Monetizing blockchain

A tailwind for aviation

BOEING

IBM Institute for Business Value

A changing aviation ecosystem

Imagine a scenario in which all companies, whether large or small and independent of their location, could be equal participants in the global aviation ecosystem. A world in which absence of size or greater distance from others does not diminish trust or create barriers to entry.

Sound far-fetched? Perhaps not. The growing use and acceptance of blockchain can help make this scenario a reality. Blockchain can help assure trust and transparency for the largest US-based airline or a small, family-owned parts manufacturer in Morocco.

Aircraft owners want transparency

Aircraft owners have achieved new levels of knowledge and sophistication about commercial jet travel and their leased aircraft assets. Increasing transparency in operating and maintaining commercial aircraft is accelerating the demand for blockchain beyond traditional defense and commercial aviation. With the expected growth in business aviation and time-share aircraft travel, aircraft owners and fixed-based operators (FBOs) will demand the security and transparency provided by blockchain.[1]

Interest and innovation in Digital Reinvention™ is surging across industries. Businesses are reinventing themselves, using emerging technologies — such as blockchain — to drive value and growth and, in some instances, create new markets.

Many organizations are digitally transforming by integrating multiple digital processes. Although digital transformation involves changing how things are done, Digital Reinvention goes further. Digital Reinvention reimagines how an organization operates. It involves being in a totally new business, providing compelling new experiences, establishing a new focus, building new areas of expertise and devising new ways of working.[2] These enterprises are generating returns on the value of their data. Most important, Digital Reinvention is making it possible for companies to offer highly individualized experiences to their partners, suppliers and end-user customers.[3]

"Today's owners want to understand what is happening with their asset and know that it is being run efficiently and maintained correctly."

Scott Cutshall, Director of Brand Development, Clay Lacy Aviation[4]

Technologies are converging

Digital Reinvention facilitates the convergence of the physical and digital worlds. Powerful technologies enable business capabilities such as blockchain, the Internet of Things (IoT), automation and artificial intelligence (AI). These key elements of innovative platforms are being systematically deployed to increase trusted and transparent engagement across business ecosystems.

From back office to front office, and now in the middle office where technology and business meet, more enterprises are digitally reinventing their operations. This reinvention doesn't happen in a vacuum. It's a team sport that requires understanding all players, both internally and externally.

Transforming the aviation industry to a more responsive ecosystem with higher efficiency and nominal disruption is a complex undertaking. It's less about specific technologies and more about the outcomes those technologies bring to the enterprise.

Blockchain keeps a record of every defined transaction made by every authorized entity. Each entity can observe—but not change— each record. Blockchain becomes an expanding, chronologically ordered list of cryptographically signed and irrevocable transactional records shared by all distributed ledger owners in a network. Each record contains a time stamp and reference links to the previous transactions. Anyone with access rights can trace back a transactional event to any point in its history.[5]

The vastness of IoT includes devices such as phones, luggage tags, robots and cars. A jet engine that has been fitted with thousands of IoT sensors generates 10 GB of data per second.[6] At the same time, AI is accelerating the ability to collate and curate this vast amount of IoT streaming data. What's missing is a real-time, record-keeping arrangement that is verifiable, immutable and trusted. That's where blockchain comes in.

Blockchain and the bottom line

Now, leading aviation companies are exploring ways to use blockchain to drive new revenue and take out cost. This shift has implications across the aviation ecosystem, which is a complex network of manufacturers, airlines, maintenance repair teams, regulatory authorities, banks and customers (see Figure 1). The benefits to companies can be threefold: higher revenue, improved efficiency and more robust compliance. New revenue opportunities exist in several areas:
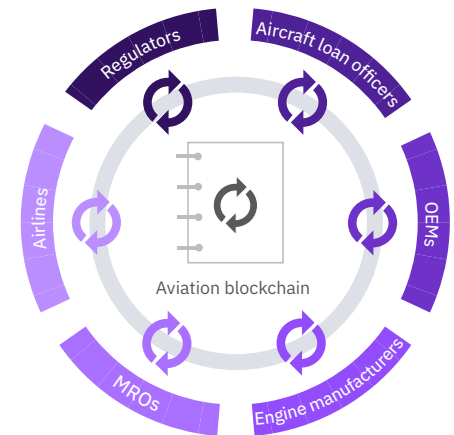
– *Aircraft loan officers:* Financial institutions depend on the predicted value of aircraft at a future date. Blockchain can provide an immutable record of an aircraft's performance and maintenance history. Predictable value helps the owner of the aircraft optimize decisions on future usage.

– *Original equipment manufacturers (OEMs):* Blockchain tracks the "chain of custody" (known as provenance) of a physical asset across the ecosystem. It tracks an asset from its component parts, through assembly and each step along the way until the asset reaches its final destination. OEMs are most vulnerable to counterfeiting. Using blockchain can help OEMs accept revenue at the time of parts distribution far sooner than traditional 30-60-90-day terms.

– *Engine manufacturers:* In much the same way it helps OEMs, blockchain can aid in the transfer of reusable aviation assets. Much of the value of these assets depends on the accuracy and quality of documentation.

– *Aviation maintenance repair and operators (MROs):* Blockchain can help provide a competitive advantage because it facilitates correct configuration management from original design through the aftermarket. Blockchain can track staff training, experience and qualifications, as well as validate data produced by the Internet of Things. MROs also measure aircraft flight hours. With blockchain, aircraft maintenance and performance can become as predictable as parts, repairs and flight data.

Figure 1
Blockchain across the aviation ecosystem

Regulators · Aircraft loan officers · OEMs · Engine manufacturers · MROs · Airlines

Aviation blockchain

New efficiency and compliance
opportunities include:

- *Aircraft utilization:* Unplanned disruption
to an aircraft can cost up to 50,000 USD
an hour.[7] To compensate, airlines manage
spare parts inventory of more than 1 billion
USD.[8] Blockchain can help minimize the cost
of disruption and the size of spare
part inventories.
- *Transportation:* Where there is jurisdiction
acceptance, blockchain can expedite
transportation approvals, shipments and proof
of receipt through trust, consensus and smart
contracts.
- *Regulatory agencies:* The FAA expends
an enormous effort to identify and mitigate
suspect or unapproved parts in the
aviation industry. Costs could be reduced
substantially using an immutable solution for
provenance.
- *Cross-aviation ecosystem:* Blockchain can be
used to determine which devices are talking
to each other and to resolve financial disputes
across the ecosystem.

From autonomy to action
In addition to driving new revenue and reducing
costs, blockchain enables autonomy. With AI and
machine learning, blockchain has the potential
to act as a digital intermediary within aviation
industry systems to facilitate acquisition and
distribution of information in a timely manner.

Smart contracts are another way blockchain
helps simplify business and eliminate the
"middle man." With AI, smart contracts become
more flexible and less susceptible to fraud as
the system learns over time which scenarios
are permissible.

With the advent of IoT and "smart machines,"
the ability to monitor manufacturing processes
for completeness and quality is achieved
systemically. This monitoring capability,
combined with blockchain, provides a trusted
record of the process, tools and materials
utilized both by people and machines. Quality
control, for example, becomes a designed-in
effort that can enable autonomic correction
and variance reporting in the manufacturing

process. The transformation to systemic quality assurance within the supply chain and manufacturing may improve product quality and reduce the disruptive variability of non-conforming products.

Four steps to get underway

– Identify and select blockchain champions. Recruit skills to monitor and evaluate developments and differences in blockchain offerings, standards and consortia.

– Focus on business issues. Blockchain is a potentially disruptive technology. However, the focus should be on solving specific problems and creating opportunities to transform the industry, rather than finding ways to use blockchain.

– Get started. Select a discrete opportunity for a blockchain proof-of-concept. Record the expected benefits and track results that measure attainment. Where successful, grow the blockchain program quickly.

– Digitally reinvent. Explore ways blockchain can help redefine existing business models or help create new ones.

The use of blockchain in aviation is opening new opportunities for innovation in an industry in which errors are simply unacceptable. The accelerating adoption of digital ledgers is leading to changes in aviation ecosystems, new technical standards and better customer experiences. So, the question is: will you lead in building the new blockchain ecosystem and setting new standards? Or will you be chasing them? The choice is yours.

About ExpertInsights@IBV reports

ExpertInsights@IBV represents the opinions of thought leaders on newsworthy business and related technology topics. They are based upon conversations with leading subject matter experts from around the globe. For more information, contact the IBM Institute for Business Value at iibv@us.ibm.com.

Experts on this topic

Robert J. Rencher

Senior Systems Engineer and Associate Technical Fellow Enterprise Information Technology The Boeing Company https://www.linkedin.com/in/robert-rencher-6a56527/ robert.j.rencher@boeing.com

Jason Kelley

General Manager Blockchain Services, IBM https://www.linkedin.com/in/jason-kelley-599330/ jekelley@us.ibm.com

Kevin Donaldson

Associate Partner IBM Services https://www.linkedin.com/in/kevin-donaldson-2a87345/ donaldsk@us.ibm.com

Notes and sources

1 "5 Trends in Business Aviation in 2018." Clay Lacy Insights Blog. 2018. https://www.claylacy.com/insights/2018trendsbusinessaviation/

2 Thach, Donna. "The Urgency of Digital Reinvention: IBM's Saul Berman Weighs In." ITSMA. April 5, 2017. https://www.itsma.com/urgency-of-digital-reinvention-ibms-saul-berman/

3 Land, Greg, Anthony Marshall, Brian O'Rourke, Steve Peterson. "Here, there and everywhere: Digital Reinvention in travel." IBM Institute for Business Value. September 2017. https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=GBE03878USEN&

4 "5 Trends in Business Aviation in 2018." Clay Lacy Insights Blog. 2018. https://www.claylacy.com/insights/2018trendsbusinessaviation/

5 Rencher, Robert, J., Sumant Hattikudur, Miles Kotay, Peter Keane-Rivera. "Systemic Adoption of Blockchain Technology within the Aviation Ecosystem." The Boeing Company. October 10, 2017.

6 Rapolu, Bhoopathi. "Internet Of Aircraft Things: An Industry Set To Be Transformed." AviationWeek. January 18, 2016. http://aviationweek.com/connected-aerospace/internet-aircraft-things-industry-set-be-transformed

7 Rencher, Robert, J., Sumant Hattikudur, Miles Kotay, Peter Keane-Rivera. "Systemic Adoption of Blockchain Technology within the Aviation Ecosystem." The Boeing Company. October 10, 2017.

8 Ibid.

IBM®