U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SAND2018-0518C

Technology 2 Market Wind Industry Survey

January 2018

Brian Naughton, Sandia National Laboratories

Katherine Dykes, National Renewable Energy Laboratory

Outline

- Survey Goals
- Respondent Demographics
- Technology Results
- Collaboration Results
- Summary

T2M Industry Survey Goals

Primary goals of the industry survey:

1. Identify new and improved research capabilities and tools that would be of high value to the wind industry where DOE and the labs can add value.

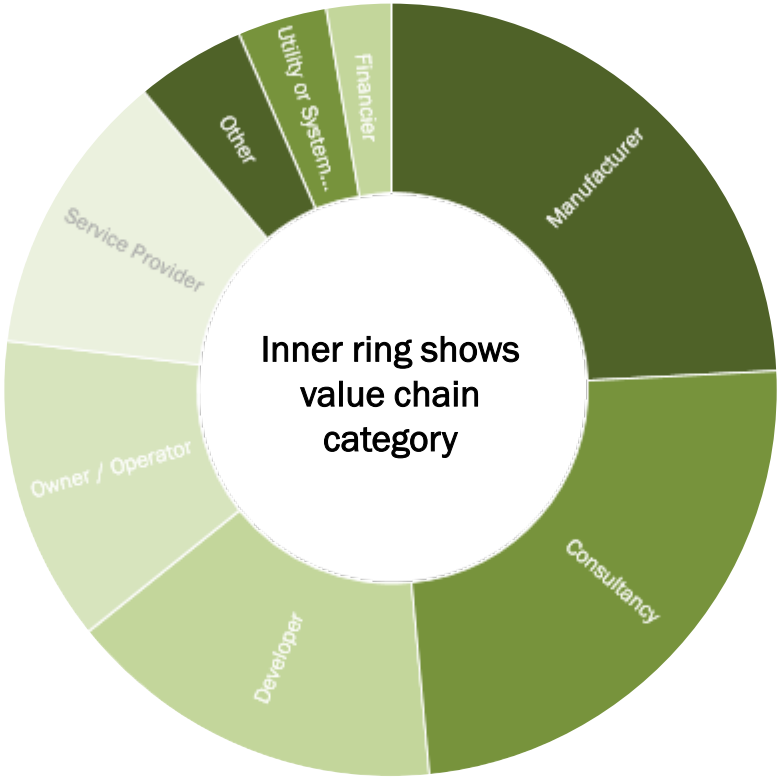
2. Identify opportunities for, and barriers to, National Lab-Industry collaboration on technology development and transfer in those high-value areas.

Respondent Demographics

Survey Results: Demographics

- 385 industry members were invited to respond to the survey, with nearly 40% (150) submitting responses.

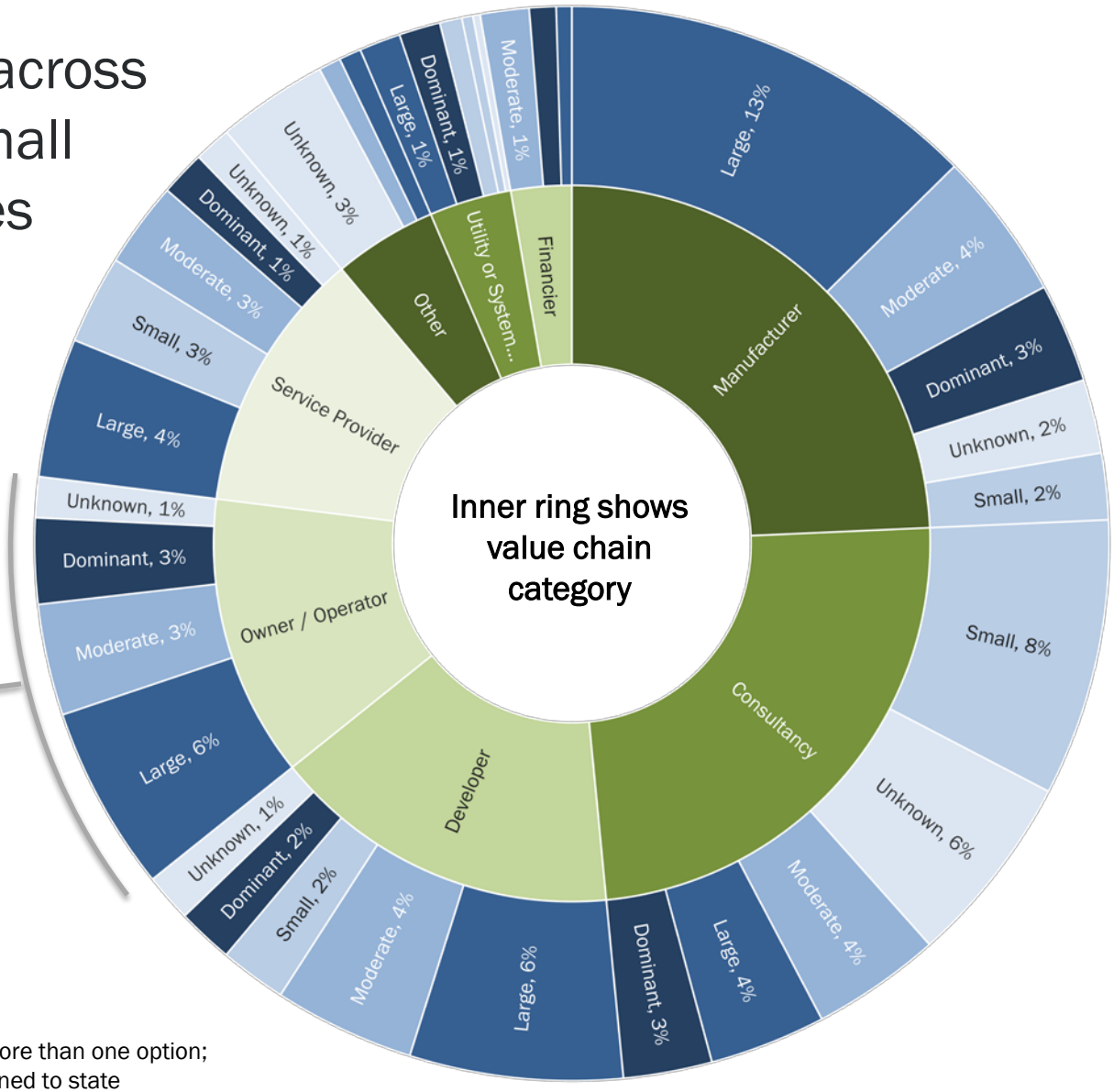
- Broad participation from equipment manufacturers, developers, owner/operators, service providers, consultancies, financiers/insurers and utility or system operators



Notes:
Respondents self-identified by category and could select more than one option;
"Other" category includes open-ended responses and declined to state

Survey Results: Demographics

Responses came from across the value chain from small through large companies



Outer ring shows self-identified market share size compared to other companies that do similar work in the wind industry.

Notes:
Respondents self-identified by category and could select more than one option;
"Other" category includes open-ended responses and declined to state

Technology Results

Summary of technical results

- The first objective of the survey was to identify technology development areas that have high value to the wind industry as well as where DOE is critical to supporting that development

- **Key Result:** On average, all technology areas were rated as *important* for continued improvement and *valuable* for government involvement for advancement.

- **Key Result:** Technology areas associated with plant and grid level design and operations were more highly rated than individual components.

Technology Categories evaluated by respondents

Wind Power Resources and Site Characterization
Mapping and GIS tools
Plant sighting analysis and computational
Instrumentation and methodologies for wind resource and environmental characterization data collection
Wind Turbine and Plant Technology Advancement
Component technology development
Lab and field testing
Design verification
Advanced manufacturing technology
Computational analysis and support tools for wind turbine and plant design
Computational analysis and support tools for wind plant performance, control, and optimization
Wind Plant Performance and Reliability
Inspection technologies
Remote monitoring (including structural health monitoring, remote monitoring technologies, etc.)
O&M data analytics
Reliability, root cause, and failure analyses
Repair methods and technologies
Wind Electricity Delivery and Integration
Production forecasting
Technology development for improved grid integration (e.g., active power control)
Grid modeling (e.g., grid stability and reliability analysis; power flow analysis; ancillary services)
Large-scale grid integration studies for planning purposes

Scoring methodology

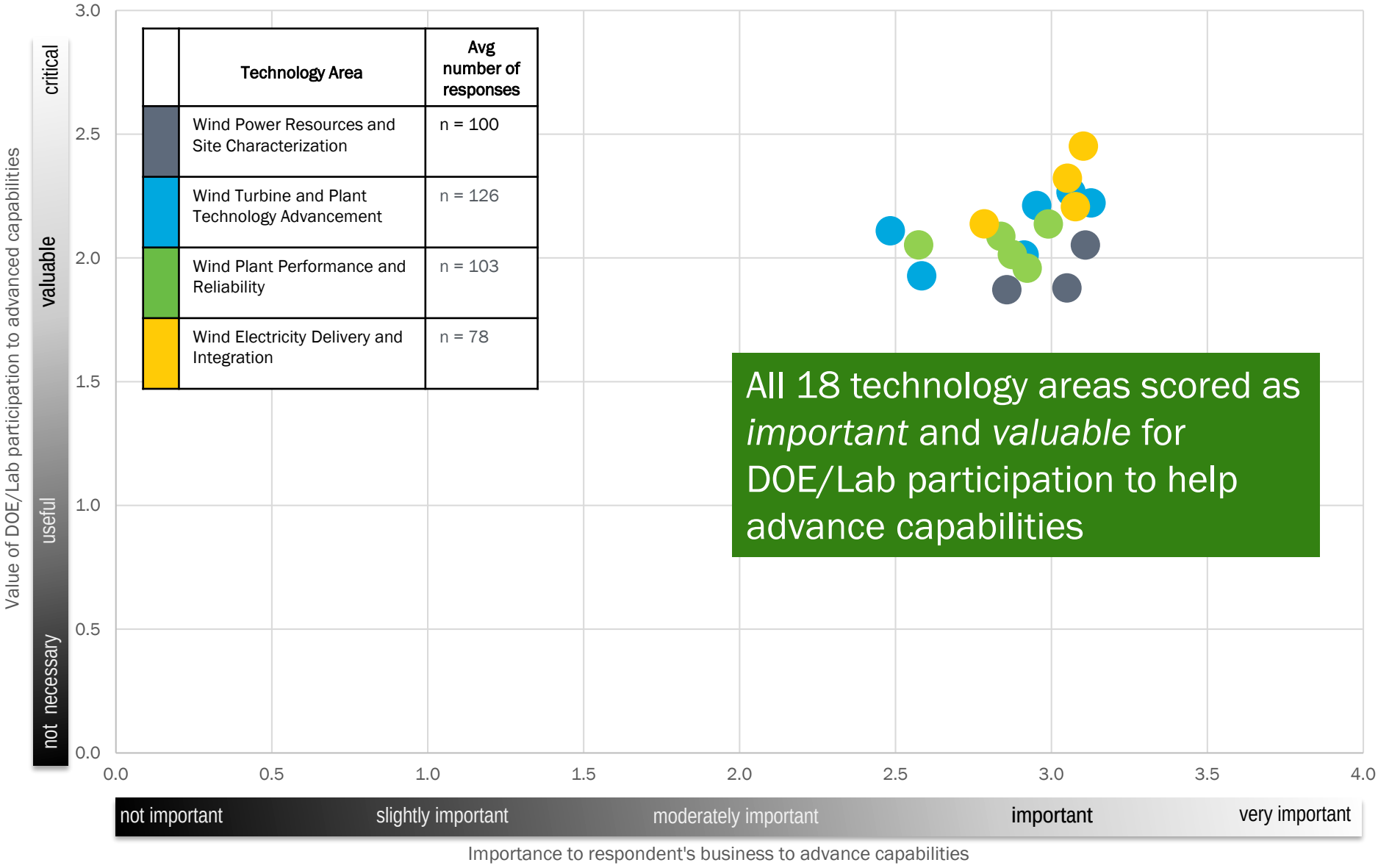
How important is it for you and your company to have access to new and/or improved capabilities within each of the following areas?

Respondent Answer	Importance Number
Very Important	4
Important	3
Moderately Important	2
Slightly Important	1
Not Important	0
No Opinion	Not counted

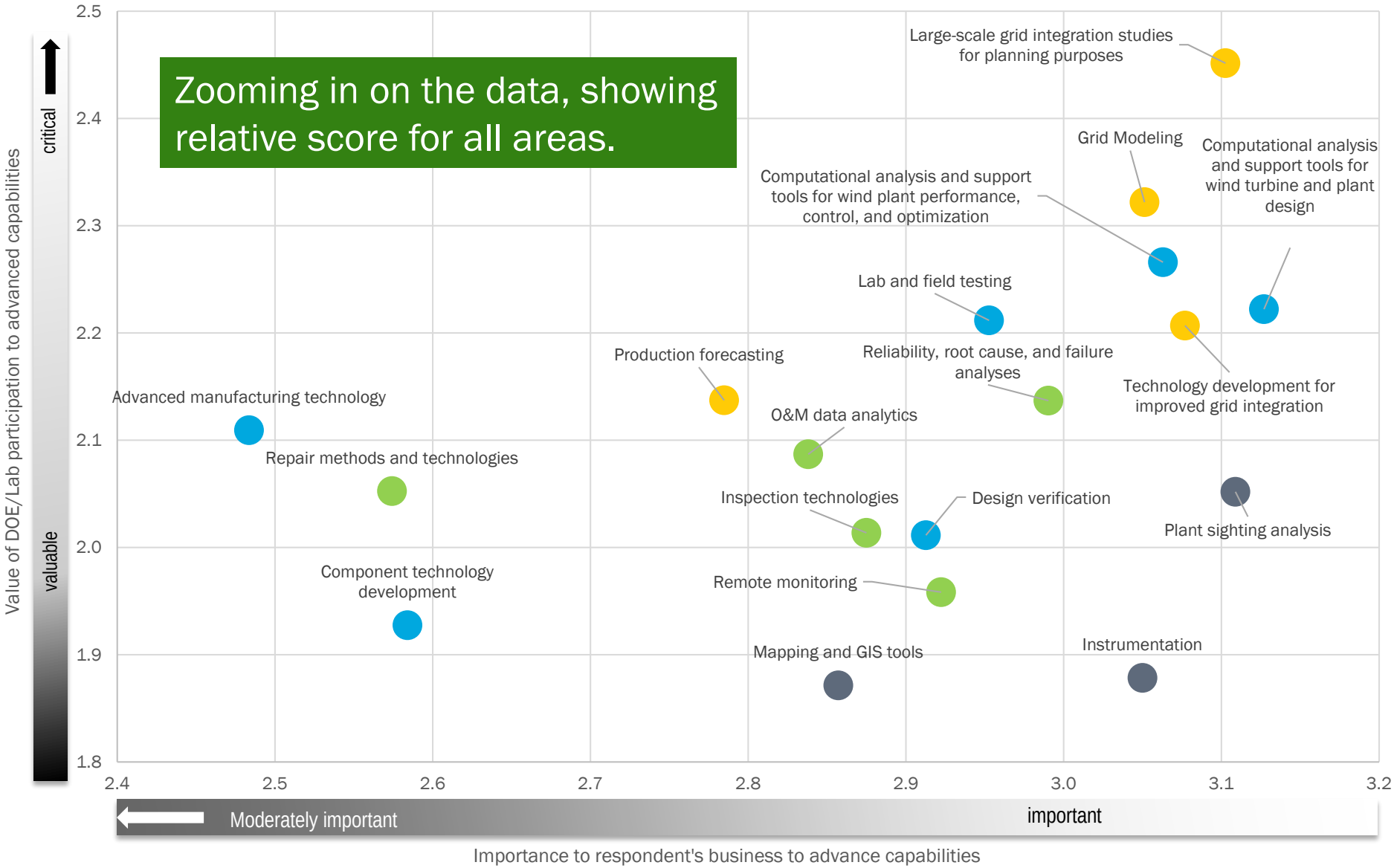
How important is DOE/national lab participation in developing new and/or improved capabilities within each of the areas listed below? (Only for those areas that were ranked as “very important” or “important”)

Respondent Answer	Value Number
Critical	3
Valuable	2
Useful	1
Not Necessary	0

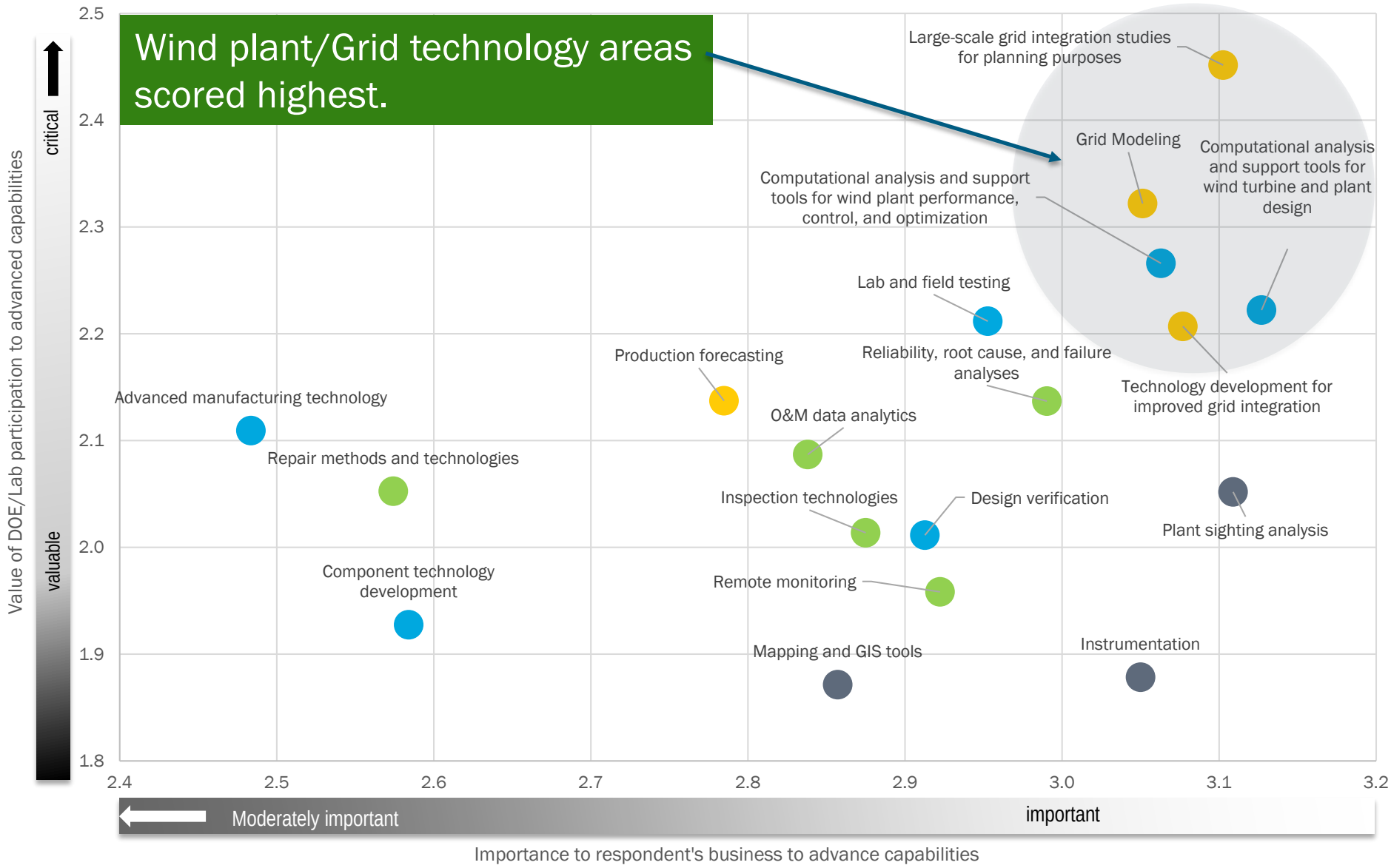
Technology Importance & Value Scoring



Importance / Value Score: zoomed in



Importance / Value Score: zoomed in



Collaboration Results

Summary of collaboration results

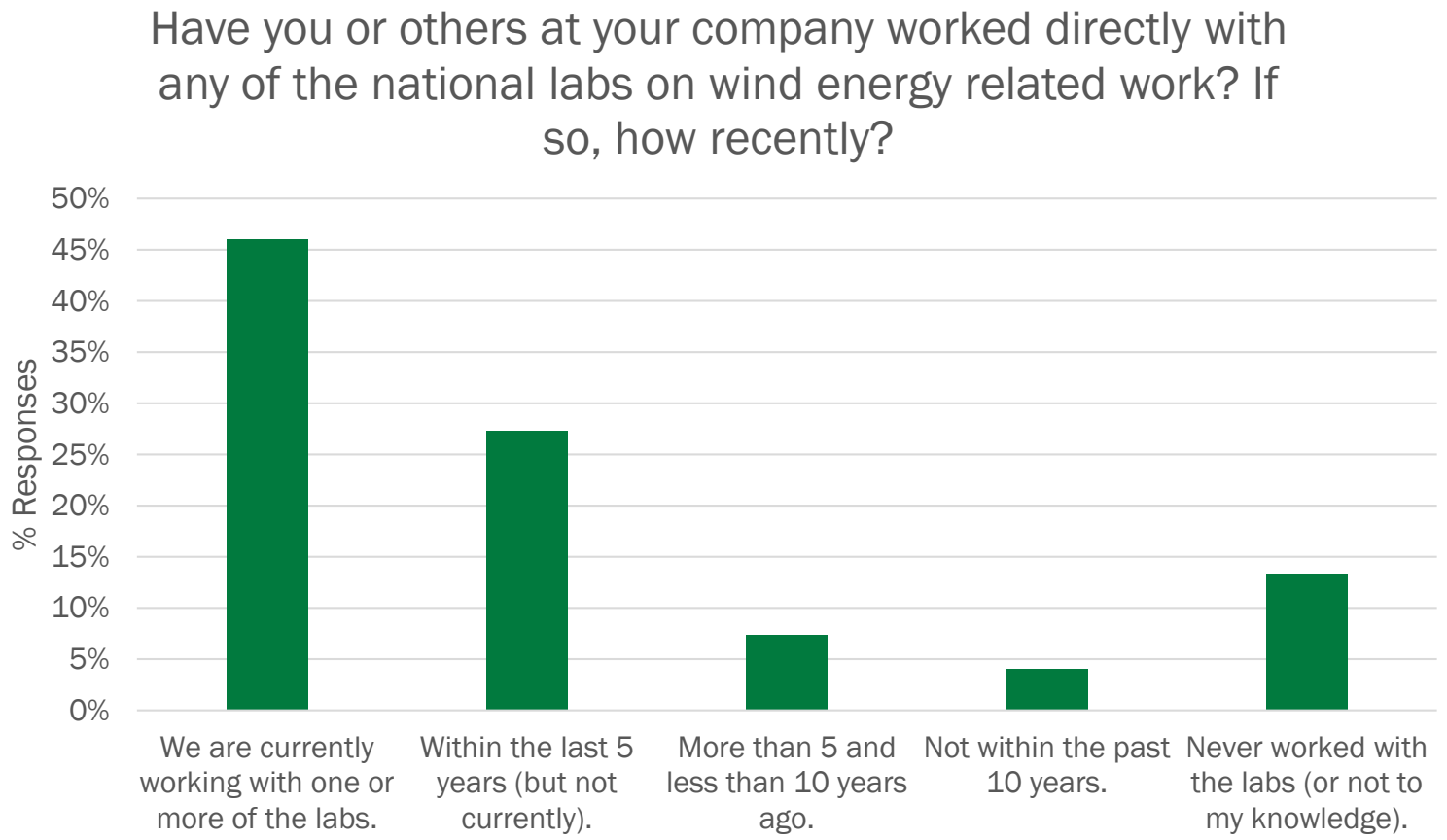
- The second objective of the survey was to identify opportunities for, and barriers to, National Lab-Industry collaboration on technology development and transfer in those high-value areas

- The next set of analysis looks first at benefits and barriers to working with the labs

- **Key result:** There are many benefits to working with the labs, but contracting and IP issues stand out as a major barrier to collaboration.

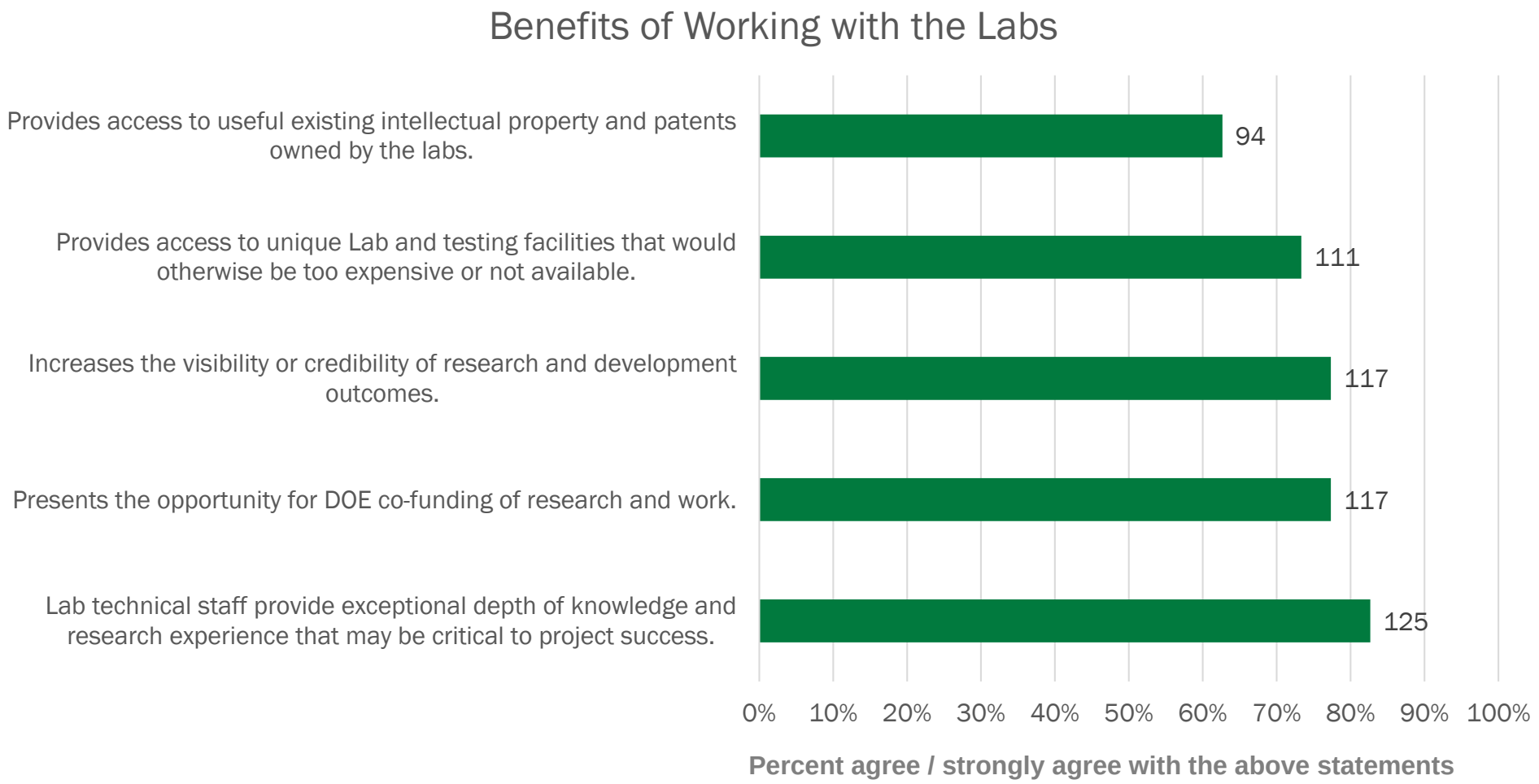
Experience working with the Labs

80% (120) of the respondents have prior experience working with the labs. This implies that the following opinions are based primarily on experience rather than perception.



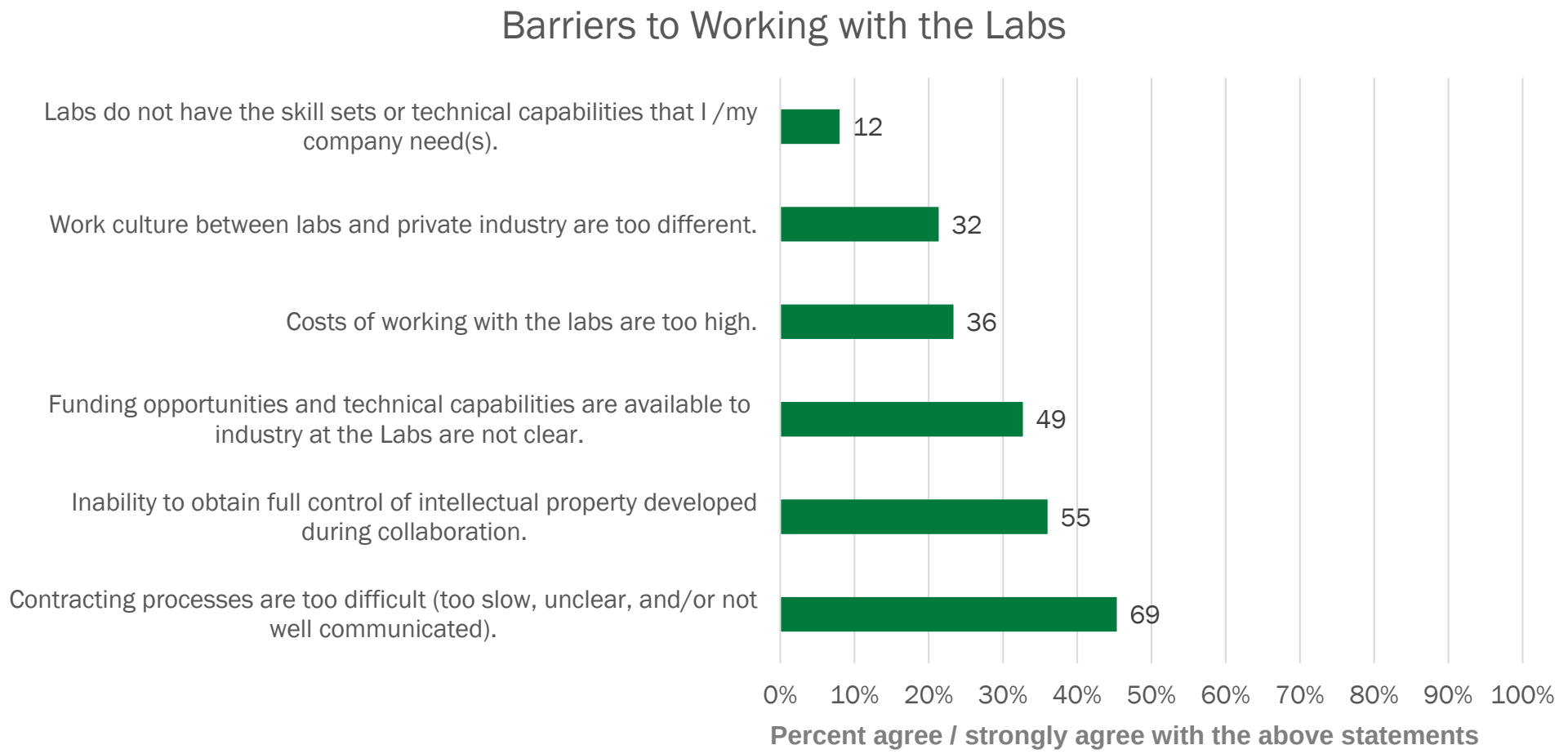
Benefits of working with the labs

Perception of benefits to working with the labs is strong across the board



Barriers to working with the labs

Largest impediments to collaboration include contracting processes and IP ownership



Summary

Summary

- An industry survey was conducted asking where DOE Wind involvement would be most valuable in advancing key technology areas.
- 150 responses from a broad cross-section of the wind industry.
- Respondents indicated that all 18 proposed technology areas were important to their business and that DOE and national lab participation was valuable in advancing those technologies.
- Respondents found a variety of benefits to working with the national labs.
- Survey revealed areas for DOE to improve, such as negotiating IP and the contracting process.
- Demographic data and open-ended responses provide detailed insights into specific opportunities and barriers to a more impactful and effective public-private collaboration to advance wind energy technologies.