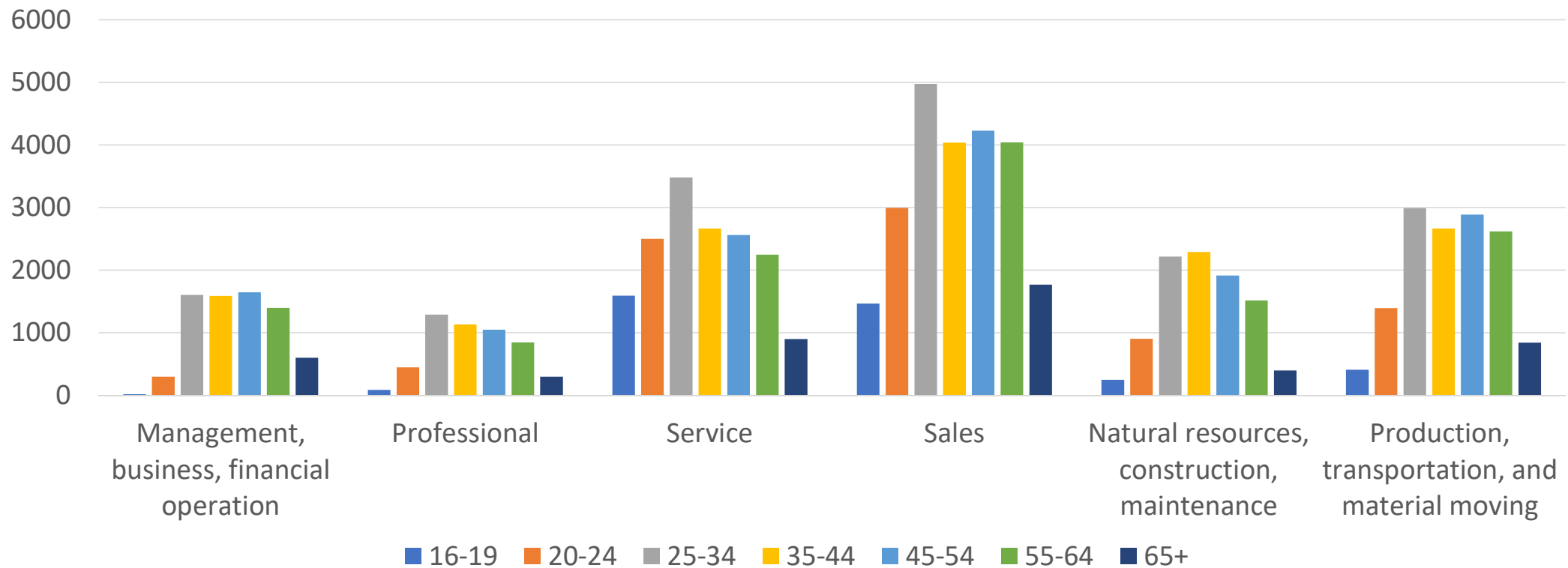
- **Purpose:** Estimation of the numbers and proportions
- **Time frame:** next 10-20 years
- **Data source:** Frey & Osborne (2017) and 2019 Current Population Survey
- 6 major industries
 - 22 sub-categories
 - 702 occupations

What % of jobs will be automated?

| Industry | All ages | 16-19 | 20-24 | 25-34 | 35-44 | 45-54 | 55-64 | 65+ |
|---|------------|-------|-------|-------|-------|-------|-------|-----|
| Total | 48% | 74% | 61% | 47% | 44% | 45% | 48% | 47% |
| Management, business, financial operation | 27% | 21% | 31% | 29% | 25% | 26% | 26% | 27% |
| Professional | 14% | 25% | 18% | 13% | 13% | 14% | 14% | 12% |
| Service | 60% | 75% | 66% | 58% | 56% | 55% | 59% | 59% |
| Sales | 72% | 86% | 80% | 71% | 69% | 69% | 72% | 75% |
| Natural resources, construction, maintenance | 66% | 74% | 69% | 67% | 66% | 65% | 65% | 66% |
| Production, transportation, and material moving | 75% | 76% | 78% | 75% | 74% | 74% | 75% | 77% |

How many jobs will be automated (in thousands)?

75 million jobs in total



Poll Question #2

Do you think COVID-19 will increase the speed of job automation?

- Yes
- No
- I don't know

How do we prepare for job automation?

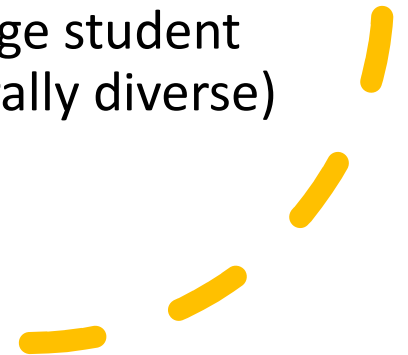
- Not all jobs will be replaced
- Higher demands in automation technology industries (e.g., STEM)
- Adult education and training (Cummins, Taylor & Kunkel 2015)
- The middle-skill STEM jobs (11% increase between 2016-2026) – engineers, technicians, electricians, etc.
- Certificates and associate degrees meet the sweet spot (Carnevale et al., 2018)



Roles of Community Colleges

(Cummins, Bahr & Yamashita, In press)

- Workforce development (historically and ongoing)
- Re-skilling and skill-upgrading → globally competitive workforce
- Accessible AET → open admission, lower tuition fee, shorter program (vs. 4-year university), convenient geographic location, locally relevant needs, a variety of STEM programs, etc.
- Sufficient qualification in the current STEM occupations
- Increasingly diverse community college student populations (e.g., older adults, culturally diverse)





Ivy Tech Community College Programs & Grants

- Agriculture and Precision Agriculture Programs
- Advanced Automation & Robotics Technology Program
- Wabash Heartland Innovative Network (WHIN)
 - \$38.9M Lilly Endowment, Inc. grant
 - \$1M Internet of Things (IoT) grant
 - \$35K Planning grant
 - \$899K Impact Grant

Programs



Agriculture

Approximately 200 Students
Pathways to Purdue Agriculture
Program
WHIN Grant



Precision Agriculture

Brand new program
WHIN Planning and Impact
Grant



Advanced Automation & Robotics Technology (AART)

75 credit hour
program
WHIN Grant



Grants

- Wabash Heartland Innovative Network (WHIN)
 - \$38.9M Lilly Endowment, Inc. grant
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WHIN Planning Grant

Figure 1: Respondents organization type

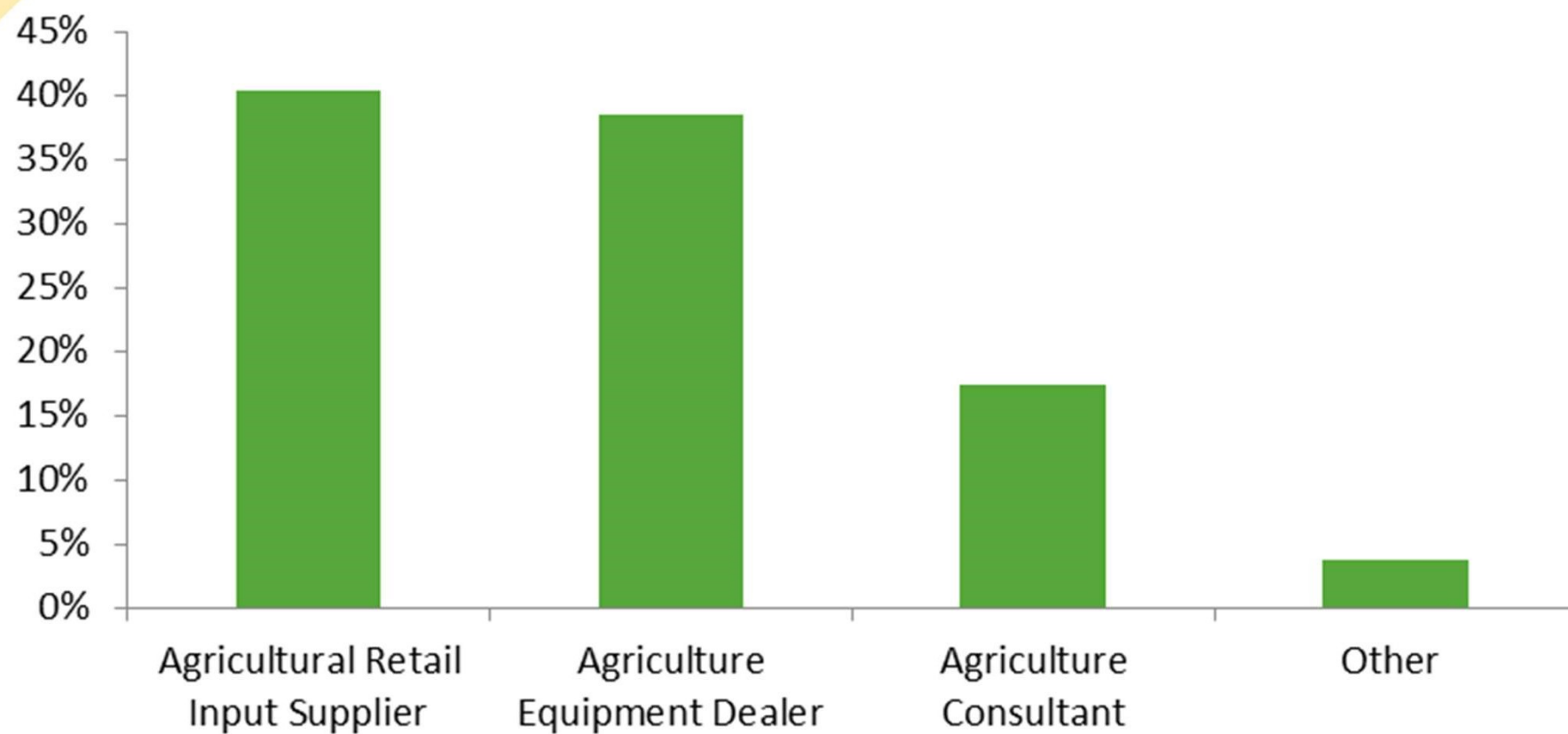


Figure 2: Agriculture retailer response by job title

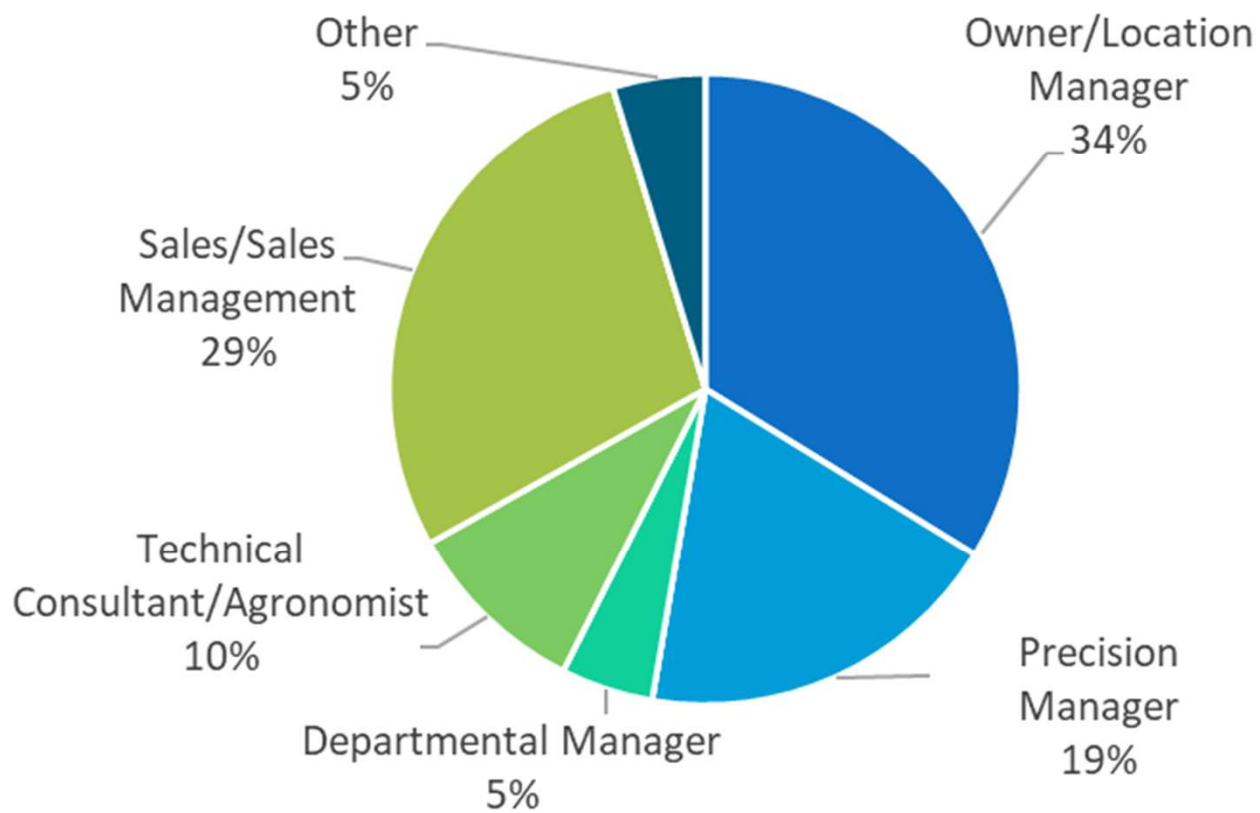


Figure 3: Agriculture equipment dealer response by job title

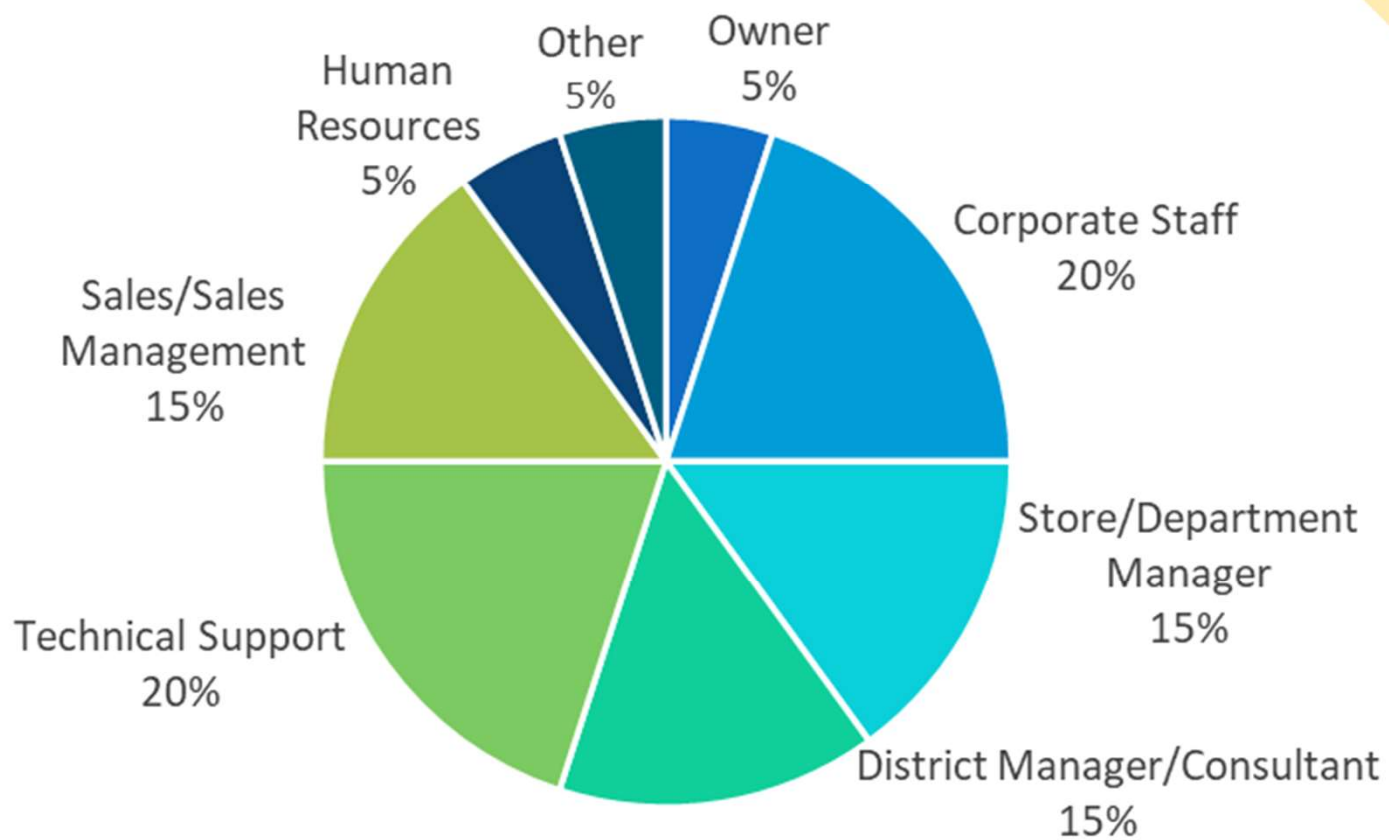


Figure 5: 2019 Estimated investment in precision technology

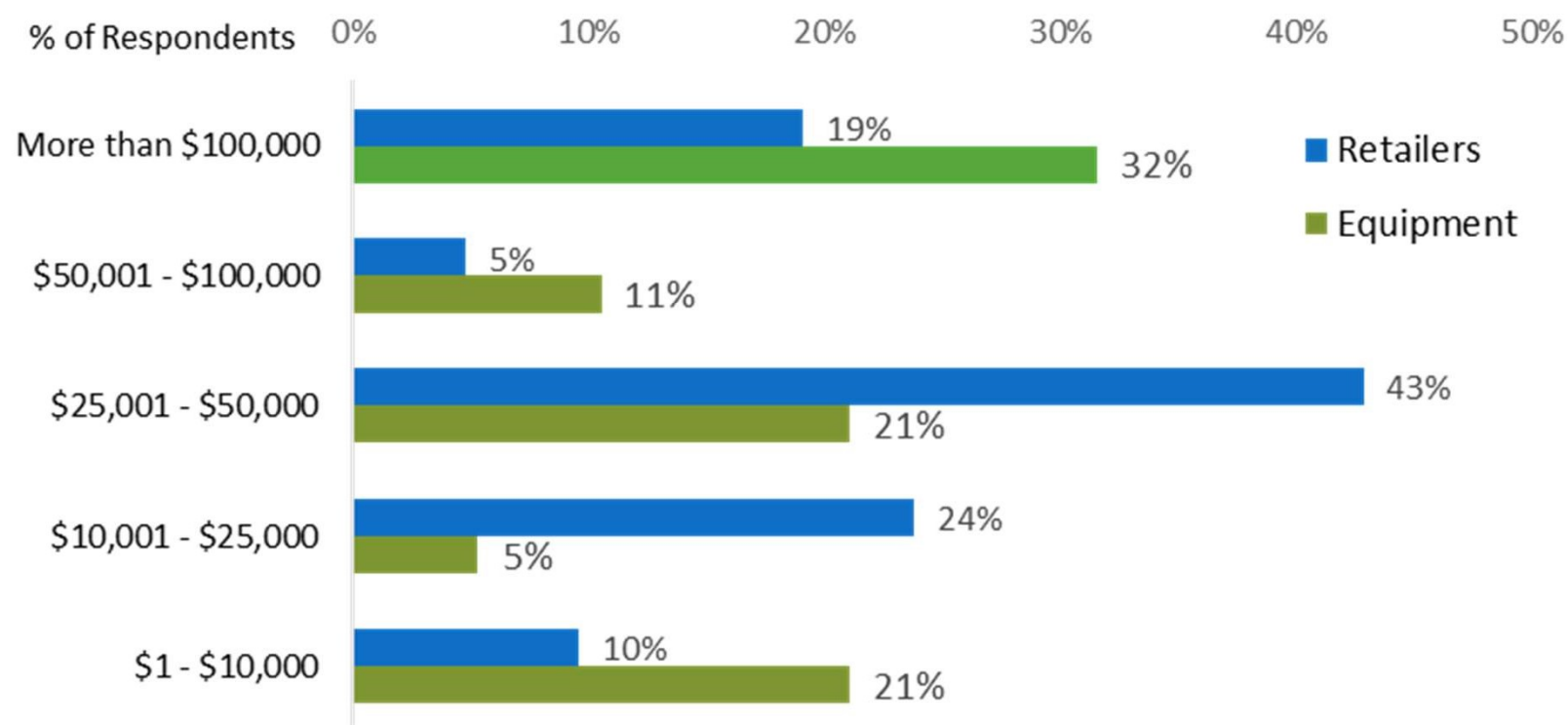


Figure 6: Future technologies used by top customers among all survey respondents

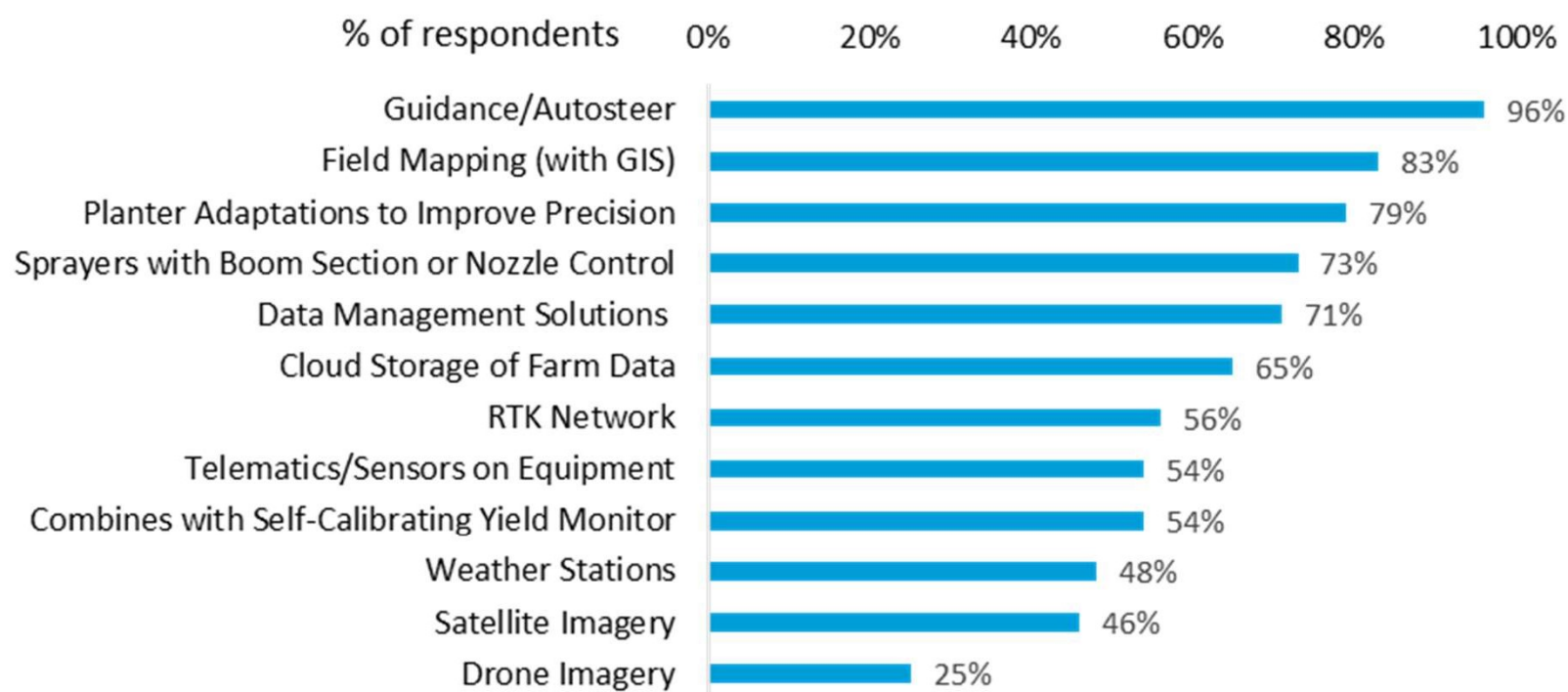


Figure 9: Agriculture retailers future usage of precision technology

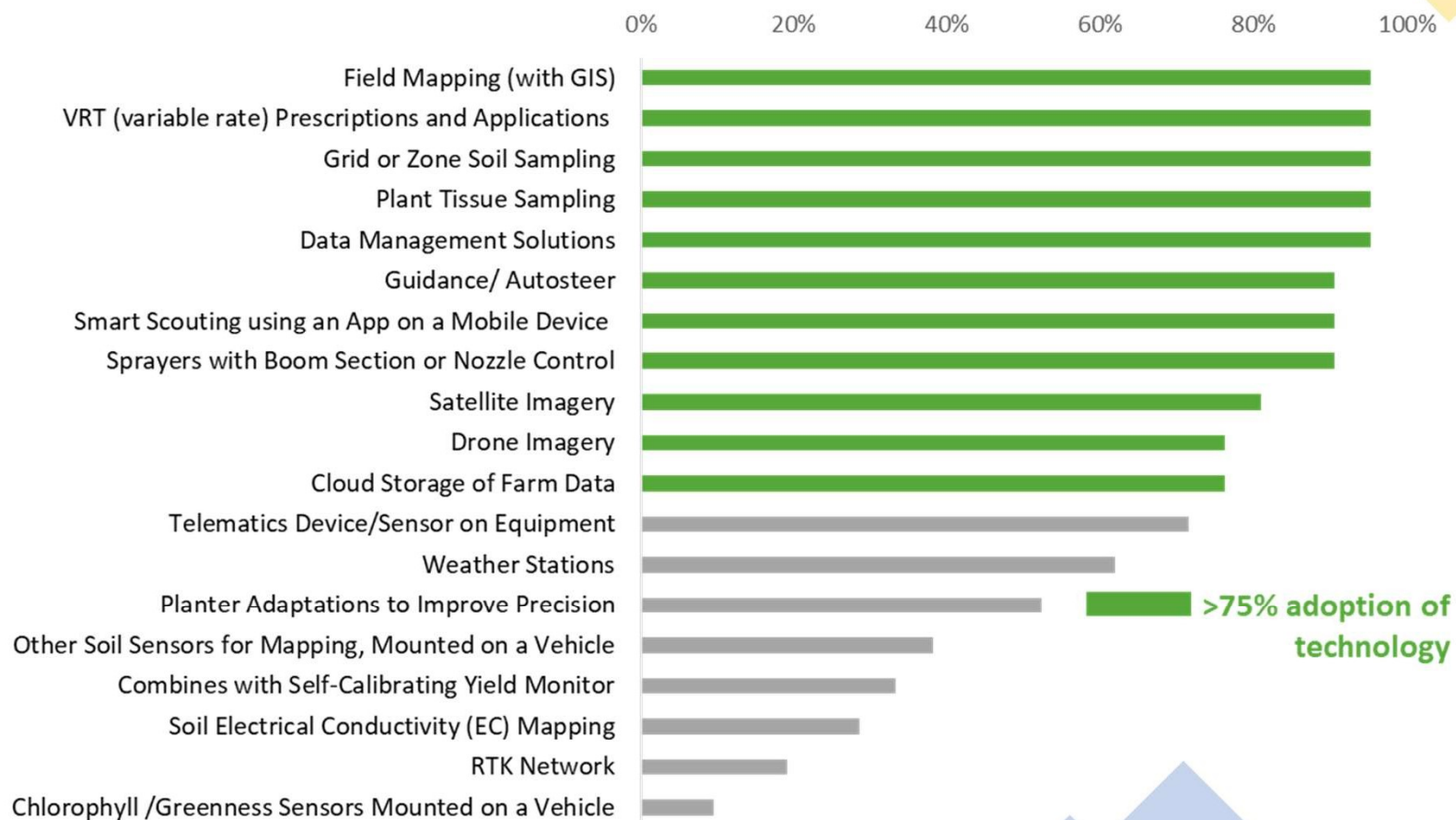


Figure 10: Most important precision software platforms to operate in the future

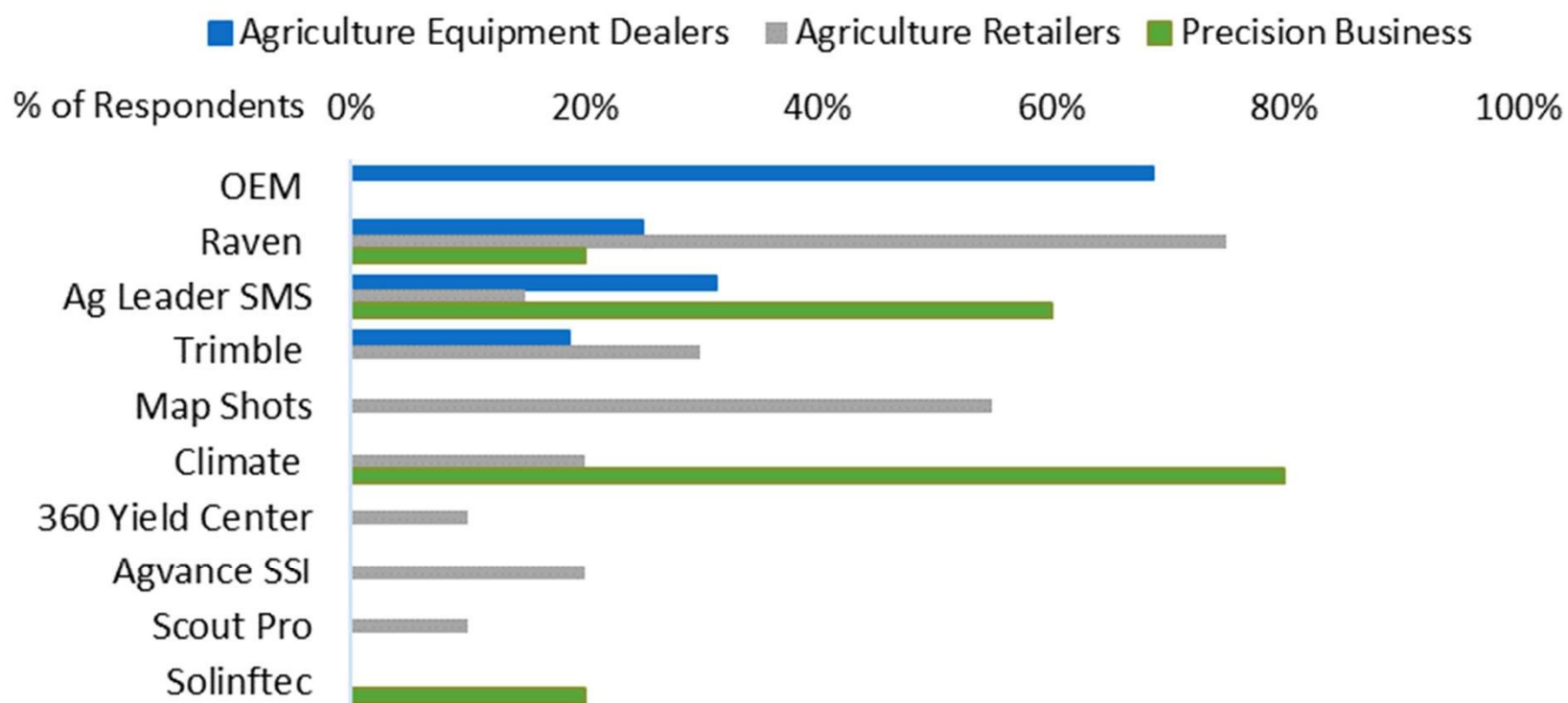


Figure 11: Precision agriculture job growth in the next 3 years

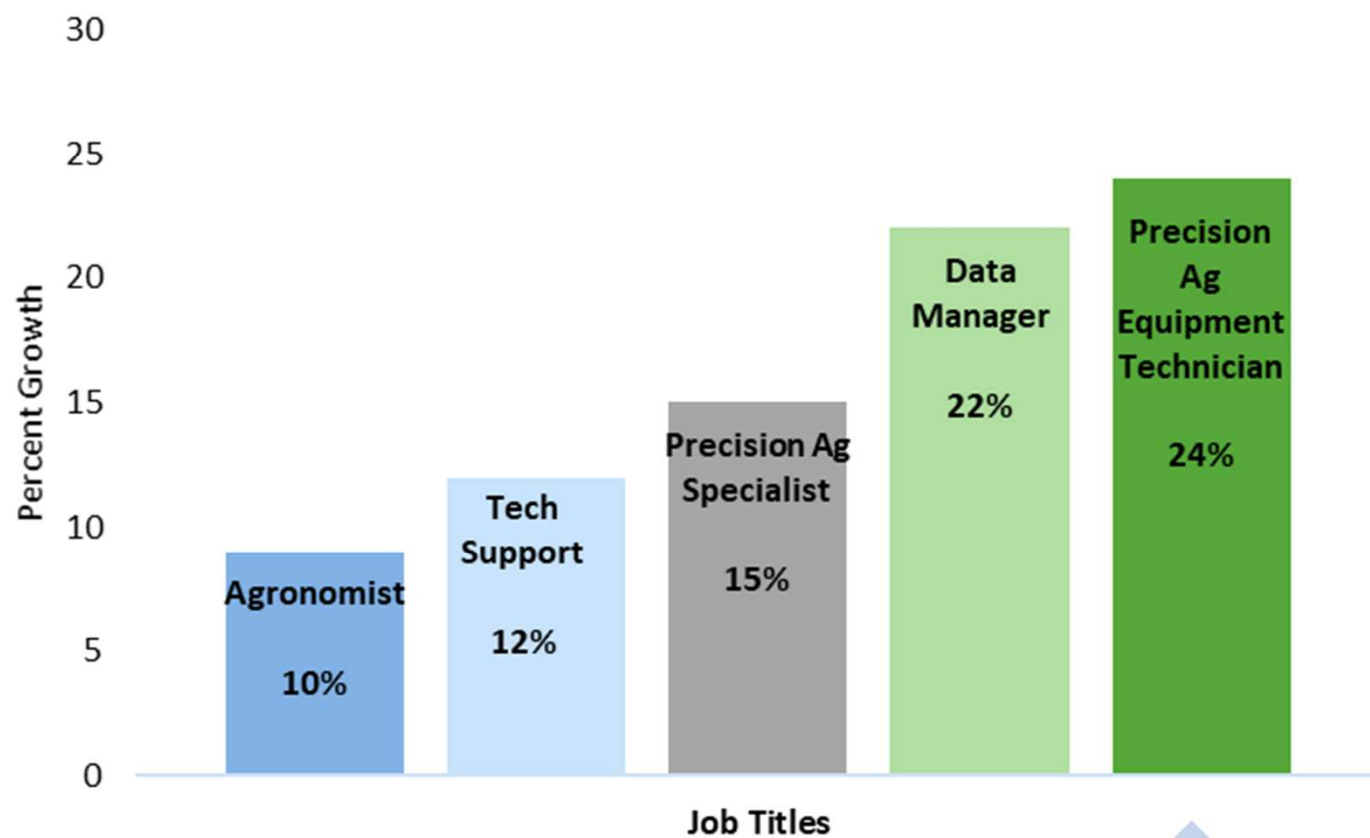


Figure 12: Employees using precision technology

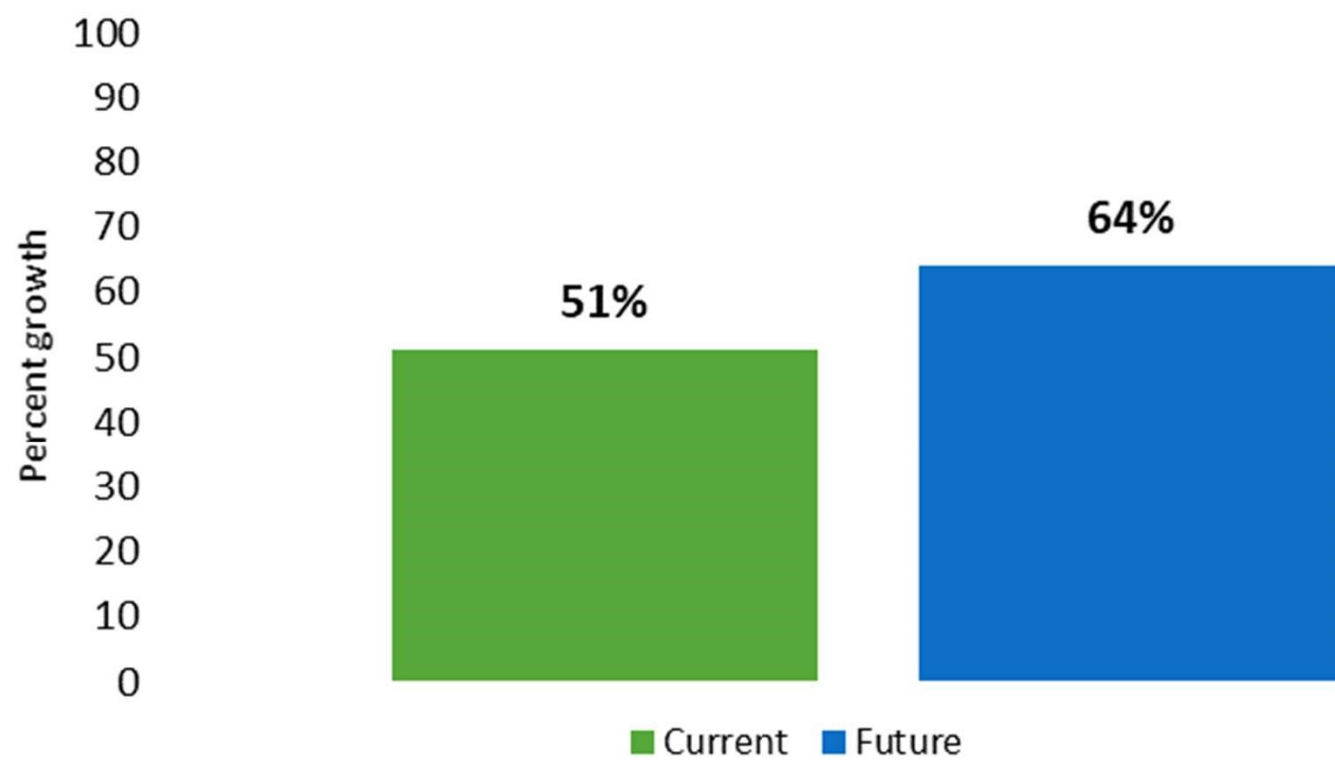


Figure 13: Agreement with "service technicians will be expected to service and operate precision farming products in the future."

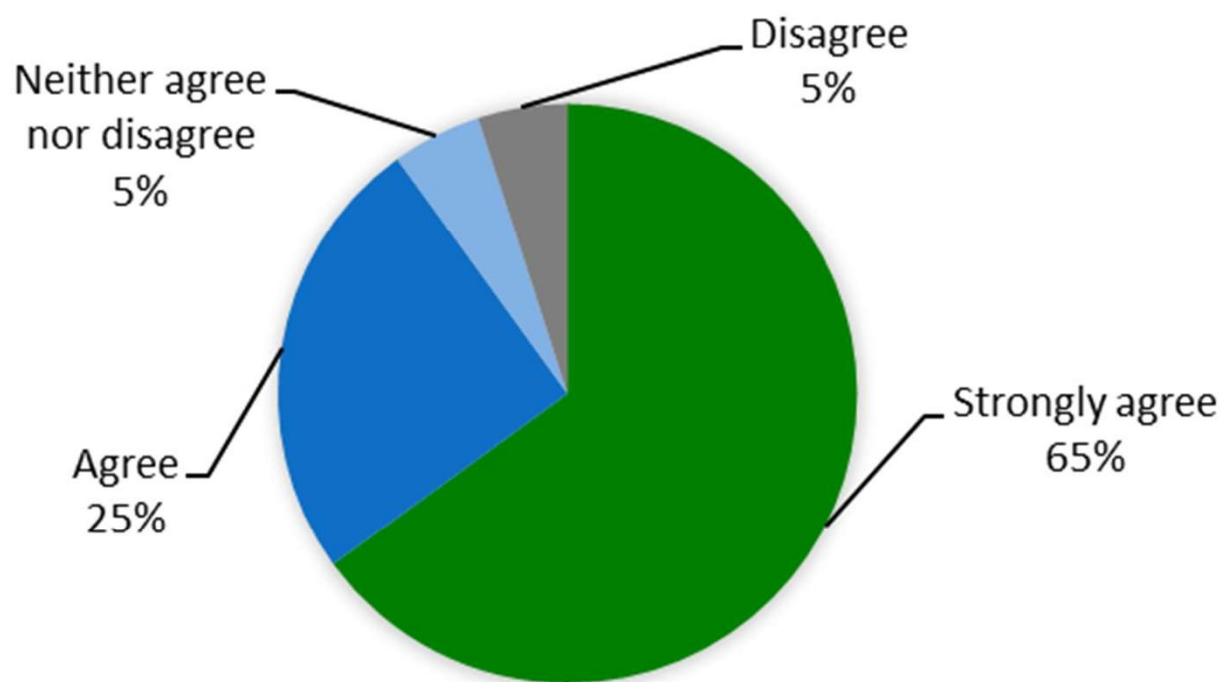


Figure 14: Level of difficulty in finding qualified applicants

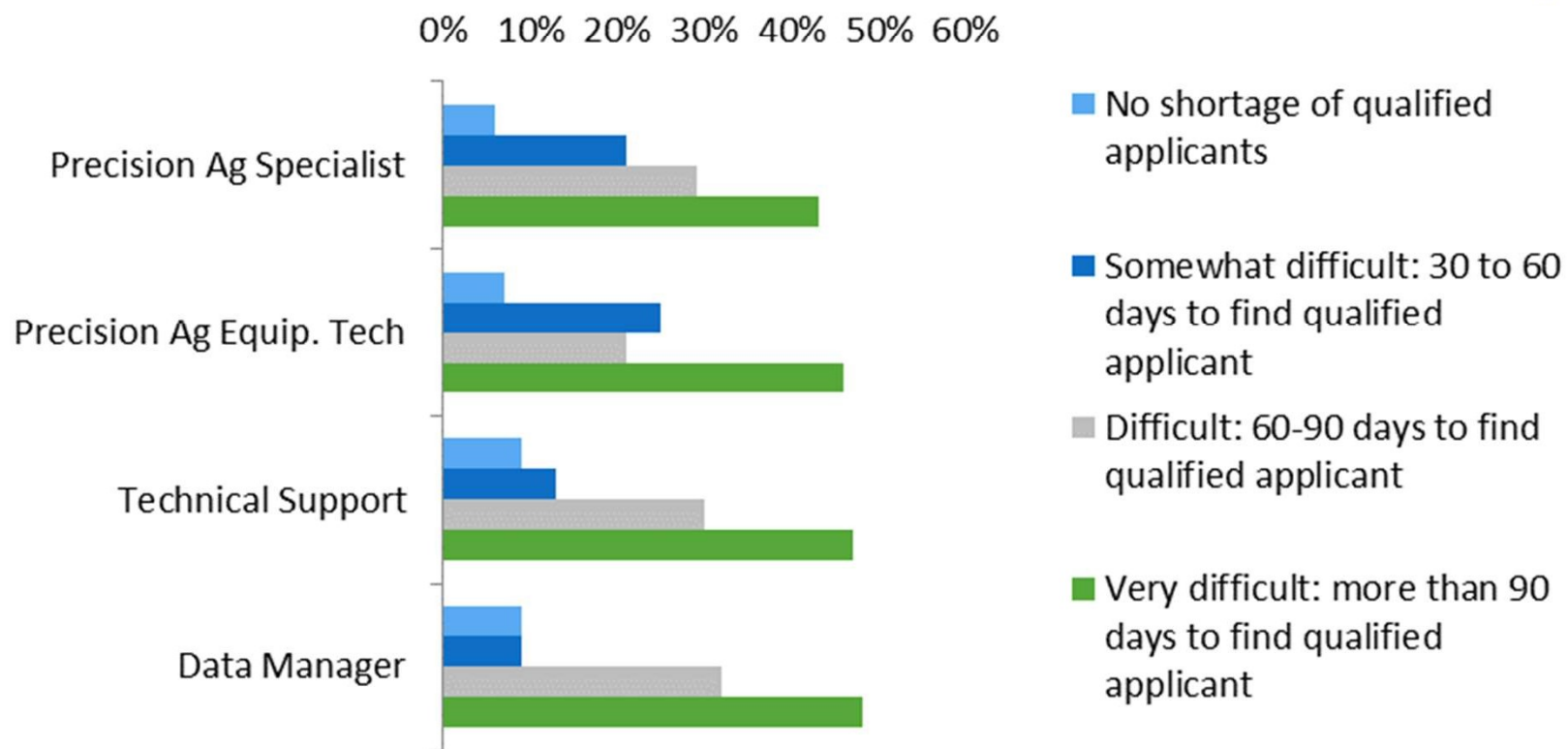


Figure 15: Education required for precision agriculture roles in the future

1-Year Technical Certificate Associate's Degree Bachelor's Degree Master's Degree

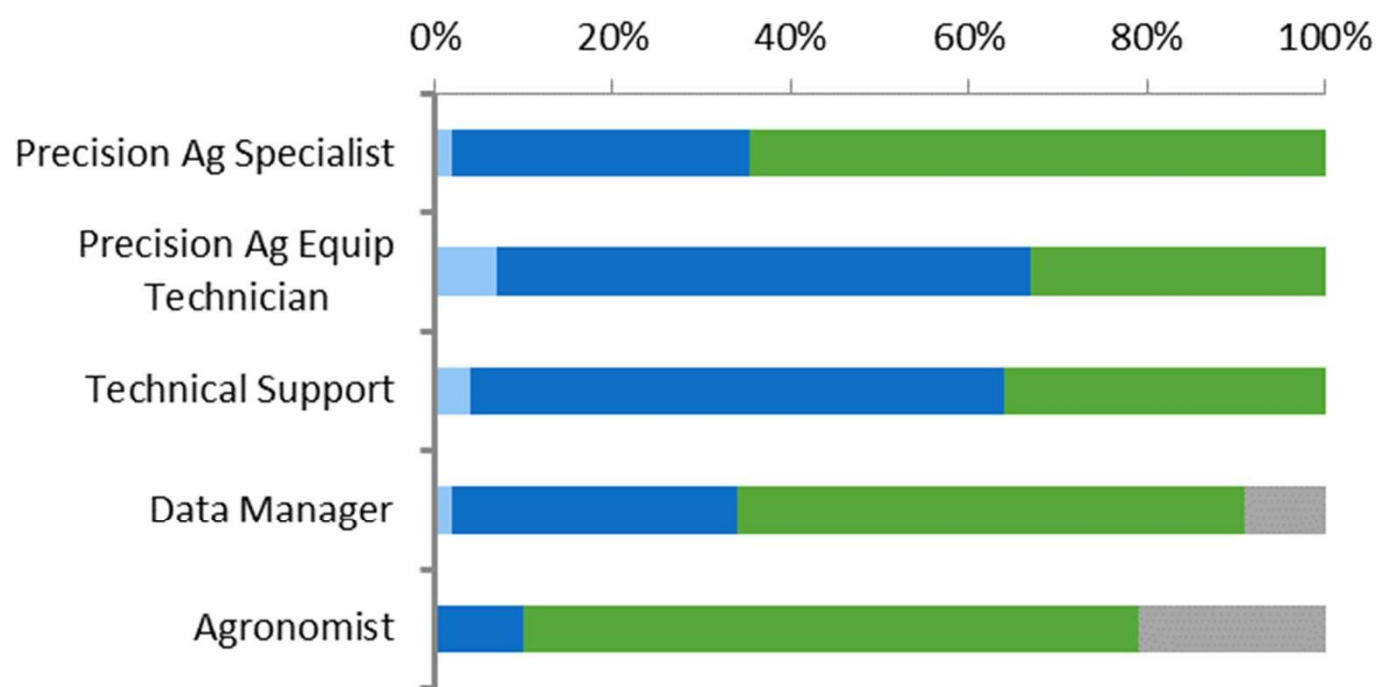


Figure 16: Importance of having a local post-secondary institution offer precision agriculture degrees

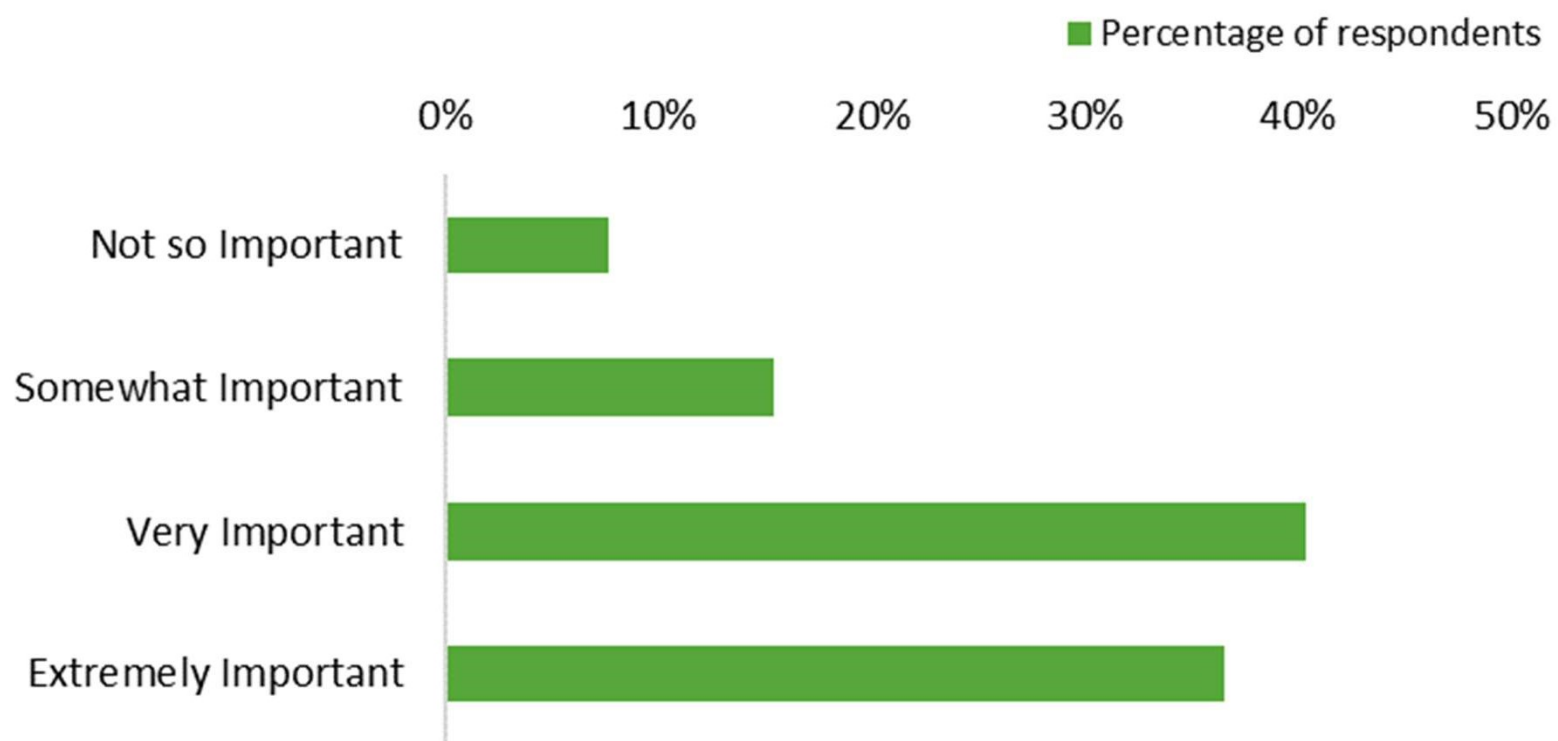
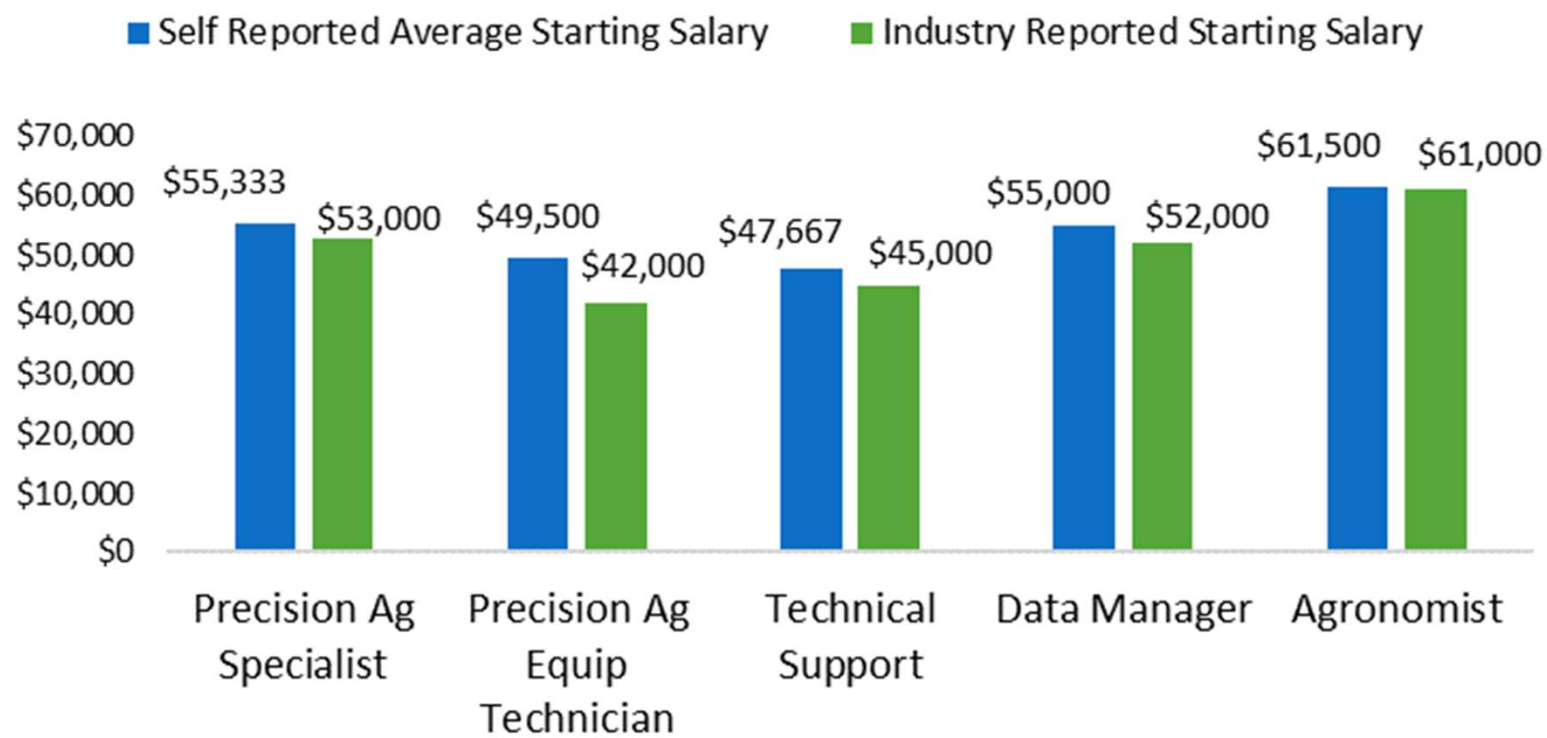



Figure 17: Starting salary if recieved post-secondary education

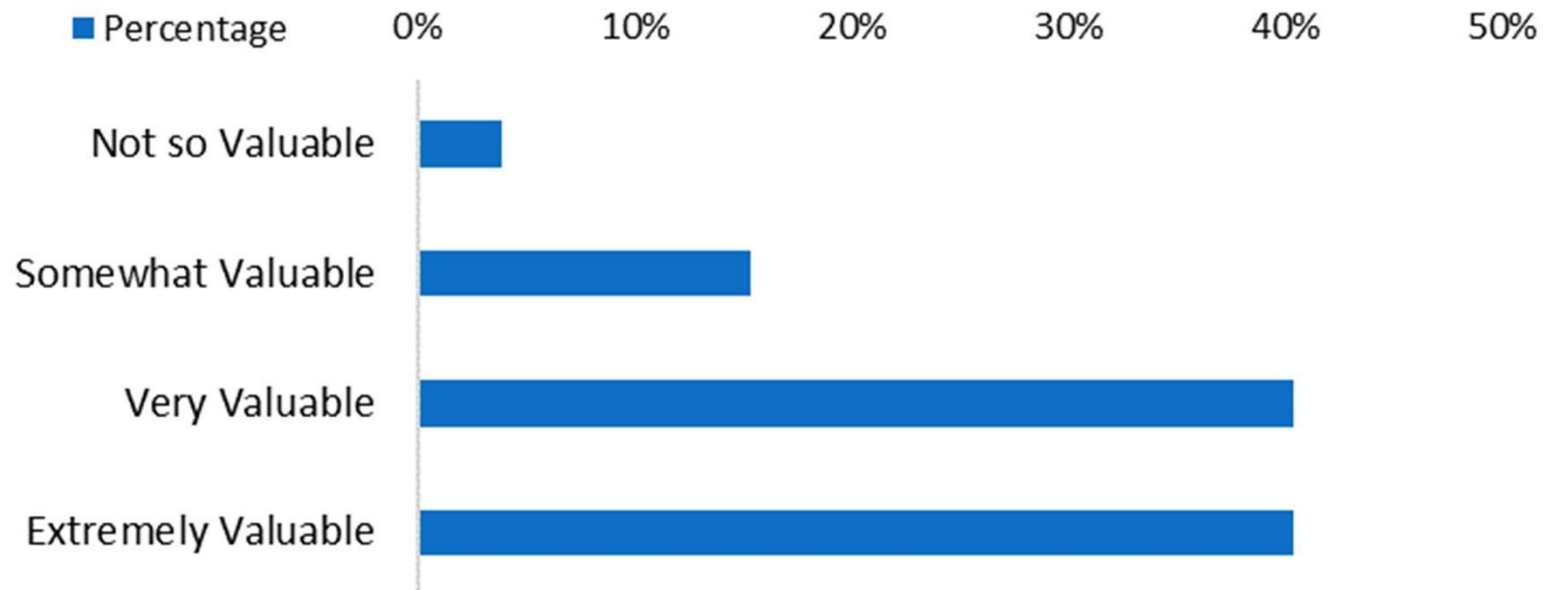


**Figure 19: Most important skills by
job title**

 = Required skill by more than
50% of respondents

| | Precision Agricultural Specialist | Precision Agriculture Equipment Technician | Technical Support | Data Manager | Agronomist |
|---------------------------------|-----------------------------------|--|-------------------|--------------|------------|
| Mechanical experience | | | | | |
| Electronic diagnostic knowledge | | | | | |
| Precision software experience | | | | | |
| Spreadsheet data analysis | | | | | |
| Precision product experience | | | | | |
| Digital mapping software | | | | | |
| Understanding of statistics | | | | | |
| Business and Accounting Skills | | | | | |
| Agronomic knowledge | | | | | |
| Agronomic recommendations | | | | | |
| Communication skills | | | | | |
| Sales skills | | | | | |
| Extended work hours | | | | | |

Figure 25: Value of new hire completing a precision based co-op or internship





Planning Grant ➔ Impact
Grant ➔ Precision Ag Program

WHIN Impact Grant



899 thousand dollar awarded



Approximately 400 thousand additional dollars in matching funds

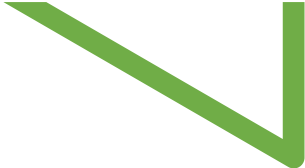



Funded

New Faculty/Program Chair position for 2 years

New Precision Agriculture laboratory



New Equipment to outfit the laboratory



Automation as an Opportunity: Ag, Precision Ag, & AART Programs

- Community College Programs are a Solution to Automation
 - Demand for skilled workers “new-collar worker” - coined by IBM’s CEO Ginni Rometty
 - Defined as “Individual who develops the technical and soft skills needed to work in technology jobs through nontraditional educational paths”

<https://www.forbes.com/sites/scholleybubenik/2019/01/24/new-collar-workers-who-are-they-and-how-are-they-contributing-to-our-labor-shortage/#5515753c2c2f>





Automation as an Opportunity: Ag, Precision Ag, & AART Programs

- Cutting Edge Programs and Curricula
 - New programs through grants
 - Updating programs through grants
 - Constantly updating curricula
 - Expanding curriculum
 - Faculty training
 - State-of-the-art equipment and laboratories
 - Internships
 - Close relationships with industry partners
-

Poll Question #3

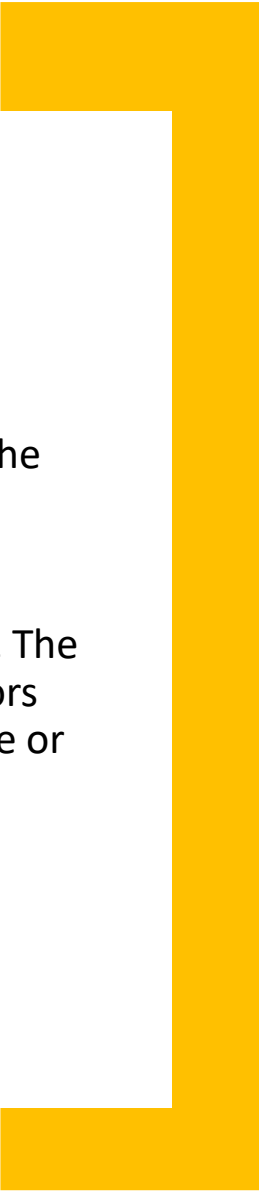
Which industries (top 3) will be most impacted by job automation?

- Government, Hospitality, Construction
- Hospitality, Retail, Health care
- Retail, Administrative, Government
- Health care, Manufacturing, Hospitality



Acknowledgement

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Questions?