The case for a globally accessible, secure digital parts platform
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The future will likely be a place where every part has a trusted digital identity and historical record that is immediately accessible to those with the right credentials.

The future of aerospace is happening rapidly. Everywhere one looks, there is discussion about digitization, big data, analytics, predictive modeling, robotics, blockchain, cloud and more. But how do these elements come together to create value in a way that is easy for the industry to access and adopt? How will industry players use them to further ambitions of a more collaborative and digitally efficient future supply chain? How does one create the right incentives to use shared solutions? How will data ownership be treated and information secured in a way that only those with appropriate access have it? These are some of the many questions that the industry will be wrestling with in the coming years.

This study introduces a solution for a globally accessible, digital platform of aircraft parts data that is created automatically via digitized operations, shared and accessible through ecosystem partners, and able to power new and innovative business processes and potentially entire business models. This solution allows part records, and thus the part’s chronological lifecycle, to be centrally stored with consolidated data from all distributed industry players that handle the part as it moves throughout the supply chain. Today, each player has its own record of the time spent interacting with the part. This data is often in physical paper form. When the time comes to share data with the next player in the supply chain, only necessary paper documents are duplicated and shared with ecosystem partners. This often gives rise to great inefficiencies, poor quality, and slow-moving parts as they change hands. When seen against the backdrop of the full magnitude of the aerospace & defense supply chain, the implications are enormous for potential improvements in supply chain velocity, working capital, forecasting, and human resources.

This study argues that having full visibility to the part lifecycle in a secure, trusted, and easily accessible digital format could provide solutions to several of the key issues facing the industry today.
Why is this desirable?

Massively reduce burden of paper leading to digital traceability

The aerospace & defense industry is constantly under the burden of creating, processing, managing, and storing paper records. Much of this is to satisfy regulatory compliance, and is a key contributor to aviation safety and IP protection, but much of it is a relentless and constant duplication of documents as they move across organizational boundaries. Furthermore, companies store years of part records in warehouses, third-party locations, and even newly acquired shipping containers as the sheer volume of paperwork overwhelsms the organization.

It’s no wonder that multiple aerospace companies appear to be at least thinking about digitizing much of the paper they traditionally process as they manufacture or interact with parts, and integrate them into end-items or perform MRO activities. The reasons for this are obvious: paper records are typically time-consuming to create, prone to error, difficult to search for, and even harder to extract meaningful information from.

As supply chain partners interact with parts, past records are consumed and new records are created. However, each party creates and stores their own view of the part—there is no ‘part-centric’ perspective that provides a view from the part’s standpoint and gives insight into how that part performs over its lifecycle, whether in the supply chain or while operating. Until recently, there has been no facility to easily contribute to the part’s historical record. Furthermore, knowing where parts are and how they are moving through the supply chain is something that has been challenging the industry for many decades.

Having traceability and visibility to where parts have come from and which end items they have been installed on is extremely important for safety and compliance with airworthiness directives as well as other reasons. There appears to be a valuable opportunity for industry players to better utilize this valuable information stream.

Increase efficiency and quality of operational execution

Today, industry companies sometimes struggle with simple processes, such as receiving parts. The first pass quality rates are often not as high as they should be due to poor or missing paperwork. These paperwork issues can stop parts in their tracks, lock up parts in quarantine cages, and kick off the endeavor to correct the problem. In fact, at a large U.S. airline carrier, Deloitte was asked to audit accessibility to part documentation. Deloitte found that greater than 60 percent of the issues with part receiving were due to poor or missing paperwork, and on average it took 34 days to correct the problem.¹

As parts slow down, capital generally gets tied up, and inventory levels increase to fill the gap. In the worst of cases, parts are scrapped (due to missing logbooks) or re-induced into the MRO process to be completely overhauled at great expense. In the MRO world, customer orders without proper paperwork can disrupt the planning process, increase turn time, and reduce cash velocity—a situation where no one wins.

In an ideal digital platform world, the part would be shipped with an electronic advanced shipping notice (ASN), and all the required documents would be posted against the part record. Both parties would have access to the records before the part is even loaded on the truck. This helps give adequate time to correct poor or missing paperwork and greatly increases the chances that it will be smoothly received.

The same solution can be applied to any other interaction with the part during its custody. Whether a company performs a dimensional check or other quality inspection, or documents the MRO process steps and parts consumed, the events can be pushed to the digital parts platform along with any supporting documentation. That event will be owned by its author, encrypted, and only seen by select parties in the ecosystem. This level of chronological documentation of a part’s history is fundamental to maintaining an asset’s value, and greatly improves the level of effort involved in process sharing and managing records.

Increased collaboration with supply chain partners leading to greater forecasting accuracy

Future application of traditional MRP and other forecasting techniques will likely grow and extend beyond the four walls of the enterprise. Other ecosystem trading partners may gain access using the digital parts platform—creating an ‘Ecosystem MRP’ where the accuracy of ordering, fulfilling, forecasting, and executing supply chain planning will increase significantly. Today, too many of the supply chain partners provide less than accurate inventory and lead-time data—mostly to avoid running afoul of service level agreements and other contractual performance metrics. The impact of this is greatly inflated lead times throughout the supply chain. By running MRP and other algorithms on a broader and more accurate dataset—one in which all parties are incentivized to provide this data—supply chain and economic performance can greatly increase and simultaneously reduce obsolescence, stock-outs, AOGs and over-stocking of the wrong parts.

Remote monitoring of compliance

Regulators can also benefit from the use of a digital parts platform. The Federal Aviation Administration and other regulators spend millions of dollars each year traveling around checking compliance to Airworthiness Directives (ADs) and other activities. With parts registered on a digital parts platform, the owners or custodians of affected parts

¹ Deloitte research and analysis in support of a client engagement.

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could be instantly notified of a new AD that requires implementation. Given that MRO records for parts would be pushed back to the platform as part of the part’s historical record, the regulator could immediately be able to see who has complied with the directive, those that are working on it, and those that have yet to start. Digital parts platform implementation can increase communication and collaboration, provide greater transparency, higher levels of accuracy, efficiency and an overall increase in safety of the regulatory system.

**Avoid counterfeit and previously scrapped parts**
Establishing a safe source of supply—especially in electronic parts—has been a highly challenging and frustrating task for the industry. Safety implications notwithstanding, there are significant compliance and operational performance implications as well.

In an ideal environment, each part is manufactured, its part/serial/batch number is captured along with images of the part label and its distinguishing features, and it is recorded on the blockchain. Once on the blockchain, it can be recalled by a customer, customs official, or other actor throughout the supply chain. Furthermore, as blockchain participants develop their public reputation on the platform, the platform can become a source of information about trusted suppliers for specific parts in the community. Parties will be able to post images of parts they have found to be counterfeit and to educate buyers on what to be on the lookout for.

Lastly, parts that have been scrapped by good actors can be registered on the platform, along with their serial numbers, images and other data. This can enable the platform to identify these parts and alert supply chain participants if any parts make their way back into the supply chain.

**Discover new insights from big data analytics**
Big Data and analytics are buzz words that have been circling the industry for some time now—yet how does one collect, store, manage, access and analyze this data? To collect and analyze a truly big dataset, there needs to be a common data standard, storage mechanism, and a way to secure data from nefarious actors, as well as create clean and trusted records that all parties using it can trust. To achieve its Big Data ambitions, this data platform must be able to cross organizational boundaries, be available for all to use, and have a level of security capability that allows sharing with only those with appropriate credentials.

**OCR, Natural Language Processing, and Machine Learning can bring old records to life**
The advances in optical character and even handwriting recognition (OCR) and natural language processing are getting better and better each day. Even the most basic OCR capability will allow searching for strings of characters in a large dataset of digitized records. For example, something as simple as recalling all records with a specific serial number can be done with ease.

Furthermore, as machine learning and artificial intelligence make bigger strides, even the most ‘dirty’ paper records could potentially gain utility as the solutions are able to interpret paper records with more accuracy. It is not outside the realm of possibility to imagine a solution that is able to learn to distinguish a P.O. from two or more separate customers. Examples of machine learning, via image recognition (P.O. format, in this example), exist today and are typically highly effective with very low error rates. When this type of image recognition is combined with OCR and natural language processing, even further analysis of documents is possible.

**The potential birth of data markets**
Once the platform exists to securely house big data, and paper records have been adequately digitized and processed to the point that a truly big dataset can be created, aerospace & defense data markets could start to emerge and gain traction amongst groups of progressive industry supply chain thinkers.

As data is collected across the supply chain, traditional ‘blind-spots’ can be reduced. This will provide a much richer visualization of how a part performs. For example, this information will be very useful to OEMs as they strive to improve reliability, availability, and maintainability while engineering and offering performance upgrades. This data will also be critical to improving forecasting, planning, and spares inventory optimization to support operations. Until now, the industry has been relying on a partial dataset, with planning assumptions for key variables such as supplier lead time or MTBF having a range of quality and accuracy.

Until now, there has been no easy way to collect, manage, sell, and distribute data. Blockchain enables micropayments to be made per each record accessed, and while owners can receive payment, other companies with an interest in that data can mine for and analyze it. This could be OEMs, 3PLs, or even third-parties providing subscription-fee managed analytics or benchmarks to their customers.

The key takeaway is that an industry player’s paper records are extremely valuable, and with the correct approach, solutions, and tools they can be differentiators in today’s aerospace & defense market.
Why has this not yet been achieved?

A classic change management problem remains
Let’s face it, the industry is typically resistant to change, conservative, and naturally errns on the side of caution for any new technologies or change in processes. Getting industry executives comfortable with cloud infrastructure, encryption, blockchain and other concepts may take time and will likely be led by industry visionaries and leadership groups who have the courage to press forward and shape how the industry will use these new technologies.

As more millennials join the industry and move upwards in the organization, the more acceptable newer technologies will likely become, and thus the more prevalent the various solutions and their respective rates of adoption will be.

There is a generally bimodal response when presented with the idea of a globally available digital parts platform—either the audience is highly resistant and does not want to lead, or they quickly reach the conclusion that this is the future of the industry and they cannot see any other path forward.

IT capability and resources significantly decays from the largest players to the smallest
Every player in the aerospace & defense supply chain plays under the same regulatory ruleset. This ruleset accepts paper records as a standard and allows digital records when produced in accordance with some boundary conditions. What typically happens is that everyone defaults to paper. It’s like a business meeting taking place in Germany where, because of one English speaker in the room, everyone defaults to English. A similar scenario is playing out in the aerospace industry with respect to records management.

Any platform solution that aims to create a large footprint of digital part records for the industry and thus great utility, cannot ignore smaller companies. Therefore, the solution should be simple enough to require minimal IT investment to implement, and very low cost to use over time.

Point-to-point EDI to every customer can be expensive to build, maintain, and scale
EDI has been around longer than the internet itself, and yet it is not everywhere we look.

Because each counterparty has a different data standard, and each connection needs to be specified and managed individually as things change, building point-to-point EDI typically takes significant investment and effort to manage over time. Furthermore, as a supplier’s ecosystem grows, so does the potential EDI burden—a supplier in this world should make a single point-to-point interface for each ecosystem partner.

Given that not all suppliers or customers are of sufficient volume to justify the cost and effort, it follows that most players are left out. Only a handful of companies drive the highest volume; thus, that is where the investment goes.
Why has this not yet been achieved? (cont.)

No easily accessible standard for exchange of digital aerospace part information
Although industry specifications such as SPEC2000 are available, they can be costly (presently SPEC2000 is approximately $8,000) and this, combined with the level of effort and talent requirement, contributes to leaving the less advantaged players out.

Capital is selfish
So far, most investment in digital has been for the company’s own gain (digitizing paperwork, for example) and not spent on facilitating the space between trading partners. It’s almost as if companies are saying, “That’s not my space, if I improve that, then everyone benefits on my dollar, and I’m not incented to do that.” No matter how much money is spent by the large industry players on digitizing internal operations, they potentially still need to receive and manage paper unless a more affordable option is found for the remainder of the supply chain.

Tech components to build a trusted, reliable and cost-effective platform for aerospace parts are now available
Building a successful digital parts platform requires the integration of many technologies, some of which are well known and widely used (mobile, for example) and others are nascent and just becoming mainstream (Machine Learning, image recognition and blockchain). Right now, all the components needed for a stable and operational parts platform are available and are being used in pilot projects around the world.

Case study: Digital Platform Pilot at a large, global aerospace parts distributor

Deloitte and Parts Pedigree (a newly formed startup of aerospace and technology veterans) are currently engaged in a pilot program at Pattonair.

Although the opportunity set is broad once parts are digitized, the scope of this case focuses on the receiving and shipping processes only for now.

Problem statement
Less than 3% of current suppliers can produce a digital ASN, which can slow down the receiving process. Significant manual entry into the ERP system for each inbound part is required and lack of inbound documentation quality could potentially hold parts up—increasing working capital. Pattonair has measured a 10X improvement in time taken to process a manual receipt when converting a supplier to digital ASN. Thus, the immediate goal is to give every supplier an easy “and no-excuses” way to create a digital ASN.

Note: Providing a frictionless and cost-effective facility for suppliers to create digital ASNs not only helps Pattonair, but it also immediately provides digital ASNs for all the supplier’s customers. As the number of customers goes up, the return on the initial investment amplifies—not to mention the potential value in the ability to track and trace parts and their documents.

In addition to this, managing paperwork is one of the single largest factors to slowing down parts in the supply chain. It singularly contributes to high levels of non-value-added time spent working on documentation issues during the receiving process and beyond. Lastly, significant time is spent searching for paperwork to respond to customer requests, etc.

3. Data provided by Pattonair.
4. Analysis based on pilot program with Pattonair.
Opportunity for the Platform customer
1. Increase velocity of the receiving process 10X through use of ASN to ERP automation
2. Increase first-time quality during the parts receiving process
3. Decrease physical touch time spent receiving parts
4. Decrease time parts spend in quarantine while clerks work on documentation issues
5. Increase visibility and tracking of parts throughout the supply chain
6. Reduce time spent creating and printing documents such as Certificates of Conformance
7. Increase confidence and trust in records via the use of the blockchain
8. Provide the ability to develop custom apps on top of this new ecosystem data

Opportunity for suppliers
1. Ability to offer a digital SPEC2000 ASN to all their customers via a single interface to a digital platform at zero cost (something that is not available today)
2. Reduce time spent managing physical paper
3. Reduce time spent searching for paperwork to satisfy customer requests
4. Ability to ship without paperwork
5. Ability to track and trace parts throughout the supply chain
6. Increase the ability to thwart counterfeiting of parts once parts and their images are stored and available on the platform
7. Ability to create custom apps on the platform

Scope
Current scope is focused on the inbound receiving and outbound shipping process. A supplier may upload digital documents to the Advance Shipping Notice (ASN) manually or via API provided by the platform. The receiver gets an advanced notice and has time to inspect the relevant documents and correct any issues before the part arrives. This supports a fully digital end-to-end process, whereby the outbound parts are shipped without physical paperwork. Each party has access to a single copy of the paperwork and may view it at any time via image recognition of the part or searching for the part historical record on the platform via a mobile app or web interface.

How it works

Supplier: Upload

1. Perform physical receipt
2. Digitize and upload supplier paperwork
3. Put away part

1. Create an operations card
2. Add digital documents to operations card
3. Create a shipping card
4. Add documents to a card

Customer: View

View digital part record on PP App

Cloud database

Shipping card
Operations card
Shipping card
Return card

Part record

Time stamp
User
Other data

Time stamp
User
Other data

Time stamp
User
Other data

Time stamp
User
Other data

*Doesn’t depict integration with AS400

Extends pilot functionality to 3rd parties

Parts Pedigree Platform

Closing thoughts
Full visibility to a part’s lifecycle and the valuable insights it could potentially yield continues to be a highly desirable destination for the aerospace & defense industry. Providing a secure, trusted, and easily accessible digital platform, like Parts Pedigree, could potentially create new sources of competitive advantage through business model innovation, deliver greater efficiency, and increase the likelihood of differentiating those industry players that choose to take advantage of this powerful new combination of technology.
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Deloitte can offer informed perspective on blockchain and other digital technology solutions.

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