From ‘What If’ to ‘Watch This’

Engineers demo a new way for manned and unmanned aircraft to talk, and mum is not the word

BY SHANNON VAUGHAN, BOEING WRITER

A four-woman team is leading the charge in creating a new way for manned and unmanned systems to communicate — and it’s all about collaboration.

Members of the Fighters new product development team — Sohaila Mali, Janell Liebel, Jessica Arbona and Lexi Anderson — are combining their diverse skills and perspectives to engineer new ways for humans and machines to communicate, ultimately creating a more integrated and informed battlespace.

TEAM BEHIND THE TEAMING

Sohaila Mali, Janell Liebel, Jessica Arbona and Lexi Anderson are developing new ways for humans and machines to communicate, creating a safe, integrated and informed battlespace.

PHOTO: BOEING

Over a six-month period, the team went from a blank whiteboard to a successful software demo that quickly converts, translates and exchanges messages between different types of platforms.

The current demonstration uses existing Boeing platforms, an F/A-18 fighter jet and an MQ-25 unmanned aircraft system. But this is just the start. The team aims to move from a simulation environment to a potential flight test in 2025. The goal is to demonstrate multi-ship collaborative capabilities — including between manned and unmanned aircraft — to the customer.

Meet the teammates changing the future of manned-unmanned teaming (MUM-T):

NEW CONTACT

In an air-to-air test, an MQ-25 T1 aerial refueling store known as the pod connects with an F/A-18 near St. Clair, Missouri.

PHOTO: BOEING

Talking the engineering language

Sohaila Mali

Since joining Boeing six years ago, Mali has supported several air dominance and commercial satellite programs with her systems engineering expertise. But recently, she stepped out of the testing and simulation lab to drive program strategy.

Mali supports research and investment planning for the new product development team. She combines her technical and business acumen to keep the team's priorities aligned with project funding and the customer's operational needs.

"The work we are doing now will drive more communications capabilities, interoperability and advanced concepts," Mali said. "It will unlock even more potential for how aircraft engage with each other and extend their operational reach across a broad and contested battlespace."

She attributes the team's communication and collaboration as the keys to their success.

"We all talk the engineering language, but we bring different backgrounds and personalities," she said. "We recognize that we each have specific strengths that are needed to accomplish our common goal."

In addition to learning from and laughing with her teammates, Mali takes pride in knowing their daily work goes toward helping the warfighter.

"The aircrew have to do so much all at once, but our work will help alleviate some of the aircrew's stress so they can focus more on the mission," she explained.

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>
> **SOHAILA MALI, PROGRAM STRATEGY**

UNMANNED-TO-MANNED TALK

An unmanned MQ-25 connects with a manned F/A-18 while flying over Mascoutah, Illinois.

PHOTO: BOEING

Thriving on doubters

Janell Liebel

> “When we first got funding for the demo, some people said what we set out to do was impossible and that we wouldn’t get it done. But the doubters drive us, we thrive on it. We love to prove people wrong.”
>
> **JANELL LIEBEL, SYSTEMS DESIGN ENGINEER**

Liebel’s official title is systems design engineer, but she describes her role as “if anything unmanned needs to talk to an F/A-18, that’s my specialty.” With nearly 10 years of Boeing experience, she is responsible for developing human-machine interfaces between tactical fighter platforms and unmanned aerial platforms.

“Most of the drones people think about are actually remotely piloted vehicles, which means there’s someone in a bunker actually flying the vehicle,” she said. “Whereas the unmanned systems I’m working on are intended to be fully autonomous, so they’re making decisions based on inputs from their environment.”

Defining requirements from scratch for a system that can connect a variety of platforms and be seamlessly integrated into various mission scenarios is an extremely complex undertaking, and the result has huge benefits.

“Moving information through the battlespace is one of the most important capabilities we can solve for,” Liebel said. “If we can find a way to have fourth-generation platforms easily talk to fifth- and sixth-generation platforms, it will help the U.S. Department of Defense achieve its warfighter goals.”

Liebel acknowledges the team has faced challenges but says that doesn’t slow them down.

“When we first got funding for the demo, some people said what we set out to do was impossible and that we wouldn’t get it done,” she said. “But the doubters drive us, we thrive on it. We love to prove people wrong.”

The team’s ability to work together seamlessly is how it is breaking down communications barriers in the battlespace.

“With our combined skills and talents, we are continuously coming up with new ideas and finding ways to implement them,” Liebel said.

Sparking ideas

Jessica Arbona

After more than seven years of engineering mining equipment and being a software consultant, Arbona joined Boeing four years ago in pursuit of problem-solving for more complex platforms.

She has found her place on the Fighters new product development team, focusing on open mission systems (OMS) to enable rapid software integration across defense platforms.

“I evaluate the current architecture, research what is needed to support the future capabilities, establish the assumptions and test via prototypes,” she said.

With input from Liebel on the MUM-T requirements, Arbona leads a team of software engineers who are tackling battle management and creating a common interface for rapid tactical third-party application integration. Currently, it can take years to push software updates across platforms, so streamlining this process will reduce aircrew workload and get new capabilities to the warfighter faster.

> “There’s no fear in sharing questions and ideas. We push each other and learn from one another’s confidence and expertise.”
>
> **JESSICA ARBONA, FIGHTERS DEMO LEAD**

Arbona highlights the team’s collaborative spirit, saying, “There’s no fear in sharing questions and ideas. We push each other and learn from one another’s confidence and expertise.”

That motivation also encouraged Arbona as she used the Boeing Learning Together Program to complete her executive Master of Business Administration from Auburn University, adding leadership and business acumen to her skill set.

“The program allowed me to pursue the degree I had always desired,” she said. “And it was a wonderful feeling to join my family in becoming a part of the Auburn community, as both my parents and sister are alumni of the university.”

Her ability to manage multiple projects and time lines is a talent that has helped the team set realistic goals, break down plans into tactical steps and stay on schedule.

“It felt really good that the customer was pleased with the progress,” Arbona said. “But what was even better was being with the team when we saw it work for the first time. That moment was unforgettable and lit a spark in all of us to keep taking this further.”

Proving the possible

Lexi Anderson

Anderson joined Boeing two years ago as a technical integrator, but she’s been taking things apart and figuring out how they work since she was 9. Her mother worked at a medical device company, and Anderson would take advantage of any chance she got to connect with the engineers in the office.

“When my electronics broke at home, I would diagnose it and then ask my mom to take it to her co-workers to fix and resolder it,” she said.

Now, she’s the teammate others turn to for solutions. Her area of expertise is data analysis and integration. As Liebel and Arbona identify the minimum MUM-T and OMS requirements, Anderson uses that to inform how the data, or messages, must be packaged to deliver the right information in the right size.

“I determined the most useful fields and created a native language so that systems can speak either ship-to-ship or jet-to-jet,” she said.

IN THE WINGS

Under a constant reminder of the warfighters’ mission, Fighters teammates say the mission drives serious collaboration and their quest to create new capabilities for aircrews and defenders.

PHOTO: BOEING

MUM-T MOMENTUM

Anderson, Arbona and Liebel collaborate to identify MUM-T and OMS requirements, package data and streamline software updates across defense platforms.

PHOTO: ERIC SHINDELBOWER/BOEING

The teamwork to modify and truncate the messages was a success. When the simulation was completed for the first time, it was a moment of victory and validation.

"We hypothesized that we could do these weird things with messages and basically take them apart and reassemble them on the other side," Anderson said. "But seeing it actually happen is a huge sense of accomplishment."

"At some point, all engineers likely ask themselves, 'is what I'm working on possible — can it be done?' and this was affirmation that it could," she added.

The team knows customer relationships and, most importantly, lives will be impacted by this work.

"When customers come to us asking about capabilities, we know it's because they trust us, and it's necessary to keep the warfighter safe during missions," Anderson said. "We take that responsibility very seriously and with honor." **IQ**

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> **LEXI ANDERSON, TECHNICAL INTEGRATOR**