



INDUSTRY
Aerospace

CLIENT


OBJECTIVE
Conduct seamless switchover for aircraft software data loading from floppy disk software data loading to secure, online electronic vault.

SOLUTION
Execute a multi-phased migration across nearly 80% of the entire Boeing manufacturing and distribution process.

SERVICES
Systems engineering

Program leadership

HOW AIRBORNE SOFTWARE TOOK FLIGHT AT THE WORLD'S LARGEST AEROSPACE COMPANY

For Boeing, the challenge was epic. Execute a company-wide, seamless switchover from an obsolete technology to a modern one. Two major constraints prevailed; one, no disruption to manufacturing; and two, little to no disruption to customers. Boeing's entire manufacturing process was at risk. They waged a valiant five-year effort. Then they called Base2.

Airborne software manages critical onboard functions such as cockpit displays, radios, passenger lighting. The software must be managed and distributed per Boeing, industry, and FAA requirements. Software data loading is one of the many essential steps taken in maintaining the airworthiness of every airplane in the world.

Software on every Boeing airplane manufactured before the new 787 Dreamliner and 747-8 used floppy disks. And floppy disk loaders to load software. These physical media were distributed by hand or mailed to production facilities and customers all over the world.

Then came the 1990s, and floppy disks joined cassette tapes on the scrapheap of history.

Boeing would need to plot a new course, while also managing the risks associated with a major transition.

A plan emerged — Boeing Electronic Distribution of Software, i.e., BEDS. Airborne software would truly become airborne; no more delivery by hand or mail.

It was a steep climb, and five years on, BEDS had stalled out. Boeing could show no measurable progress on making the switch. Several reasons explained why. As the program impacted more than a dozen areas of the organization, mixed signals emerged among parties. Who owns this project? Who benefits from it? Why are the changes urgent?

When Boeing first began to push BEDS out to manufacturing and customers, they found a long chain of impact. Almost 80% of the entire manufacturing and distribution process would be affected. Stakeholders had tried to bake the entire initiative into one giant project. Beyond intramural discord, the scope was simply too large. Success would depend on consensus. Some stakeholders would have to give more than others. But how to get there?

VOID THE MYTHOLOGY

Challenges around consensus and scope joined forces with a few well-entrenched mythologies. Myth one: you can't distribute software electronically until the aircraft has a hard drive. Myth two: customers must retain physical media on the airplane or risk running afoul of the FAA and other regulatory bodies. "There was some tribal knowledge we had to work with," said Parvathi Iyer, a Base2 senior project manager.

As they worked to build the true story, Base2 research revealed that myths one and two were just exactly that. Aircraft didn't need hard drives because laptops could function as secondary storage for data and software. And customers using electronic distribution would be well inside FAA regulations.

WORKING SESSIONS, BUILDING TRUST AND CONSENSUS

When Base2 began work, they saw that most stakeholders knew their own turf. What they didn't know was how the entire BEDS program could come together outside of their purview. No one had a complete, integrated view of things. "This is something we always do," said Jon Winqvist, a Base2 senior systems engineer who worked on BEDS in the early stages. "We help people see over the fence, to see how the project impacts other areas."

Big picture thinking and consensus building is where Base2 makes its presence felt and its impact lasting and powerful.

"Our approach is we do whatever works for the customer," said Winqvist. "We share what we know with individual team members. With program managers and leadership. We ask hard questions. As we move ahead, we say what is really happening. What the path forward is. Good relationships and trust are incredibly important. That way people know what we've said is true and accurate and that we know what the right solution is."

CREATE THE TRUE STORY

"To decipher and convey the true story, that was absolutely an important part of this," said Iyer. "We could speak to every person at Boeing, but if we didn't have a compelling story for them about how this would happen, what was in it for them, why it was a good idea, that it really could work, it wouldn't work." She added that when people came to know the true story, and that the changes would impact everyone, they became engaged and wanted to help.

As Base2 led working sessions, teams worked through the current process. What was the goal? What were the next steps? They developed several process and tool improvements. Base2 revisited the initial project requirements that were far too detailed, slimming them down to only what was necessary for success. Changes were made and steady progress followed.

Iyer, working with her Boeing counterparts, suggested taking a different road to the destination.

"We decided," she said, "to break up the BEDS initiative into phases. That way we could contain the scope and be more successful."

EIGHTEEN MONTHS AFTER BASE2 CAME IN TO WORK WITH BOEING, BEDS WAS A SUCCESS.

What may have looked like a technology or a manufacturing process challenge was, in some key ways, more of a people and a process alignment issue. "The technical piece was decided very early on in the project," said Iyer. Getting the story out to everyone and bringing them along was the hard part.

Base2 would say they succeeded because they:

- Understood the issues
- Developed an integrated vision
- Created relationships and trust
- Built the true story and sold it
- Gained consensus and effectively managed people

Not long ago, a person at Boeing manufacturing would request software from the software library. Not so soon afterwards, the floppy disks were in the mail. Today, with BEDS, a person at a laptop searches a secure, online electronic vault. Software is downloaded to a laptop, which can connect to an aircraft, or to a piece of equipment in a factory anywhere in the world. Quality checks throughout the system ensure the right version is being loaded. BEDS has taken flight.