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Digital Airworthiness Platform

DPP-ready

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Executive Summary

The aviation maintenance sector is at a crossroads. General aviation in Europe remains heavily dependent on fragmented, manual processes. Maintenance oversight is largely carried out by small CAMOs that rely on PDFs, Excel sheets, and paper records, creating inefficiencies, high costs, and compliance risks. Meanwhile, the industry faces a shortage of qualified mechanics, persistent supply chain disruptions, and growing regulatory pressure to digitize lifecycle records.

The **Digital Airworthiness Platform (DAP)** initiative addresses these challenges by introducing a **Digital Product Passport (DPP)-ready, AI-enabled, and decentralised compliance platform.** At its core, the platform creates **structured, machine-readable aircraft records** anchored to a DPP. Each maintenance or regulatory event is recorded as a **Verifiable Credential (VC),** stored securely in decentralised **Solid pods,** and linked back to the aircraft's digital passport. This ensures a single, verifiable source of truth accessible to all stakeholders — OEMs, CAMOs, MROs, regulators, and owners.

The solution transforms compliance from a manual, paper-heavy process into an **automated, AI-driven service.**

- **Owners** benefit from lower costs, proactive maintenance alerts, and improved residual value.
- **CAMOs** reduce administrative overhead and can focus on value-added advisory.
- **OEMs** gain stronger lifecycle control, create new subscription-based revenue streams, and build customer loyalty through predictive services.
- **Regulators** receive standardized, verifiable data, enabling faster and more targeted oversight.

Strategically, the platform begins by partnering with **existing CAMOs** and launching a **Tier 1 OEM pilot project,** while simultaneously building **a federated digital trust network** in collaboration with **Howest Cyber 3 Lab**. The Aviation Trust Network (ATN) is positioned to act as the external enabler of this transformation, helping OEMs navigate the transition toward full DPP compliance and realize the market efficiencies described in this paper. While individual OEMs may choose to pursue **a minimal, standalone path** to meet future regulatory requirements, achieving the full benefits of **standardization, decentralization, and AI-driven servitization** will require **a federated approach** — one that no single manufacturer can deliver in isolation.

By working with the ATN, OEMs gain access to the expertise, infrastructure, and interoperability needed to implement **trusted credentialing, decentralized data flows, and cross-industry integration**, ensuring that their compliance efforts translate into a competitive advantage rather than a regulatory burden. This **phased rollout** begins with integration of existing PDF-based documentation but steadily evolves toward **fully JSON-LD structured data**, unlocking the scalability and intelligence required for **a future-proof, AI-enabled airworthiness ecosystem**.

The **market potential is significant**. While compliance costs currently average €1,500 per aircraft annually, the platform can offer the same service at around **75% of current costs**, delivering savings to owners while improving margins for OEMs. For a single OEM with 4,000 European aircraft, this represents €2–3M in recurring annual revenue. At network scale, with multiple OEMs onboard, revenue could exceed €10M/year in Europe alone — with further upside from premium AI and digital documentation services.

To achieve this vision, the initiative requires initial funding of **€200,000–€300,000** for research and prototype development, followed by **€300,000–€500,000** for the OEM pilot phase. Scaling the solution to a full multi-OEM ecosystem is expected to require **€1M–€1.5M** over three years — a modest investment relative to the long-term revenue and strategic value unlocked.

By supporting this project, investors and government stakeholders enable the creation of a **European-led, DPP-compliant infrastructure** that not only drives cost efficiency and safety but also positions the aviation sector at the forefront of digital innovation and sustainability. This is an opportunity to lead the transformation towards **AI-powered, decentralised airworthiness management** and to actively shape the future of aviation compliance in line with emerging EU regulations.

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Industry Pain Points & Trends

Workforce & Capability Challenges

Like many industries, aviation, and particularly in aircraft maintenance, the industry is needing to deal with its **aging and declining pool of qualified mechanics**. See for instance: https://ifa-industries.com/en/aviation-aircraft-mechanic-shortage-continues/

The issue is not easily resolved as junior mechanics need to undergo **rigorous training and testing** to become certified, and at the same time learn how to navigate and interpret Service Bulletins (SBs), Airworthiness Directives (ADs), and Aircraft Maintenance Programmes (AMPs), most of which still in pdf-form, and **manually track compliance and write reports**. For instance, a new hire joining a CAMO may spend 4 weeks just learning how to manually extract SB applicability from OEM portals and enter it into Excel-based trackers or AMP-builders.

Without structured documentation and standard workflows, **critical knowledge is not portable,** thus onboarding is slow and kind of relies on senior mechanics who "know where to look".

Supply Chain & Inventory

Persistent supply chain disruptions have been an issue as well; the aftermath of the COVID-19 pandemic has left lasting effects on global supply chains, with manufacturers facing difficulties in sourcing essential components due to shortages of raw materials like aluminium and semiconductors.

Traceability gaps due to a lack of digital records; it may not be clear *when* a part was installed, *where* it came from, or whether it still is airworthy. An example by a CAMO-manager: "I once spent days trying to confirm whether a magneto installed on a Rotax engine has a valid release certificate. The shop had it in email, but the owner didn't, and nothing was centralised."

Unreliable SB/AD follow-up; some SBs become mandatory via an AD while others remain optional, potentially creating confusion. ADs/SBs refer to specific part numbers, S/N ranges, or modifications. Without structured aircraft configuration data, it is hard to automate applicability checks.

Documentation Inefficiencies

CAMO's and OEM still wrestling with **PDFs and inconsistent AMP formats**. Standards like the Air Transport Association (ATA)'s iSpec 2200 do exist, but it tends to be up to the manufacturers whether they use them or not. Pulling the information together into a consistent AMP for a specific aircraft tends to be a manual job.

Lack of a Digital Backbone

The current airworthiness management ecosystem suffers from a fundamental absence of a shared digital infrastructure. Most data remain locked in **PDF documents, Excel trackers, and isolated maintenance systems**, creating **data silos** that cannot easily exchange information. This fragmentation is compounded by proprietary formats, inconsistent document structures, and the lack of standardized identifiers for components, aircraft configurations, and maintenance events.

The result is **zero interoperability:** CAMOs, OEMs, MROs, and regulators all maintain their own datasets, often duplicating information and introducing inconsistencies. Owners are forced to rely on manual reconciliations, while compliance evidence is scattered across emails, paper logbooks, and disconnected IT systems. Without a unifying data model, even simple tasks — such as determining which SBs apply to a particular aircraft configuration — require significant manual effort.

This lack of a digital backbone is more than just an IT inconvenience; it is **a structural blocker** to progress.

- **Automation** becomes impossible when data cannot be queried or linked across systems.
- **AI technology** cannot operate effectively on unstructured, fragmented records.
- **Regulatory oversight** remains dependent on time-consuming audits because compliance data is not standardized or verifiable.

Moreover, the absence of machine-readable, lifecycle-linked data prevents predictive analytics and proactive compliance management. Even when AI tools are deployed, they must first perform costly data cleaning and interpretation, eroding potential efficiency gains. This makes innovation prohibitively expensive for small CAMOs and discourages OEMs from investing in more advanced services.

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The aviation sector lags industries like automotive, where connected systems and standard data formats have enabled predictive maintenance, supply chain optimisation, and seamless compliance reporting. **Without a digital backbone, aviation cannot benefit from these advances.**

A robust, standardized digital backbone — based on **DPP principles, decentralised storage (Solid pods), and VCs** — is therefore essential. It would replace scattered data silos with an interoperable layer where every event is traceable, every document is machine-readable, and every stakeholder operates on a single source of truth. Only with such a foundation can the sector moves toward true automation, AI-driven oversight, and cost-efficient compliance management.

Regulatory Fragmentation

EASA-member state NAAs diverge on the AMP, the Minimum Equipment List (MEL) and audit scope. At a General Aviation Manufacturers Association (GAMA) workshop held in Brussels (March 2017) opportunities for improvement in regulation and oversight were identified, including:

Potential use of industry standards that can be used to reduce the number of audits,

Metrics and data needing to be collected to support the need for standardisation between member states, the development of templates, e.g. the AMP and MEL, and the use of industry standards that can be used to reduce the number of audits.

Redundant and expensive compliance overhead; a CAMO getting ready for a routine audit may need to spend 10-15 staff-hours reconciling SBs with AMP-entries and producing signed documentation – because it is not stored in a structured, verifiable way.

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Regulatory Shift; the Digital Product Passport

EU Digital Product Passport

The **DPP** is a core element of the European Union's **Eco-design for Sustainable Products Regulation (ESPR)**, which aims to make products more durable, repairable, and sustainable across their entire lifecycle. The DPP is a machine-readable, modular digital record that contains essential product information, including composition, maintenance instructions, compliance data, and environmental impact. It is designed to improve transparency and traceability across complex value chains by enabling different stakeholders (from manufacturers to recyclers) to access relevant product data based on their role and authorisation.

Under the DPP framework, the manufacturer or importer — the economic operator placing a product on the EU-market — is responsible for **creating, updating, and maintaining the DPP.** While the DPP will initially apply to priority sectors like batteries, textiles, and electronics, **the timeline and scope for aviation have not yet been formally defined**. That said, the regulatory direction is clear: once DPP obligations are extended to aircraft and components, OEMs would be required to deliver structured, machine-readable documentation for the entire product — including third-party components.

This represents a significant shift from today's model, where maintenance oversight and compliance tracking are typically handled by the aircraft owner or a contracted CAMO. In effect, the OEM would take on much of the responsibility for structuring and maintaining **the AMP** from the outset, potentially changing the compliance landscape entirely.

Article 4 of the ESPR proposal (COM/2022/142) gives the European Commission power to adopt delegated acts specifying product groups that must comply with DPP requirements, meaning that **aviation can be added without needing a new law** — via delegated legislation aligned with ICAO, EASA, and EU sustainability targets. Moreover, increasingly ICAO and EASA have been emphasizing **digitisation and sustainability** in rulemaking roadmaps.

Current CAMO Landscape

Continuing Airworthiness Management Organisations (CAMOs) were originally conceived as independent entities, separate from maintenance providers, to oversee the continued airworthiness of aircraft objectively. In practice, this separation has not materialized in general aviation. Most small maintenance shops have established **their own in-house CAMO**, using the CAMO approval to bind customers to their services. The result is a fragmented landscape where CAMO oversight is closely tied to individual workshops rather than acting as an impartial layer of compliance management.

Outside of the airline sector — where one large independent CAMO exists but focuses primarily on commercial fleets — there are **no true independent CAMOs** operating at scale in general aviation. Most airlines, for their part, run their own internal CAMOs, leveraging in-house resources. This **scattered and vertically integrated CAMO-environment** prevents the pooling of resources and expertise needed for meaningful investments in digitisation.

Each small CAMO or shop operates its own data silos, often relying on paper logbooks and PDF-based documentation, making it **nearly impossible to implement advanced digital tools or AI technology** across the sector. The lack of standardisation and shared infrastructure has left general aviation far behind in terms of automation and cost efficiency.

Opportunities

The introduction of the DPP to aviation would offer a unique opportunity to fundamentally reshape how continuing airworthiness is organised in general aviation. Unlike today's patchwork of CAMOs, where each organisation maintains its own data and practices, the DPP creates **a standardized, machine-readable format for product information** that can be applied across the entire lifecycle of an aircraft and its components. This standardisation would remove the inefficiencies caused by inconsistent AMP-templates, disparate MEL interpretations, and the manual collation of PDF-based records. With DPP-compliant data, airworthiness oversight becomes structured, interoperable, and ready for automation.

By design, the DPP enables **decentralised data management,** where each manufacturer or component supplier maintains their own authoritative documentation while linking it to the aircraft's digital passport. This removes the need for small, isolated CAMOs to maintain their own duplicate and often inconsistent datasets. Instead, MROs, regulators, and owners would access the same single source of truth — updated at its origin and verifiable across stakeholders. This **federated structure** paves the way for advanced analytics and AI-driven compliance monitoring, as the information is no longer locked in scattered silos but accessible through linked, trustable data sources.

The DPP also enables a shift toward **servitisation,** where manufacturers move beyond selling hardware to offering ongoing services tied to the aircraft's lifecycle. In a DPP-enabled world OEMs such as Socata, Pilatus and Tecnam can take on a larger role in monitoring compliance and maintaining digital airworthiness records. This not only simplifies the ownership experience — lowering cost and administrative burden for operators — but also creates new revenue streams for manufacturers through **subscription-based digital services**, lifecycle management packages and predictive maintenance offerings. At the same time, their products become more attractive to buyers by offering **reduced total cost of ownership and enhanced residual value** through verifiable, AI-backed maintenance records.

By embracing the DPP as a core enabler of **standardisation, decentralisation, and servitisation,** European OEMs can lead the transformation of general aviation. Rather than relying on a fragmented network of small CAMOs, the future could see manufacturers driving airworthiness oversight directly, supported by digital tools and AI, creating value for both them and their customers.

Inclusion of Annex I Aircraft under the DPP

While the initial focus of the **DAP** model has been on **EASA-certified aircraft**, the implications of the Digital Product Passport (DPP) extend further. The DPP regulation does not differentiate between certified and non-certified aircraft, meaning that **Annex I aircraft** — those remaining under national regulations — will likely also fall under its scope once new production enters the market.

Historic and orphaned aircraft may remain exempt, but **newly built Annex I types** will almost certainly be required to comply with DPP obligations, particularly as the EU moves towards harmonised lifecycle traceability across all product categories. This mirrors developments in upcoming **EU e-licensing regulations**, where national personnel licences must be integrated into a

European framework.

For aviation, this is not merely a compliance requirement; it represents **an opportunity to converge nationally approved aircraft towards a more unified European standard.** By embedding these aircraft into the same DPP-enabled infrastructure, manufacturers and owners can benefit from the same cost efficiencies, digital record-keeping, and AI-driven compliance support as their EASA-certified counterparts. This convergence strengthens oversight, improves data quality, and enhances the value proposition of national aircraft types across the European market.

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The Vision: the Aircraft that Speaks for Itself

The Future

The combination of standardised DPP data, decentralised documentation storage, and servitisation-driven OEM involvement sets the stage for a new paradigm in aviation: **the aircraft that speaks for itself.** In this vision, every aircraft carries a digital passport linking to its configuration, maintenance history, and applicable requirements, all continuously updated by manufacturers, service stations and regulators through VCs.

AI-agents built on top of this structured data can reason about the aircraft's state, monitor AD and SB applicability, and predict upcoming maintenance needs. Instead of owners and CAMOs manually reconciling PDFs and chasing information, the aircraft itself becomes an active participant in its own airworthiness management — notifying its owner, mechanic, or regulator what actions are required and when, while providing the evidence to prove it. This is where compliance becomes seamless, ownership costs drop, and safety margins rise — not through more bureaucracy, but through **intelligent, connected aircraft ecosystems.**

Imagine an aircraft that not only keeps track of its airworthiness status but actively communicates it. Its DPP holds a live record of every component, every SB, and every AD compliance event. Instead of owners or CAMOs manually piecing together documents, the aircraft itself alerts them: *"My 100-hour inspection is due in 12.4 flight hours; SB-912-34 applies to my engine and is not yet complied with; here are the service stations in range authorized to perform it.*

This is **not science fiction**, but the logical outcome of DPP-standardisation, decentralised documentation (Solid pods), and cryptographically verifiable lifecycle events (VCs).

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The Digital Airworthiness Platform

Core Pillars

At the heart of the platform are **DPP-compliant aircraft records**, built on the emerging EU-standard for product lifecycle traceability. Each aircraft is represented by a structured, machine-readable DPP that captures its configuration, serial numbers, installed components, and links to relevant manuals, SBs, and ADs. Unlike today's static records, these passports are dynamic, continuously updated as events occur, forming a single source of truth that is accessible, interoperable, and future proof.

Every significant maintenance, inspection, or regulatory event generates a **VC** — a cryptographically signed, tamper-proof record issued by an authorized party such as an MRO, CAMO, or OEM. These credentials serve as digital evidence of compliance, linking directly to the aircraft's DPP. By leveraging **DIDs,** each credential can be verified by any stakeholder without relying on a central authority, ensuring trust and auditability across the aircraft's lifecycle.

Instead of centralizing all data in one proprietary system, the platform uses **Solid pods** — secure, web-based storage controlled by data owners, such as OEMs or component manufacturers. Each pod holds technical documents (e.g., ICAs, AMMs, SBs) and provides **controlled, versioned access** to authorized users. This **decentralised architecture** eliminates redundant data silos, ensures that only the latest approved documentation is used, and allows AI and external systems to query data directly without costly duplication.

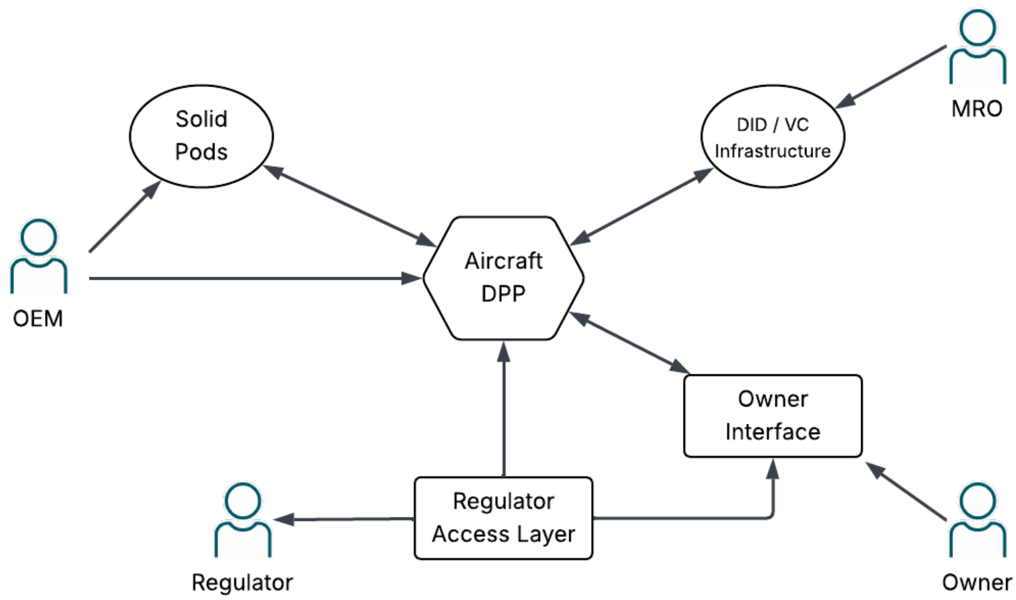
Built on top of structured DPP- and VC-data, the **AI reasoning engine** transforms raw compliance information into actionable intelligence. It can automatically detect applicable ADs and SBs, predict upcoming maintenance requirements based on usage data, and even generate work orders or compliance reports. Over time, this AI becomes the aircraft's **digital voice**, proactively advising owners, mechanics, and regulators of what is needed to keep the aircraft airworthy — reducing human workload while increasing safety and reliability.

The platform offers a **user-friendly owner portal** where aircraft owners, pilots, and fleet managers can view compliance status, upcoming maintenance requirements, and service history at a glance. Through **API-access,** CAMOs, MROs, OEMs, and regulators can integrate directly with the platform, issuing or verifying credentials, retrieving documentation, or automating workflows. This open interface ensures that the system fits seamlessly into existing maintenance ecosystems while enabling new services to emerge on top of its data layer.

Together, these five pillars form a **decentralised, AI-ready compliance infrastructure** that not only meets future DPP requirements but also unlocks new business models and efficiencies across the aviation industry.

Architecture Overview

The platform architecture integrates these components into a seamless ecosystem in which data flows securely between stakeholders. It is designed as a federated system, avoiding central bottlenecks while enabling interoperability and trust.



The architecture is built around the **Aircraft DPP,** which acts as the anchor for all lifecycle data. When an event occurs — such as a SB being performed — the MRO issues a **VC** using the DID/VC infrastructure. This credential is linked directly to the aircraft's DPP, where it becomes part of the permanent, verifiable record. Technical manuals and other supporting documents remain stored in **decentralised Solid pods** controlled by the OEM, with the DPP referencing them rather than duplicating content. Owners and MROs access the platform through role-based interfaces that surface relevant data and allow new credentials to be added. Regulators connect through **a verification layer,** enabling them to instantly confirm compliance without manually reconciling disparate records. This interaction model ensures that all actors work with a single, trusted dataset, while maintaining control over their own data sources.

AD/SB Traceability

An **optional AD/SB traceability module** extends the platform's core DPP functionality by automating how **ADs** and **SBs** are tracked and managed. Instead of relying on manual checks and fragmented PDF workflows, the module maintains **a live applicability matrix** for each aircraft based on its configuration data stored in the DPP. When a new AD or SB is issued, it is ingested as a **machine-readable object** linked to the relevant components and serial number ranges. The platform then automatically determines which aircraft are affected, updates their DPP-records, and issues targeted notifications to owners, CAMOs, or service providers. Compliance is verified through **VCs** issued by MROs once the required work is performed. This module would drastically reduce administrative workload, prevents missed actions, and ensures that compliance status is always up to date and auditable — turning what is currently a labour-intensive process into **a real-time, verifiable compliance flow.**

Dynamic AMP Generation

The platform also includes a **dynamic AMP** capability, replacing today's static, manually compiled AMP documents. Traditionally, CAMOs or owners must consolidate OEM instructions, regulatory requirements, and SB/AD applicability into a static maintenance program — often by copying and pasting from multiple PDFs. In the proposed system, **the AMP is generated dynamically** from the aircraft's DPP and linked airworthiness instructions, with rules that automatically incorporate applicable SBs, ADs, and component-specific maintenance intervals. Whenever a manufacturer issues an update or a regulator mandates a change, the AMP adjusts automatically, ensuring that the version in use is always current and compliant. This not only reduces errors and administrative workload but also provides owners and maintenance providers with **a living, real-time program** that reflects the exact configuration and compliance status of the aircraft at any given moment.

Predictive Maintenance Capability

Beyond compliance management, the platform lays the groundwork for **predictive maintenance,** leveraging both historical maintenance data and, where available, live telemetry from the aircraft. Even without a direct data feed, the system can apply AI reasoning to the aircraft's DPP records, lifecycle events, and usage history to forecast when maintenance will likely be needed — for example, anticipating component wear based on accumulated hours, past inspection findings, or patterns in SB applicability. This allows owners and service providers to **plan interventions proactively,** reducing downtime and avoiding costly unscheduled repairs.

When connected to onboard monitoring systems such as **Garmin's PlaneSync** or other EMS/avionics data feeds, the platform can take predictive capability to the next level. In this setup, **the EMS itself would be assigned a DID,** enabling it to securely authenticate and share selected operational data (e.g., engine health parameters, exceedance logs) directly with the platform. The AI engine can correlate this data with manufacturer thresholds and historical maintenance records to generate early alerts or recommend specific inspections. By integrating these streams, the aircraft effectively becomes a self-reporting entity in the ecosystem — capable not only of telling its owner what maintenance is due but also predicting **what it will need before issues arise,** optimizing safety and cost efficiency.

AI Co-pilot for Compliance

At the heart of the platform's innovation is **an AI co-pilot for compliance,** designed to continuously monitor airworthiness requirements and assist owners, pilots, and service providers with proactive compliance management. Drawing on the aircraft's DPP, service history, and applicable regulations, the AI agent **tracks all maintenance intervals, AD/SB requirements, and component lifecycles.** Using flight-hour and calendar data, it automatically determines when inspections, part replacements, or compliance actions are due. When thresholds approach, the AI can **generate draft work orders for MROs,** pre-populating them with the required tasks, parts, and references to the latest OEM instructions. This drastically reduces administrative overhead and ensures that compliance never slips through the cracks.

The AI co-pilot is particularly transformative **for light sport and general aviation (GA),** where maintenance records are often incomplete or inconsistently documented. In this segment, it is not uncommon to find uncertainty about whether a specific SB was performed or when a critical part was last replaced. By applying natural language processing (NLP) and pattern recognition, the AI can **review unstructured reports** returned from MROs, extracting key compliance information and updating the DPP accordingly. Even when records are fragmented, the AI can flag potential gaps, recommend verification actions, and request missing documentation. Over time, as more data is processed, the AI builds a richer understanding of the aircraft's maintenance history, allowing it to fill in missing links and provide increasingly accurate compliance guidance.

This agentic AI layer transforms compliance from a reactive, paperwork-heavy process into **an autonomous, continuously optimized service.** The result is a system where owners and mechanics can focus on the actual maintenance work, while the AI quietly ensures that regulatory and manufacturer requirements are always met — efficiently, reliably, and with minimal human intervention.

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Business & Revenue Model

Recurring Revenue Streams

The platform's business model is designed to ensure that **OEMs remain at the centre of the value chain,** while **the Aviation Trust Network (ATN)** supports them in achieving DPP compliance and operational efficiency. The ATN does not charge aircraft owners, MROs, or CAMOs directly; instead, it **partners with OEMs**, providing them with the infrastructure and expertise needed to build their own **trusted maintenance ecosystems.**

The **ATN generates revenue** primarily through **consulting services** and **access to the federated trust network.** This includes assisting OEMs in setting up credential frameworks, designing access policies, and integrating their documentation into a decentralized architecture. The ATN also provides a network layer that allows OEMs to connect their trust infrastructure with other stakeholders securely and interoperably — a service that would be impractical for each OEM to develop in isolation.

For OEMs, the platform enables **new revenue opportunities** tied to their enhanced role in airworthiness management. They may **charge MROs, CAMOs, and owners** for access to their **OEM-specific trust networks**, ensuring that only authorized service providers can issue Verifiable Statements (VSs) on their aircraft. OEMs can also monetize **access to digitized technical documentation**, offering it at a cost-effective rate compared to legacy solutions, while strengthening control over their maintenance data.

Additionally, the ATN offers **DPP-as-a-Service** for smaller OEMs that lack the resources to develop and maintain their own DPP infrastructure. Hybrid solutions are also possible, where OEMs retain control over key elements while leveraging ATN's network, credentialing, and AI components. Finally, the platform's **AI compliance co-pilot** is positioned as a **premium module**, licensed to OEMs who wish to enhance their service offerings with predictive maintenance and automated compliance management.

This structure ensures that **OEMs capture the aftermarket revenue** from their own fleets, while the **ATN provides the enabling technology and expertise** to accelerate adoption of DPP-compliant, AI-ready airworthiness ecosystems.

Value Chain Impact

The platform's adoption fundamentally reshapes the aviation maintenance value chain, benefiting all key stakeholders while streamlining operations and reducing costs.

OEMs: Stronger Lifecycle Control and New Revenue Opportunities

For OEMs, the platform offers a way to **extend their influence beyond the point of sale,** turning compliance and documentation into continuous engagement with their fleets. By operating a **trusted maintenance network** and controlling access to service credentials, OEMs strengthen their brand, ensure that work is performed to their standards, and reduce the risk of non-compliant maintenance. Charging MROs, CAMOs, and owners for access to this network creates **a recurring income stream,** while monetizing access to **digitized technical documentation** opens a second revenue channel. Furthermore, the platform positions OEMs to **leverage servitisation models** — offering maintenance packages, AI-driven predictive services, or even full lifecycle support. This can **lower the cost of ownership** for operators while boosting customer loyalty and aftermarket revenue.

MROs: Easier Compliance and Competitive Differentiation

MROs benefit **from streamlined access to up-to-date OEM documentation** and a simplified compliance workflow. Instead of spending hours piecing together information from scattered sources, mechanics can access the correct revision of manuals or SBs directly through the DPP. Issuing Verifiable Statements (VSs) via the platform is straightforward, reducing administrative effort while improving the credibility of their work. Although MROs pay for access to the OEM trust network, this cost is offset by faster audits, fewer compliance disputes, and **enhanced customer trust** — as their credentials are cryptographically verifiable by regulators and owners. Participation in an OEM-backed trust network also allows MROs to **differentiate themselves** in a competitive market, opening the door to new customers seeking verifiable, high-quality service.

Private and Commercial Aircraft Owners: Lower Costs and Greater Transparency

For private and commercial aircraft owners, the platform offers **unprecedented clarity** into their aircraft's compliance status. The AI-compliance co-pilot continuously monitors requirements, alerts them when maintenance is due, and even suggests approved service providers. This reduces the administrative burden traditionally handled by CAMOs or owners themselves, lowering costs while improving safety and reliability. Owners also benefit from **improved resale value**, as a fully verifiable digital maintenance history is far more attractive to buyers and financiers. For commercial operators, automated compliance tracking translates into **fewer audit findings** and **reduced downtime,** while for private owners, it means **peace of mind** that their aircraft is always airworthy and compliant without excessive effort.

By **aligning incentives** across OEMs, MROs, and owners, the platform creates a value chain where **compliance becomes easier, safer, and more profitable** for every participant.

OEM Role and ATN Value

While the upcoming DPP regulations will require OEMs to provide digital lifecycle records as a condition for selling their products, compliance alone does not create differentiation. OEMs will need to decide whether to build costly in-house systems or leverage shared infrastructure that reduces overhead and accelerates implementation. The ATN offers a federated solution where OEMs **share the cost of a common platform while retaining control** of their own data pods. Beyond basic compliance, ATN enables value-added services such as predictive maintenance, supply chain analytics, and AI-driven fleet support — features that OEMs can monetise as part of their aftermarket strategy. This combination of **cost efficiency and new revenue opportunities** makes ATN a strategic enabler rather than merely a compliance tool.

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Benefits & Strategic Opportunity

OEMs gain a unique chance to evolve from selling aircraft to offering full-lifecycle services. By embedding compliance management into a DPP-enabled, decentralised network, they can capture new servitisation income streams while reducing liability risk. Their control over digital airworthiness records strengthens brand retention, ensures maintenance is performed to OEM standards, and opens premium offerings such as predictive maintenance and AI-driven lifecycle support. With scale, OEMs can optimize supply chains, forecast parts demand more accurately, and deliver tailored service packages that enhance customer loyalty.

CAMOs benefit from a significant reduction in manual effort and compliance overhead. The platform automates applicability checks, streamlines audits, and provides structured data access, enabling CAMOs to focus on value-added advisory rather than administrative work. In the near term, this model supports collaboration with existing CAMOs, allowing them to operate more efficiently and differentiate through digital capabilities. Over time, as OEMs assume greater responsibility for digital oversight, CAMOs can reposition themselves as specialized service providers integrated into the OEM trust ecosystem.

Owners experience lower compliance costs, proactive maintenance alerts, and improved residual values thanks to fully verifiable digital records. Predictive AI insights reduce unplanned downtime and enhance safety margins, while seamless access to approved documentation and service providers simplifies the ownership experience. For private owners, this means peace of mind and reduced administrative burden; for commercial operators, it delivers measurable efficiency and stronger audit readiness.

Regulators benefit from structured, machine-readable data and a built-in audit trail. This enables faster, more targeted oversight without increasing the compliance burden on operators, aligning with EASA's digital transformation goals.

Strategically, **the transition from fragmented CAMO oversight to an OEM-led decentralised model** is the key opportunity. By starting with partnerships with existing CAMOs and gradually building a federated network of verifiable documentation, the platform can scale across fleets and geographies. This scalability allows efficiency gains at every level — fewer silos, more automation, and stronger safety outcomes — while positioning early adopters to lead in a DPP-driven regulatory environment.

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Roadmap & Investment Ask

The DAP initiative requires a phased roadmap, combining research collaboration, pilot implementation, and progressive scaling. This approach allows us to start with practical solutions (using existing PDF documentation) while building towards a fully DPP-compliant, AI-driven, decentralised ecosystem.

Phase 1 – Research & Core Infrastructure (0–12 months)

- Partnership with **Howest Cyber 3 Lab** to design and implement the decentralised trust backbone, **including DIDs, VCs, and Solid pod-based storage.**
- Develop governance models and credential schemas for airworthiness events.
- Build a **first version of the owner/operator wallet app** capable of storing VCs, uploading flight hours, and presenting compliance status.
- **Investment:** €200,000–€300,000 to cover research, prototype development, and initial infrastructure.

Phase 2 – Pilot Project with an OEM (12–24 months)

- Collaborate with a **Tier 1 OEM** (e.g., Diamond, Pilatus, Tecnam) to validate the network and app in a live environment.
- Integrate existing **PDF-based documentation** and link it to VC-based compliance events.
- Test dynamic AMP generation and credential flows with CAMOs and MROs.
- **Investment:** €300,000–€500,000 to refine the app, integrate with OEM systems, and run the pilot.

Phase 3 – Transition to Structured Data (24–36 months)

- Develop **PDF-to-JSON-LD translation tools** to convert legacy documentation into machine-readable formats.
- Encourage **OEM partners** (e.g. engine manufacturers like Rotax) to adopt **native digital documentation,** gradually replacing PDF workflows.
- Federate data pods across multiple stakeholders, ensuring each OEM maintains its own authoritative documentation while contributing to the ATN ecosystem.

- Expand AI reasoning capabilities for predictive maintenance and automated compliance audits.

Phase 4 – Scaling & Full Ecosystem Deployment (36+ months)

- Expand the network to include **multiple OEMs,** independent CAMOs, and regulators, leveraging early success to drive industry adoption.
- Implement **advanced AI co-pilot features**, enabling real-time maintenance recommendations, automated work order generation, and supply chain forecasting.
- Establish **commercial service models** with OEMs, integrating premium features and DPP-as-a-Service offerings for smaller manufacturers.
- Align with **EASA and ICAO digital initiatives**, ensuring regulatory recognition of DPP-compliant, verifiable airworthiness records.

Investment Justification

The platform is designed to balance cost reduction with OEM profitability. By pricing compliance at **~75% of current CAMO costs**, owners benefit from lower expenses, while OEMs capture recurring revenue with higher margins due to automation and AI.

For example, with an average **€1,500** current CAMO cost, the platform would be priced at **€1,125**. For an OEM with **4,000 European aircraft**, this equates to **€2–3M/year** at moderate adoption rates (50–70%). At a network level, with multiple OEMs onboard, the platform could generate **€8–12M/year** in recurring European revenue, with further upside from premium services.

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Appendices

Revenue Potential vs Investment

Phase	Scope	Price Model (75% of CAMO cost)	Investment (€)	Revenue Potential (€)
Phase 1	Research & VC network	N/A	200,000 – 300,000	Proof of concept
Phase 2	OEM Pilot (fleet ~ 4,000 aircraft)	€1,125/aircraft/year	300,000 – 500,000	2.2M – 3.1M
Phase 3-4	Multi-OEM scaling (fleet ~15,000 aircraft)	€1,125/aircraft/year	1M – 1.5M	8.4M – 11.8M

Sources for Market & Cost Estimates

Fleet size:

- Eurocontrol European Civil Fleet Size (2023) – approx. 22,948 civil aircraft, excluding ~7,200 airliners.
- Manufacturer fleet data (Diamond, Pilatus, Socata, Tecnam) – public registration statistics and industry reports.

CAMO costs:

- EASA Part-M/ML compliance market data and European CAMO pricing (typical €1,000–€2,500/year per aircraft).
- Industry inputs (CAMO managers, GAMA workshops).

Pricing model:

- Based on 75% of current CAMO fees, aligning cost savings for owners with OEM profitability.

Revenue projections:

- Calculated from current fleet sizes × subscription price × adoption rate.

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References

Reference	*Relevance to the DAP / DPP*
CIRPASS 2	EU-funded project developing the Digital Product Passport framework under the Ecodesign for Sustainable Products Regulation (ESPR). Serves as a reference for DPP architecture, governance, and data standards.
European Blockchain Services Infrastructure (EBSI)	An EU blockchain initiative enabling secure issuance and verification of verifiable credentials. EBSI aligns with DPP principles and is suitable for the trusted credential layer of the DAP platform.
ESPR (Ecodesign for Sustainable Products Regulation)	Regulation mandating DPP adoption across product sectors. Provides the legal foundation for extending DPP requirements to aviation products, including Annex I aircraft.
ESRI (Ecodesign Stakeholder Reference Implementation)	Reference implementations and guidelines supporting ESPR and DPP adoption in different product sectors. May provide guidance on technical and interoperability requirements.
EASA Digital Transformation Roadmap	Outlines EASA's priorities for digitisation and data-driven oversight, aligning with the platform's objectives for AI and DPP-enabled compliance management.
ICAO Annex 6 (Part II and III)	Establishes requirements for continuing airworthiness and maintenance, supporting the regulatory context in which DPP-linked compliance would operate.
EU e-Licensing Regulations	Upcoming EU framework mandating the integration of national personnel licences into an EU-wide digital standard. Supports the paper's point that nationally approved aircraft may also converge towards DPP compliance.

ATA iSpec 2200 and S1000D	Existing documentation standards used in aviation (currently PDF-heavy), referenced to explain why a shift to DPP/JSON-LD formats is necessary.
GAMA Workshop (Brussels, 2017)	Industry workshop highlighting inefficiencies in regulatory oversight and the need for standardisation — used in the pain points section.
EASA Part-M and Part-ML Regulations	Regulatory framework governing CAMO oversight and continuing airworthiness management. Important to contextualise the cost reduction potential.
W3C Verifiable Credentials Standard	Global standard underpinning verifiable credentials, reinforcing the platform's alignment with open standards.
Solid Project (W3C)	Reference for the data pod concept, underpinning the decentralised storage architecture proposed in the platform.
EU CIRPASS DPP Pilots	References any aviation-related DPP pilot initiatives, strengthening the claim of being ahead of the curve in regulatory alignment.

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Sample DPP

The sample code shows a simplified before-and-after example of a DPP structure in JSON, for an aircraft that undergoes an engine replacement. This illustrates how a DPP might evolve when modular and interoperable DPPs are used, as foreseen under ESPR.

Before: *DPP of an AutoGyro Calidus with its original engine*

```
{
  "dpp_id": "did:atn:aircraft:autogyro:calidus:SN12345",
  "product_type": "Aircraft",
  "manufacturer": "AutoGyro GmbH",
  "serial_number": "SN12345",
  "model": "Calidus",
  "production_date": "2024-06-01",
  "components": [
    {
      "component_type": "Engine",
      "manufacturer": "Rotax GmbH",
      "model": "912 ULS",
      "serial_number": "ROT-ENG-98765",
      "dpp_link": "https://rotax.com/dpp/912ULS/ROT-ENG-98765",
      "installed_on": "2024-06-01",
      "status": "active"
    }
  ],
  "modifications": [],
  "lifecycle_events": [
    {
      "event_type": "Manufactured",
      "timestamp": "2024-06-01",
      "location": "Hildesheim, Germany"
    },
    {
      "event_type": "Registered",
      "timestamp": "2024-06-10",
      "authority": "LBA Germany"
    }
  ]
}
```

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After: *updated DPP of an AutoGyro Calidus with its engine replaced*


```
{
  "dpp_id": "did:atn:aircraft:autogyro:calidus:SN12345",
  "product_type": "Aircraft",
  "manufacturer": "AutoGyro GmbH",
  "serial_number": "SN12345",
  "model": "Calidus",
  "components": [
    {
      "component_type": "Engine",
      "manufacturer": "Rotax GmbH",
      "model": "912 ULS",
      "serial_number": "ROT-ENG-98765",
      "dpp_link": "https://rotax.com/dpp/912ULS/ROT-ENG-98765",
      "installed_on": "2024-06-01",
      "removed_on": "2025-04-05",
      "status": "retired"
    },
    {
      "component_type": "Engine",
      "manufacturer": "Rotax GmbH",
      "model": "915 iS",
      "serial_number": "ROT-ENG-112233",
      "dpp_link": "https://rotax.com/dpp/915iS/ROT-ENG-112233",
      "installed_on": "2025-04-06",
      "status": "active"
    }
  ],
  "modifications": [
    {
      "mod_id": "mod-001",
      "mod_type": "Engine Replacement",
      "description": "Replaced 912 ULS with 915 iS engine per STC STC-001-ROTAX",
      "approved_by": "EASA Part 21J.345",
      "date": "2025-04-06",
      "documents": [
        "https://aviationtrust.net/stc/STC-001-ROTAX.pdf"
      ]
    }
  ],
  "lifecycle_events": [
    {
      "event_type": "Manufactured",
      "timestamp": "2024-06-01",
      "location": "Hildesheim, Germany"
    },
    {
      "event_type": "Registered",
      "timestamp": "2024-06-10",
      "authority": "LBA Germany"
    },
    {
```

"EVENT_TYPE": "ENGINE REPLACED",
"TIMESTAMP": "2025-04-06",
"LOCATION": "LOMMEL AIRFIELD",
"PERFORMED_BY": "AEROMAINT BV, BE.CAO.0012"
}
]
}

Notes:

- Each engine has its own DPP, referenced by a unique DPP_LINK (this could be a DID + VC if using SSI)
- Lifecycle events track key changes like manufacture, registration, and component swaps
- The modifications block provides regulatory and traceability information for compliance
- The DPP for the aircraft remains under the responsibility of AutoGyro GmbH unless delegated but is dynamically updated by the CAMO or maintenance organisation acting on the owner's behalf.

Verifiable Credentials and EBSI

VCs are cryptographically signed digital statements that can be issued by a trusted entity (issuer) and presented by a subject (holder) to a verifier, who can confirm their authenticity without relying on a central database. In the context of aviation, VCs can be used to record **maintenance events, airworthiness reviews, service bulletin compliance, and even mechanic authorization**. Each credential is linked to a DID, ensuring that the issuer's identity can be verified securely. This creates a chain of trust that is tamper-proof, portable, and instantly verifiable.

The **European Blockchain Services Infrastructure (EBSI)** provides a pan-European framework for issuing and verifying VCs in a way that is legally recognized across EU member states. Originally developed to support education credentials, business registries, and other government-related services, EBSI's architecture can also support **industrial use cases** where regulatory compliance and cross-border recognition are critical. By leveraging EBSI, aviation VCs — such as Airworthiness Review Certificates or compliance attestations for Service Bulletins — could gain official recognition across all EASA member states without each regulator having to maintain its own proprietary verification systems.

For this to work, a **government agency or regulatory authority** would need to be involved as a trusted anchor in the network, issuing the **root credentials** that recognize OEMs, CAMOs, and MROs as legitimate issuers of aviation-related VCs. The ATN could act as an integrator, ensuring that aviation credentials comply with both EBSI standards and the specific needs of the aviation sector. This approach would:

- Provide **legal and regulatory backing** for aviation VCs
- Enable **instant cross-border verification** of compliance records
- Strengthen the federated trust network by linking it to an **EU-recognized infrastructure**.

By integrating EBSI into its architecture, the ATN not only aligns with EU digital identity initiatives but also creates a **future-proof** mechanism where aviation compliance credentials have the same level of trust and interoperability as official government-issued documents. This could become a major differentiator in driving OEM adoption and regulatory acceptance of the platform.

Solid Pods

Solid Pods (Personal Online Data Stores) are a decentralized storage technology originally conceived by **Sir Tim Berners-Lee**, the inventor of the World Wide Web. The initial vision behind Solid was to give individuals back **control over their personal data**, allowing them to store it in pods that they own and control, while selectively granting access to apps and services. This approach breaks away from the traditional model where data is locked into siloed platforms, offering instead a system where data stays with the owner and applications come to the data.

While Solid was designed for personal data, its **principles of decentralization, fine-grained access control, and semantic data linking** make it increasingly attractive for **industrial and regulatory use cases**. Enterprises are adopting Solid to host machine-readable data that can be securely shared across organizational boundaries without losing control. The technology is also aligned with EU data sovereignty initiatives and standards, making it well-suited for emerging frameworks such as the **DPP**.

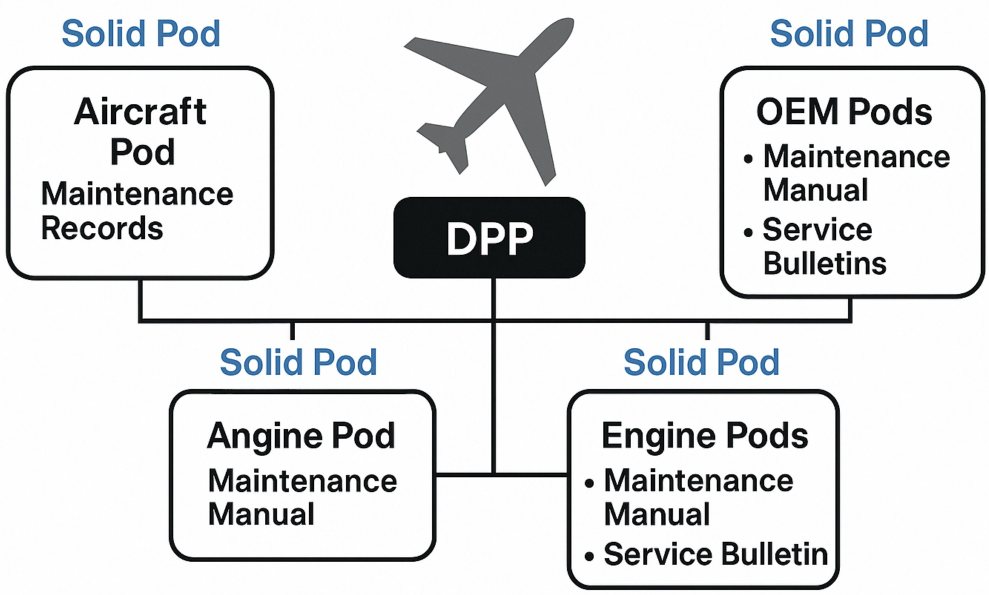
The ATN favours Solid Pods over other data solutions because they:

- **Align with EU DPP principles**, supporting linked data and decentralized ownership
- Provide **fine-grained access control**, allowing OEMs to define exactly who can see or update which documents

- Enable **federated architectures**, where each OEM controls its own data store but participates in a larger trusted network
- Are **AI-ready**, exposing data in formats (RDF, JSON-LD) that can be reasoned over without costly transformations.
- Avoid **vendor lock-in**, relying on open W3C standards.

In ATN's architecture, **each OEM hosts its technical manuals, service bulletins, and other ICAs in Solid Pods under its control.** The aircraft's DPP does not copy these documents but instead **links to them,** ensuring that every stakeholder always retrieves **the latest approved version**. Access is granted through **credentials and policies**, not static logins or manual sharing. This structure keeps control where it belongs — with the data owner — while making the ecosystem interoperable and scalable.

Illustration



Federated Documentation Structure

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Glossary of Terms

Term	*Definition*
Aircraft Maintenance Programme (AMP)	A structured document that outlines all required maintenance tasks, intervals, and inspections to ensure continued airworthiness of an aircraft. In the proposed system, the AMP is generated dynamically from the aircraft's DPP, automatically incorporating updates from OEMs and regulators.
Airworthiness Directive (AD)	A legally enforceable directive issued by aviation authorities (e.g., EASA, FAA) requiring corrective actions to address safety issues. The platform ingests ADs as machine-readable objects to automate applicability checks and compliance updates.
Annex I Aircraft	Aircraft falling under national aviation regulations rather than full EASA certification. While historic Annex I aircraft may remain exempt, newly built types are likely to require DPP compliance, creating an opportunity for standardisation across Europe.
Continuing Airworthiness Management Organisation (CAMO)	An organisation approved to manage the continued airworthiness of aircraft by planning, tracking, and verifying compliance with maintenance requirements. CAMOs currently face inefficiencies due to fragmented and paper-based processes.
Decentralised Identifier (DID)	A globally unique identifier used to securely verify the identity of entities (e.g., OEMs, MROs) in a decentralised system, without relying on a central authority.
Digital Product Passport (DPP)	A machine-readable, modular record containing essential product data, including configuration, compliance, and environmental information. The DPP forms the foundation of the proposed platform by linking all lifecycle events and

Term	*Definition*
	documentation.
General Aviation (GA)	A category of aviation that includes all civil aircraft operations other than commercial airline and military flights. GA is a primary target for cost reduction through the DAP.
Instruction for Continued Airworthiness (ICA)	Documentation issued by OEMs detailing maintenance tasks, intervals, and methods to ensure continued airworthiness of a product. ICAs are stored in Solid pods and linked to the DPP in the proposed system.
Maintenance, Repair, and Overhaul (MRO)	Organisations performing actual maintenance and repair work on aircraft. In the platform, MROs issue VCs to confirm performed work and update the DPP.
Minimum Equipment List (MEL)	A document listing equipment that may be inoperative while an aircraft remains airworthy under certain conditions. The platform supports digital MEL integration to improve compliance tracking.
Original Equipment Manufacturer (OEM)	The manufacturer of the aircraft or its components. OEMs are expected to play a leading role in a DPP-enabled ecosystem, controlling documentation and issuing compliance-related credentials.
Service Bulletin (SB)	Manufacturer-issued notifications recommending or requiring specific maintenance actions or modifications. Some SBs become mandatory via ADs. In the platform, SBs are stored digitally and linked to specific aircraft configurations.
Solid Pod	A secure, web-based data storage mechanism controlled by the data owner. In this system, Solid pods hold technical documentation and lifecycle records, ensuring decentralisation

Term	*Definition*
	and verifiable access control.
Verifiable Credential (VC)	A cryptographically signed, tamper-proof record issued by authorised parties (e.g., OEMs, MROs, CAMOs) to confirm compliance events. VCs link directly to the aircraft's DPP and are verifiable by any stakeholder.