



Beacon

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Keep Flying

Why a human-centered Aviation Maintenance approach is essential to Aviation Sustainability

Ch. 2. EFFICIENT PROCESSES

The second pillar of Maintenance Sustainability

November 2022

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Efficient Processes

A SUSTAINABILITY PLATFORM

We believe sustainable aviation maintenance relies on three pillars.

With more effective oversight, planning, and communications, aviation can ensure that the three pillars of sustainable aviation maintenance are powerful enough to fuel optimal flight operations now and well into the future. The three chapters of our White Paper explore the three pillars of sustainability.

In this second Chapter, we review the second of these pillars: EFFICIENT PROCESSES.

FLY NET ZERO 2050

“The costs of decarbonizing aviation are in the trillions of dollars, and the timeline to transition a global industry is long,”

— IATA Director General Willie Walsh.

1. EMPOWERED PEOPLE

In the first chapter of our White Paper on sustainability, we delved into factors in human resources currently impacting aviation maintenance and, more broadly, aviation operations and considered how a platform could resolve systemic issues.

2. EFFICIENT PROCESSES

In this Chapter of our White Paper, we explore how aviation could optimize maintenance processes to reduce waste and downtime, supporting aviation sustainability.

3. EFFECTIVE LIFE CYCLE MANAGEMENT

In the third chapter of this sustainability series, we will explore the life cycle management of aviation through the lens of the people who ensure and account for the extension of that life cycle. We will also look at the documentation required for accountability—an essential element to ensure that the sustainability actions taken in aviation are credible and provable.





*Why a **human-centered Aviation Maintenance approach** is essential to **Aviation Sustainability***

CH. 2. EFFICIENT PROCESSES - the second pillar of Maintenance
Sustainability

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Empowered People

FOREWORD

*By Marco Cesarino
Head of Beacon*

One of our design principles is “cut through the complexity.” We wanted to simplify the transfer of information and how tasks are prioritized, in aviation maintenance, championing clarity and using technology to enhance human potential.

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Each airline saving a minute is also reducing the waste of vital resources during “downtime” for themselves and their interaction fields, ensuring the sustainability of aviation and those who rely on it.

THE VALUE OF A MINUTE SAVED

In 2021, U.S. passenger airlines’ average cost of aircraft block (taxi plus airborne) time was \$80.52 per minute.

— A4A



Our people-first focus made us think differently about disruption in the sense that startups like ourselves often use the word. In a startup environment, disruption is too often about blowing things up, tearing things down, and taking everything in a new direction. But we have opposed that sense of disruption from the start. We respect the knowledgeable and caring people of the aviation community and want to work with them to transform the aviation industry, working within its safety-first framework, so that it is both future-ready and sustainable. We knew any changes Beacon might introduce to the status quo had to be creative, value-added, and inclusive.

This endeavor supports sustainability by advancing the collective progress of the aviation ecosystem, including individuals and partner organizations, to the industry at large. Through the Interaction Field of the aviation ecosystem, which we examined in Chapter 1 of this White Paper, sustainability gains radiate to all the industries which rely on aviation.

From day one, we've dedicated ourselves to fostering connections and designing for mindfulness and intentionality. We wanted this platform to embrace the pride and joy of empowering flight. We all know aviation is a stressful environment, with every minute of aircraft downtime creating a costly ripple effect throughout the aviation ecosystem.



By increasing transparency and streamlining work, we hope to maximize the pride of a job done effectively and efficiently, reducing that stress and gaining acknowledgement for the skilled person who makes it happen. We want to increase the joy of watching an aircraft leave the hangar and the tarmac on time, taking off into the skies again, and help people focus on the part of the job that matters most. We aim to boost the satisfaction of a career in a field that is always a blend of science and magic. We want people to feel encouraged, to love their careers in aviation, and keep flying.

Marco Cesarino
Head of Beacon

A blue, handwritten signature in cursive script, appearing to read "Marco Cesarino".

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Efficient Processes

THE STATUS QUO

Aviation Maintenance is a critical factor in an airline's on-time performance, which not only affects the airline's reputation but also impacts the airline's economic, social, and ecological sustainability.

In the first Chapter of this White Paper, we mentioned the Interaction Field of aviation. Think of this Interaction Field as the power of collaborative interactions between organizations with a common interest, extending outward to all the parties who rely on those organizations. In aviation terms, airlines, MROs, and suppliers have interaction fields that extend to airports, passengers, industries that ship cargo on planes, and all the towns and cities which rely on aviation to deliver tourists and goods.

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DELAYS CAN COST OVER \$10K PER HOUR

“In assessing the potential impact of (un)availability, operators asserted that aircraft dispatch delays can cost \$10K (or more) per hour with flight cancellations imposing a financial penalty of \$100K (and above) per instance,”

— IATA MTGG

Aviation impacts all industries and parts of consumers' lives in one way or another, even if they never fly.

THE INTERACTION FIELDS OF AVIATION



**01 AIRLINES, OEMS
MROS, SUPPLIERS**

THE CORE SET OF PARTNERS THAT KEEP PLANES FLYING.

**02 GA, AIRPORTS, GROUND
SVCS, INFRASTRUCTURE**

THE COMPLEMENTARY PARTNERS THAT MAKE AVIATION POSSIBLE, AND THOSE WHO SHARE THE AIRSPACE.

**03 INDUSTRY, CARGO
CUSTOMERS**

THE ECONOMY WHICH RELIES ON AVIATION TO TRANSPORT PEOPLE AND GOODS SAFELY AND SECURELY.

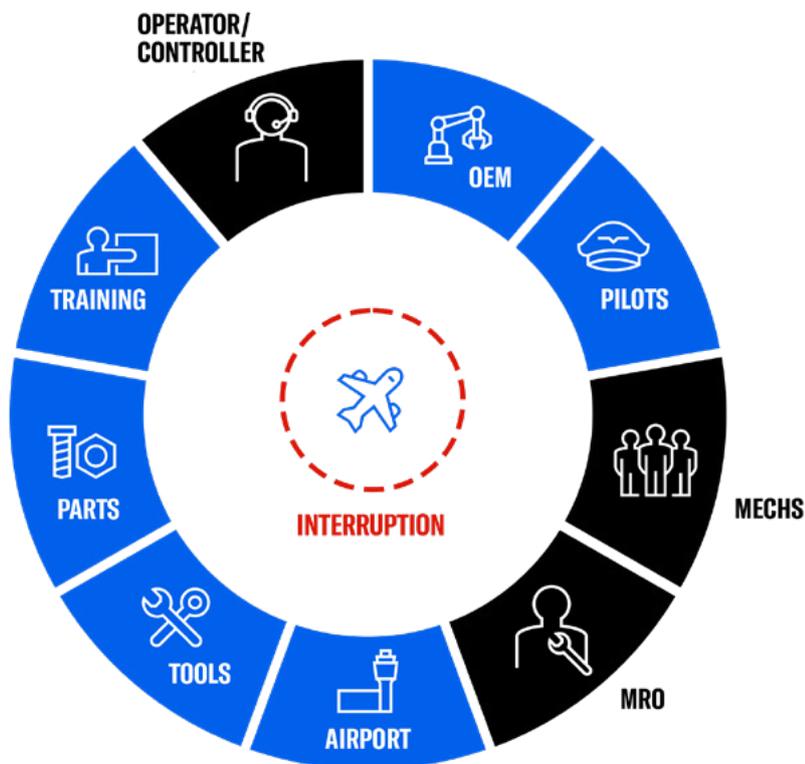
04 GLOBAL COMMUNITY

ALL THE PEOPLE, TOWNS, CITIES AND NATIONS WHICH RELY ON AVIATION TO KEEP THEM CONNECTED.

Aviation maintenance will need the tools and methods to facilitate a coordinated and rapid response for failure modes reported in flight.

The current tools available to many working in this time- sensitive industry—phone calls, paper documents, faxes, emails—are just not up to managing the complex logistics of day-to-day operations.

SIMPLIFIED AVIATION MTX ECOSYSTEM



Whatever gains we make through more efficient aircraft maintenance processes, better collaboration, and better knowledge exchange in aviation benefit both the aviation industry and those who depend on aviation.



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THE IMPACT OF FLIGHT DELAYS ON SUSTAINABILITY

In sustainability, small actions have significant results. Delays of any kind cost airlines and their customers, passengers, and shippers, wasted time, and lost productivity.

FLY NET ZERO 2050

\$47 PER HOUR

“Flight delays have cost air travelers billions of dollars at an estimated \$47 per hour for the average value of a passenger’s time.”

— Airlines4America



*“FAA/NEXTOR CALCULATED THE ANNUAL COSTS OF DELAYS TO AIRLINES AND PASSENGERS IN DIRECT EXPENSES, LOST DEMAND, AND INDIRECT COSTS TO BE **\$28 BILLION** IN 2018.”*

—Airlines4America

When an airline’s maintenance department operates more efficiently, it doesn’t just make that airline more sustainable. Their efficiency also means fewer air traffic disruptions at their airports, which help other operators at that airport be more sustainable. And it’s not just airlines. Flights taking off and landing on time make ground workers more efficient and simplify baggage processing. Taxis and other drivers spend less time waiting for passengers in vehicles, emitting CO₂. The shippers who rely on aviation also benefit. Perishable goods are preserved, ensuring less waste, and supply chains run smoother, ensuring greater productivity.

Every minute an airline gains in its operations, the aviation ecosystem gains, and so do the customers that rely on the ecosystem.



Every minute saved in getting planes back up in the skies can be hours saved in the cumulative Interaction Fields of aviation. That time is a sustainability factor because we expend fuel, consume energy, and waste resources without accomplishing the mission.

[Airlines for America](#) reports that in 2021, U.S. passenger airlines' average cost of aircraft block (taxi plus airborne) time was \$80.52 per minute.

That cost includes fuel use, which impacts environmental sustainability. It also includes the costs of staff on standby, not just maintenance but also crew. The value of the aircraft asset is also factored in. When planes aren't flying, they're not generating revenue, which impacts the economic sustainability of the airline.

Delays also waste valuable capacity beyond the airline's assets—extra gates, ground vehicles waiting, and ground personnel on standby.

And that negative impact on sustainability radiates out to those who rely on aviation as factories wait for critical components, short life-cycle shipments like fresh fish and flowers risk going to waste, and other businesses waiting for deliveries work less efficiently.

It's not only money. It's the wasted resources that money represents. Each airline saving a minute is saving millions in the cumulative for all those who rely on aviation while reducing the waste of vital resources. The more airlines that save a minute, the better use of resources airlines make, and the better use of resources their industry partners and customers make.



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A SINGLE SOURCE OF TRUTH

For aviation companies, being confident of the status of any activity, transaction, or event is critical for the continuity of operations and safety. Having the right information with the right context—immediately and throughout—is critical to reducing the time spent on the ground. But today, many of these processes are still manual, relying on paper checklists and documents and imperfect methods of communication, such as faxes, telephone calls, or email. These methods become a knowledge sieve, allowing critical information to fall through the cracks. Misunderstandings or lack of awareness on the status of a part or what work must be performed on an aircraft can cause costly delays.

FLY NET ZERO 2050

EVERY MINUTE COUNTS

70% of OOS Events Span between **60-90 minutes**.

Most of this time is spent on coordination, not focused on the fix.

For regulatory reasons, aviation still relies on paper documentation, including maintenance manuals and checklists. While there is a rationale for this hard-copy recordkeeping, the process around maintenance, and the method of communication and collaboration could be digitized. In fact, we see trends toward that already with the introduction of aircraft health monitoring systems, which will require an adequate interface to alert maintenance crew of problems in-flight.



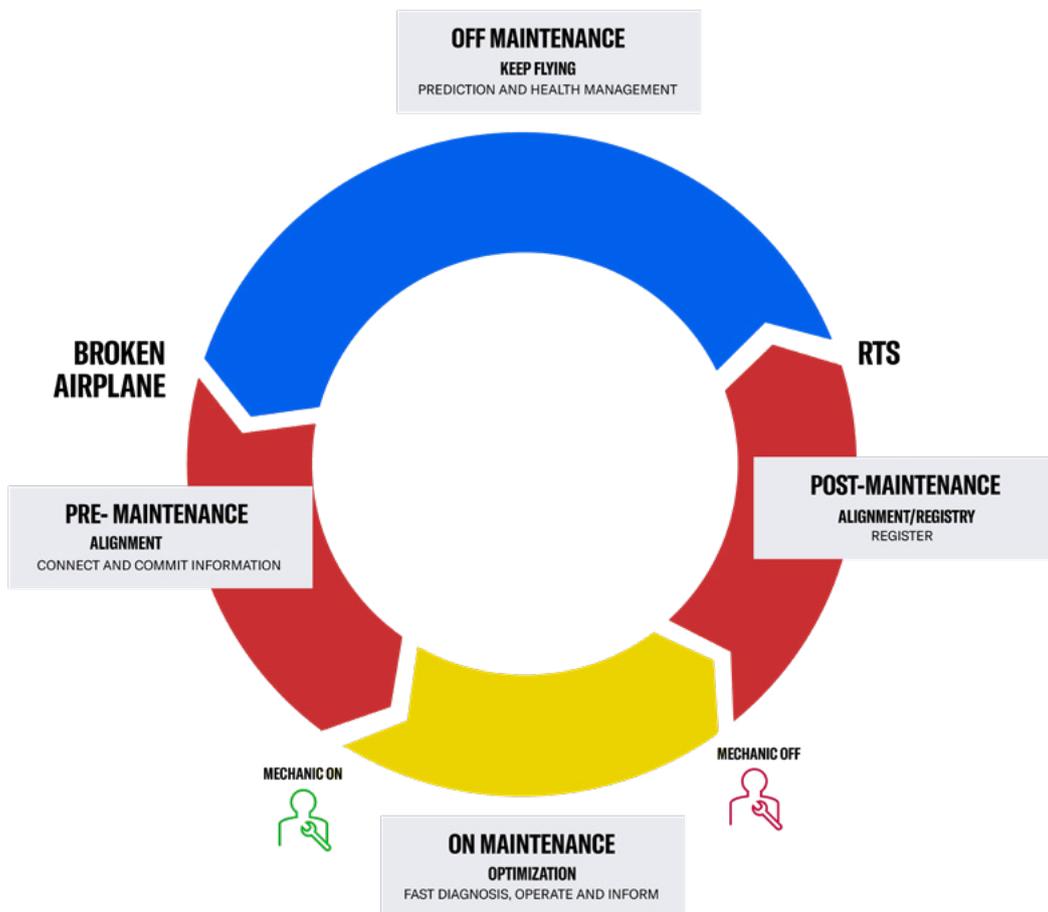
We can also consider the adoption of digital tools to facilitate other critical functions. Flight crew now have digital flight bags, saving volumes of pages in hard-copy manuals. Cabin crew are equipped with PEDs to perform their cabin services duties. These digital tools not only make work easier on crew, they also open up new opportunities for communications and enhanced, personalized service for passengers. Maintenance should not be left behind.

As an industry, aviation must embrace digital solutions that offer a single reliable source of truth to guide decision-making. As we move forward to a sustainable future, we need to empower human resources and make the best use of our limited time by acting on accurate information. Flight safety must always remain the top priority, which is why digital tools must be compliance-ready, compatible with existing systems, easy to adopt, and accessible to all. Digital tools should enhance current processes by addressing the communication gaps that lead to misunderstandings, missing parts, and ultimately aircraft delays.



The Beacon platform reduces the time required for pre- and post-maintenance alignment, with contextualized information available immediately helping to cut wasted time and resources in the process.

Optimized processes, through more efficient communication exchange, also shorten the time required for the fix, resulting in the aircraft spending more time in operation.



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Efficient Processes

HOW PLATFORMS POWER TRANSFORMATION

The aviation industry has acknowledged that new technologies will be required to meet Net Zero 2050, which includes new technology aircraft such as hydrogen-powered and electric airplanes, but it should not be limited to those new aircraft technologies, just as sustainability is not limited to carbon reduction alone.

New technologies that streamline operations have an important role in aviation sustainability. That includes innovations like ‘smart aircraft’ and ‘smart cabins’, which we’ll delve into more deeply in the next chapter of this series. It also includes tools like digital twinning of the fleet to plan more efficient operations and digital tools that boost collaboration, communication, and understanding.

FLY NET ZERO 2050

AVIATION VS. OPEN COMPUTE

Data centers have a significant environmental footprint, contributing approximately 2% of global greenhouse gas emissions.

IATA reported that all of aviation contributed around 2% of global greenhouse gas emissions in 2019.

Data centers turn to platforms to make their maintenance and operations more efficient.

Will aviation do the same?



New technologies that streamline operations have an important role in aviation sustainability. That includes innovations like ‘smart aircraft’ and ‘smart cabins’, which we’ll delve into more deeply in the next chapter of this series. It also includes tools like digital twinning of the fleet to plan more efficient operations and digital tools that boost collaboration, communication, and understanding.

Platforms fit in this category, and many industries have already implemented them to improve their performance.

We spoke to Simone Cicero, CEO of Boundaryless and the inventor of [Platform Design Toolkit](#) to discuss the power of platforms to transform an industry by encouraging collaboration at an ecosystemic level.

“When you have a product, whenever you can organize the market of services on top of the product, it’s a smart move. It’s another direction where you can expand your business leadership in the digital space, in digitalized markets,” Cicero said. “It’s what we call extensions. So you can think of not just intermediating the services that happen on top of a piece of hardware, for example, like a plane, but you can think of building ways for third parties to contribute to your product.”

Cicero shared one example of this collaboration dynamic with the project [Open Compute](#), which has completely transformed the way we build data centers. Data centers have a significant environmental footprint, contributing approximately 2% of global greenhouse gas emissions. (For comparison purposes, IATA reports that aviation contributed approximately 2% of global greenhouse emissions in 2019.) Like aviation, data centers are also heavily reliant on people for their operations.

“Open Compute created an ecosystem that intermediates more than \$2 billion by creating this shared specification process where everybody agrees on open designs. These enable much smaller players to essentially design and manufacture parts locally. So you may have a separate design deployed across the world, but when the data center is in Tunisia, you have a Tunisian firm providing services and not depending on the US subsidiary to send people abroad.”

If this sounds familiar in an aviation context, it is because that structure already exists in our maintenance ecosystem. OEMs have local authorized distribution and maintenance centers. A large network of independent small manufacturers, repair stations, and testing labs support the day-to-day servicing of aircraft. The missing link between the Open Compute Data Center approach and the aviation approach is that most of the interactions between these parties in aviation happen in a linear and disconnected fashion. There is no open exchange where all affected parties are aware of the same status of a part, repair, or test result.

In today’s world, data centers are critical to global productivity and global sustainability. Though arguably they are not as critical as aviation. After all, data centers also rely on aviation for their supply of component parts. Aviation should at least be on-par with data centers by adopting new ways of exchanging critical knowledge.

Cicero describes the standards established by the cutting-edge technologies that are becoming essential to our global productivity as “integrity strategies.” They focus on ensuring governance through a single source of truth.

“What we are seeing coming up, for example, from the Web3 ecosystem, creating shared governance processes, and potentially decentralizing decision-making are fostering new types of organizations,” Cicero says. “The platform becomes an enabler of commercial changes and then it all plays out in the ecosystems which need to be optimized to become unique. We are seeing this in the car industry as well as in many other spaces. There is a kind of convergence in creating these open standards, and the tendency will be that we agree on the standards, we agree on shared governance processes, and shared specification processes. If we succeed with this convergence, and in the ontologies we use, the language we use for organizing markets, it will be much better for everyone. The energy can then be put into creating custom solutions. The interesting thing is many companies, at the moment, especially big companies, are pondering organizational models that make this happen inside their own context.”



This is where aviation has a huge advantage over emerging technologies and new business models. The shared standards are already globally defined, the ontology and terminology are known, the governance processes are clear, and the infrastructure is already in place to ensure aviation retains its record as a safe and reliable mode of transport. By deploying a platform to exchange information with those standards, rules, and regulations already in place, aviation has the potential to improve the efficiency of its processes by many multiples to keep aircraft flying.



Some examples of what Cicero describes, applied to the aviation ecosystem, might include integrating approved repair stations that handle component parts into the platform for better tracking of components that are out for repair and overhaul. This would make it easier for maintenance technicians and controllers to know with confidence whether a critical component will be available to install as needed or whether it has been determined to be BER (beyond economic repair) and must be replaced. Another possibility is to add suppliers and service providers to the platform during major maintenance events—such as during C-checks or cabin refurbishment programs—to help boost the information flow. Partners can answer questions on LOPAS (location of passenger accommodations), and report/address problems with any components delivered. The possibilities to extend the platform of aviation maintenance to key partners and suppliers are virtually limitless.

“It’s a matter of understanding that you have a product [in this case the aircraft] relying on these products that are, to some degree, human-powered services and marketplaces,” Cicero says. “Everything that fits into the product can be added to the platform as an extension.”



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Efficient Processes

STREAMLINING BEST PRACTICES FOR SUSTAINABILITY

The aviation industry senses a need for open collaboration from the ground up. In our previous chapter, we mentioned the popular aviation maintenance Reddit community where technicians exchange knowledge.

Industry working groups also see that need.

FLY NET ZERO 2050

JET AGE, MEET DIGITAL AGE

The jet age positioned aviation at the heart of innovation.

Platforms can power aviation's next great era of sustainability.



“A link needs to be created between the repair organization and the line or base maintenance organization that shares the experience. On one hand, the troubleshooting will be improved, and problems will be solved in a more effective way. On the other hand, unnecessary repair or overhaul events will be avoided. The more data the airline has, the more sophisticated the decisions will be, so it makes sense to share experiences with other airlines in order to improve data quality. If component maintenance is outsourced to a service provider, it is important to have a feedback loop with the line or base maintenance provider and to cover these improvements in contract negotiations or tenders,” say the authors of a study prepared by [IATA’s Maintenance Cost Technical Group \(MCTG\)](#), an airline volunteer group that gathers and analyzes maintenance costs, delves into the complexities of maintenance operations, and suggests best practices.

JET AGE

The Time-Suck of Missing Information

The Risks of Lack of Documentation

The Search for Missing Parts

The Hazards of Miscommunication

A Siloed Knowledge-Base

Tricks of the Trade vs Best Practices

Staff Shortage

DIGITAL AGE

Digitizing Connection

Beacon is responsive and adaptive and empowers professionals and organizations to connect and collaborate effortlessly

Future Ready (Dynamic Architecture)

Beacon is future-ready, leaning forward, poised for action, enabling and transforming the industry daily flights.

The Ecosystem

Value-added Interaction Fields powered by the network effect of an effective platform.

Empowering

Beacon empowers teams to Focus on the Fix.



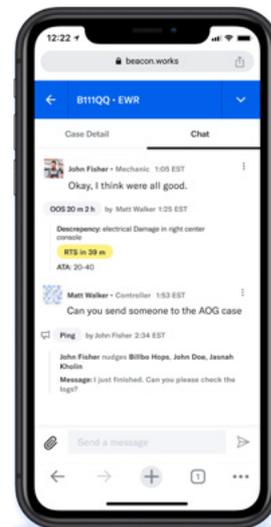
As MCTG suggests, there are weak links in the chain of maintenance which could damage the whole as traffic increases and new aircraft are introduced to the fleet. The “feedback loop” they reference ideally describes the collaborative interactions facilitated by a platform.

The need is there, and it is clear. All that is required now, is to take the first step forward by cutting through the complexities in today’s maintenance practices which result in lost momentum and misspent resources.

EMPOWER MTX TEAMS

Beacon equips Operators, MROs, and Technicians with the tools to increase capacity and aircraft availability while optimizing operating costs.

Reduce OOS Time by	Increase Productivity by	Reduce Overall Delays by
20%	10%	5%





The jet age positioned aviation at the heart of innovation. Platforms can power aviation's next great era of sustainability. It is that need that drives us every day to optimize the Beacon platform and to ensure we remain human-centered in our approach.

We are poised and ready to enable the sustainable age of aviation, one that holds true to its core values of safety and engineering know-how, while adjusting our vectors to get more people up to speed, speaking the same language, reading from the same manual, and doing their best to keep aircraft flying for generations to come.

We love planes and we're pretty sure our great-grandkids will too.

A NEW ERA OF SMARTER COLLABORATION FOR FASTER RETURN TO SERVICE

"I now can assign cases to my team from a distance."-
Supervisor

"Coordination has never been that easy." -
Crew Chief

"I only pick the phone when it is absolutely necessary.
Beacon gives me great visibility and extra bandwidth."
- **Controller**

"I can now focus on the best part of the work, the fix."
- **Technician**

Beacon empowers the users to see more and more clearly.

It provides insights to make better decisions.

Beacon enables them to be more efficient by communicating better and collaborating smarter.

With Beacon, users can focus on the best part of their job—keeping planes flying



Keep Flying

Efficient Processes

WHAT LIFTS US?

FLY NET ZERO 2050

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22



GROWTH MINDSET

We embrace a growth mindset no matter how hard the challenge is ahead and inspire partners by approaching unprecedented ideas with creativity, humanity and grit.

CO-CREATION

Our superpower lies in the depth of our diversity and our desire to understand and constantly learn from alternative perspectives.

PEOPLE-FIRST

We always put people first and are passionate about enhancing people's lives - from our partners to our network of Beacon community members.

ALWAYS ON

We're responsive and adaptive. We listen deeply to the community and are unafraid to change course to accelerate our mission.

Beacon is a trailblazer that has the tenacity to open new opportunities to allow its users to benefit from a new way of aviation maintenance. We bring together nonconformists, audacious adventurers, and those who dare to change the status quo and contribute to building a sustainable future for the aviation industry. Beacon leads the ecosystem with optimism, simplicity, and expertise into a new era of collaboration and smarter ways of creating value.



WHAT LIFTS YOU?

We want to hear your thoughts! Share your views on the future of aviation maintenance sustainability with Beacon by following us on LinkedIn.

[Sign up](#) to get full insights from our White Paper series and future publications shining a better light on the future of aviation maintenance sustainability.



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*Why a **human-centered Aviation Maintenance approach** is essential to **Aviation Sustainability***

CH. 2 EFFICIENT PROCESSES - the second pillar of Maintenance Sustainability

ABOUT

BEACON

Beacon challenges current MTX systems and brings 21st-century solutions to improve maintenance services. Beacon applies a human-centric and ecosystemic approach to the use of technology to industry challenges. Beacon is a fleet agnostic platform that works alongside existing in-house systems to facilitate the interaction among stakeholders in aviation maintenance while ingesting data to bring actionable insights which enable optimal aircraft operations. Beacon cuts through complexity and provides a simple-to-use solution to maintenance event tracking. We are designing a new era of maintenance with faster return-to-service, better communication, and smarter collaboration so you can keep flying.

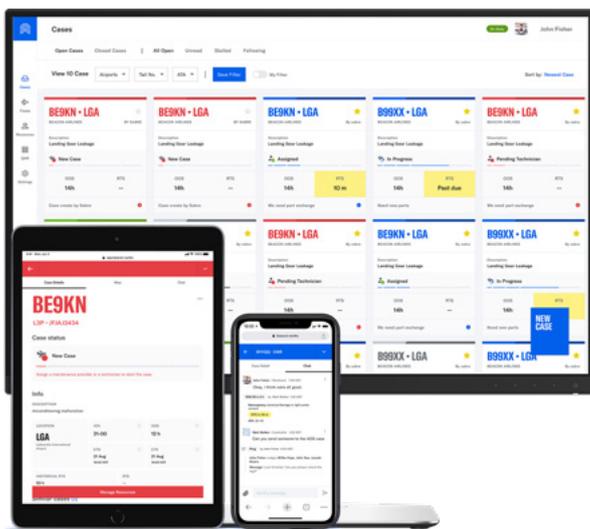
EMBRAER-X

Embraer-X is a venture builder and Embraer's innovation agent that transforms ideas into innovative businesses, transcending the aviation market and igniting the Innovation Ecosystem. We are crafting the path to make a positive impact in the world by developing solutions that inspire our partners to spread true grit to make changes people crave, based on our three pillars: Sustainable by Design, Integrated Mobility and Airborne Info-Systems. Learn more at embraerx.embraer.com



LEAD THE CHANGE

We want to hear your thoughts! Share your views on the future of aviation maintenance sustainability with Beacon by following us on [LinkedIn](#).



**SCHEDULE A DEMO OF
THE BEACON PLATFORM**

Request a Demo