

APL's Young Professionals Network Looks toward the Lab's Centennial

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ABSTRACT

This article and the illustrations that follow highlight what members of APL's Young Professionals Network (YPN) think the Lab might look like when it reaches its centennial. YPN aims to help early-career staff members build community and develop their careers, while giving them the opportunity to help shape the future of the Lab by providing input on APL leadership's strategic planning directions. Today's YPN members will be at the height of their careers—and possibly APL's leaders—in 2042, so their insights are especially valuable.

INTRODUCTION

Through discussion and a follow-on survey, members of APL's Young Professionals Network (YPN) considered what the Lab might look like at its centennial in 2042. They predicted the technologies and disciplines that might become more prominent—including seemingly disparate disciplines that might come together in a game-changing combination toward the Lab's next defining innovations. They considered which sponsors the Lab might be working with. They suggested new mission areas the Lab might establish. And they offered ideas about how the Lab will position itself to realize its Centennial Vision.

CHANGING TECHNICAL FOCUS AREAS, TECHNOLOGIES, AND SPONSORS

There was consensus that artificial intelligence/machine learning (AI/ML), space, and climate change/environment/energy will drive APL's technical focus over the next two decades. When asked which disciplines

might come together to contribute to the Lab's next defining innovations, nearly 60% of respondents identified AI/ML as one of the pair. YPN members predict that AI/ML will permeate just about everything the Lab does by 2042. In the space and climate domains, they envision the Lab growing its work in SmallSat engineering and possibly even in extraterrestrial biology and contributing to ongoing and future humanitarian efforts to assist in solving problems related to climate change.

When considering which sponsors the Lab might be working with in 2042, YPN respondents picked defense-related entities most frequently, with NASA coming in second. While some YPN members hope the Lab will expand its work supporting the Air Force such that it rivals APL's current support of the Navy, many hope that by 2042 the Lab will have delved further into health care and environmental initiatives. Examples mentioned include expanding robotic health care programs; assisting in finding cures for disease; and working toward renewable energy and sustainable technology. YPN

members hope that solving humanitarian challenges, such as those related to pandemics and disasters, poverty, food shortages, and social inequalities, will make up at least 20% of APL's funded work by 2042. The remaining 80% could be broken down into 30% civil space and 50% military efforts.

When asked to identify new mission areas the Lab might stand up by 2042, similar themes emerged. A quarter of respondents pointed to a climate/energy/environment-related mission area, with one noting that "climate change isn't just a threat to the environment, but a threat to the economy, political stability, and national security." While they hope work to solve global challenges will extend throughout all APL's departments and sectors, some wonder whether the Research and Exploratory Development Department will expand dramatically to focus solely on tackling these challenges.

APL'S NEXT DEFINING INNOVATION

Similar themes surfaced when YPN members offered projections about APL's next defining innovation. Most respondents targeted AI/ML, autonomy, the environment/climate, and space, and the majority predicted that the Lab will achieve its next defining innovation within 5–10 years. Some specific ideas include trustworthy AI, using machine learning to assist in human decision-making, autonomous framework detection, automated discovery of fundamental mechanistic relationships (in dynamical systems terms) via machine learning techniques, brain–computer interfaces, a discovery in the field of environmental conservation, green technologies/sustainability, and a discovery in space exploration.

YPN members delved more deeply into autonomy in particular, considering which tasks robots and machines might be helping sponsors with the most by 2042. Tasks that are dangerous or performed in austere environments received the most votes, with examples including warfare, explosive ordnance device detection and disposal, and operations in areas with high radiation or pollution.

KEY SUCCESS FACTORS

YPN members considered how the Lab will position itself to achieve its next defining innovations. From the many ideas, a few strong themes emerged—namely, that APL will continue to assess and enhance its culture and environment. YPN members pointed to continued expansion of diversity and inclusion initiatives, as well

as enhancements to employee benefits, the workplace environment, and innovation and collaboration practices and tools.

When asked to choose three words that describe APL in 2021, YPN members overwhelmingly focused on innovation, with forms of the word appearing in more than half of responses. Several YPN members also chose forms of the word *collaboration*, as well as *advanced*. Triplets include *innovative, fun, collaborative*; *smart, impactful, innovative*; *driven, dedicated, diverse*; and *visionary, advanced, protectors*. When identifying three words they think will describe APL at its centennial, again a majority responded with forms of the word *innovation*. Several also chose *cutting-edge, agile, impactful, and renowned* or *excellent*.

CONCLUSION

However APL changes, it will continue to make critical contributions to existing and future critical challenges. YPN members look forward to seeing what comes into actuality at APL's 100th anniversary, knowing they will be proud to be part of it. As one respondent said when choosing three words to describe the Lab in 2042, APL's story has "only just begun."



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Katrina A. Magalotti led the effort to collect input from APL's Young Professionals Network (YPN). She is a software engineer in APL's Force Projection Sector (FPS).

She has a BS in computer engineering from Manhattan College and an MS in computer science from Johns Hopkins University. While in high school and competing her undergraduate degree, Katrina interned in the Systems Group of the Maritime Systems Branch in FPS. When she joined APL full-time, she worked primarily on sonar systems in this same group but also on modeling and simulation efforts for another FPS group. After several years of working on sonar and radar systems, her focus shifted to modeling and simulation, and she currently collaborates with APL's Air and Missile Defense Sector (AMDS) and other groups within FPS on various modeling and simulation projects. Katrina is a member of the leadership teams of both YPN and Allies in the Workplace (APL's LGBTQ+ affinity group) and is a member of FUSE, APL's employee resource group focused on developing and implementing initiatives to promote a positive, diverse, and inclusive culture at the Lab. Her email address is katrina.magalotti@jhuapl.edu.

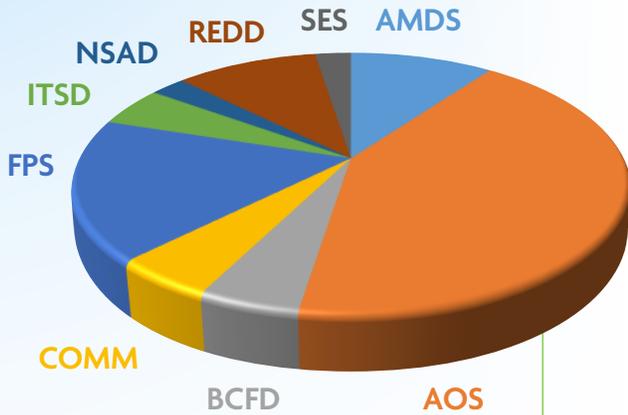
100

APL in 2042

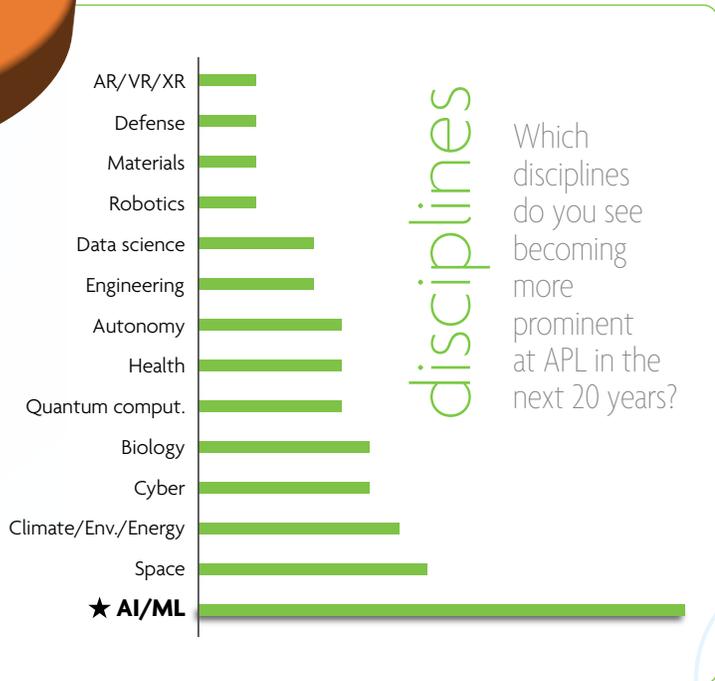
as envisioned by APL's Young Professionals Network

words describing APL
TODAY
chosen by YPN members

**Innovative
Advanced
Collaborative**



respondents' organization



Only just begun

— Three words a YPN member used to describe APL at 100



“I envision an increase in work with soft power sponsors.”

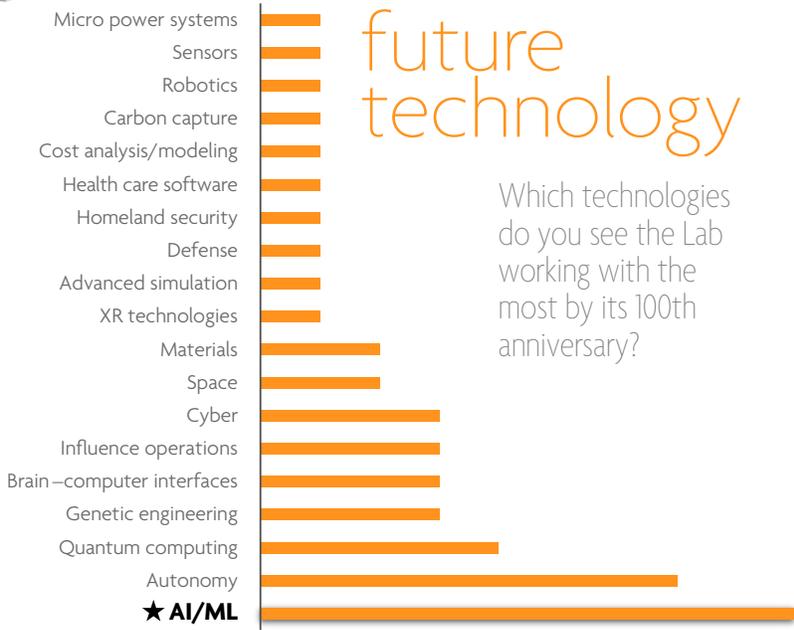
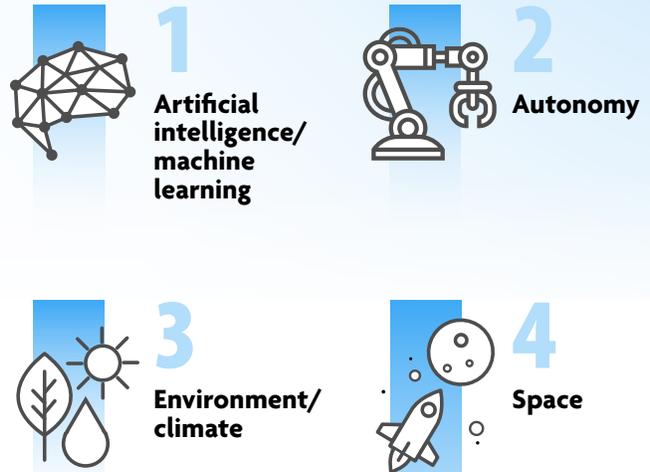
mission areas

What new mission area do you see the Lab establishing in the next 20 years?

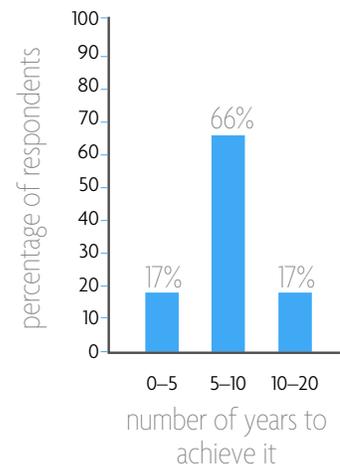


next defining innovation

What do you see as the Lab's next defining innovation? How long do you think it will take to get there?

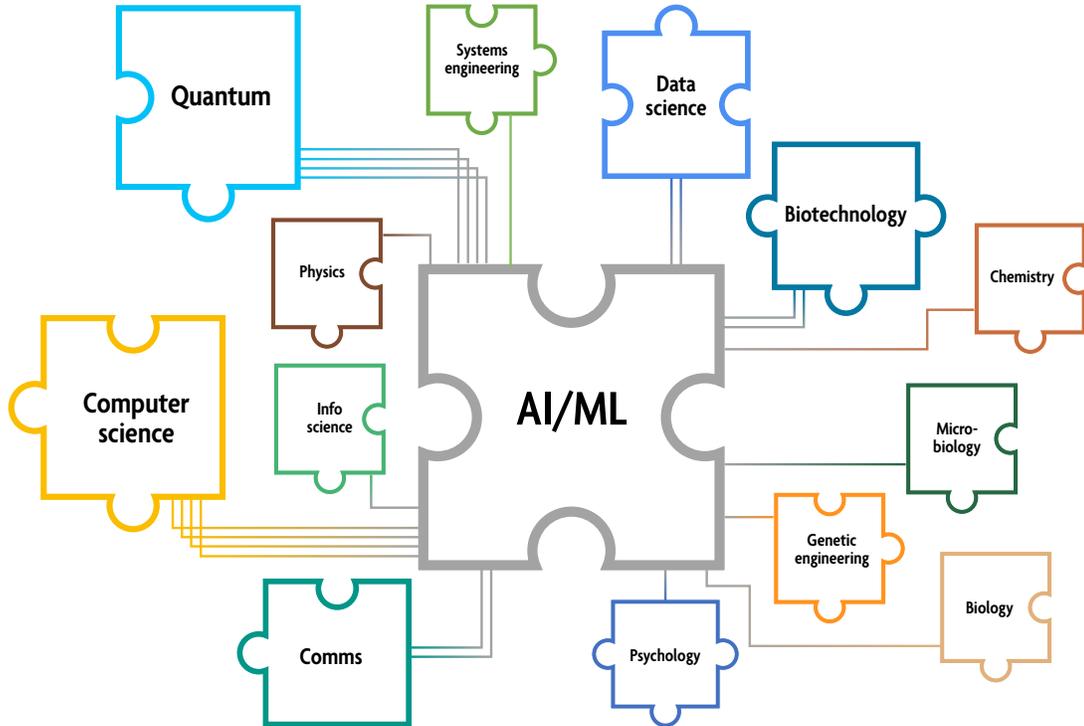


- Battery proficiencies
- Evidence-based governance
- New communications tech
- Investment analysis



“The next defining innovation may already exist. It takes time for the impact of a new innovation to be fully realized.”

hybrid disciplines



Hybrid degrees and seemingly disparate disciplines are increasingly coming together to solve challenges. Choose two disciplines that you think will be a game-changing combination and most likely to contribute to new defining innovations by APL's 100th anniversary.

“Environmental science might come together with behavioral economics toward addressing human impacts on our planet.”

words
describing APL
at 100
chosen by YPN members

**Innovative
Excellent
Leader**



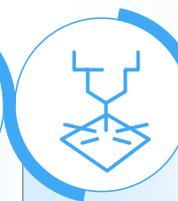
**Warfare,
dangerous
tasks, austere
environments**



**Data
synthesis**



Medicine



**Precision
production**



ISR&T



Space

role of autonomy

Which tasks do you see robots/machines helping sponsors with the most by 2042?

how do we get there?



Employee benefits

- Expanded parental leave programs
- Expanded physical and mental health programs



Collaboration practices



- More virtual collaboration, better tools (AR/VR/XR)
- More interconnected/cross-disciplinary
- Increased collaboration with
 - ◊ Socially conscious partners
 - ◊ Geographically diverse teams
 - ◊ Industry
 - ◊ International partners

Workplace culture

- Continued emphasis on diversity and inclusion, increased staff embracement
- Increased innovation fueled by diverse teams
- Continual assessment of hiring practices



Workplace environment



- Increased use of AI to handle routine tasks
- Climate-friendly changes—e.g., composting system and supply reuse system
- Campus enhancements
 - ◊ Improved mobility options
 - ◊ Increased access to outdoor and indoor green areas
 - ◊ Spaces for collaboration and for reenergizing

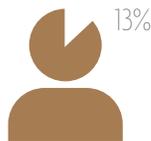
diversity



30–40%



Aligned with US population*



70–80%

What percentage of minorities do you see at the Lab at its 100th anniversary?

* By 2044, >50% of Americans will identify as belonging to at least one minority group (<https://www.census.gov/library/publications/2015/demo/p25-1143.html>).



Diverse
Forward-looking
Guiding

— Words YPN members chose to describe APL at 100

Graphic design: Christine M. Fink, APL Communications Department