

K Systems dApps

A Set of Decentralized, Ethereum
Blockchain Based, ISO 9001, ISO AS/EN
9100, ISO/TS 16949, Compliant Quality
Management Systems and Production
Workflow Validation Systems for the
Aerospatial and Automotive Industries.
<But mostly we work for a further evolution of Humanity>

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Contents

1.	Executive Summary.....	2
2.	Abstract	2
3.	The big problem.....	3
4.	Our Solution.....	5
a.	Blockchain Technology	5
b.	Inter Planetary File System <IPFS>	6
c.	ISO 27001, the international information security standard	6
5.	The Working Prototype.....	6
6.	An Example of K SYS 1 Implementation.....	6
7.	Conclusion	8

1. Executive Summary

K SYS (K Systems) are a set of DApps that live on the Ethereum blockchain. The first of them, K SYS 1, is a production & quality management system (QMS) DApp for the aero spatial industry. It is a decentralized application that can be used to version, store, secure, certify and track all the data regarding the industrial production of a car, an aircraft or a satellite module. Forever.

K SYS dApps' implementation of the ISO Quality standards is achieved using multiple Smart Contracts that are linked to each other and that use the only decentralized consensus algorithm capable of meeting the performance requirements of applications on the blockchain, Delegated Proof of Stake (DPOS).

Each step and document involved in the production flow of the parts is permanently stored on the blockchain and IPFS, at the end of the process the parts are automatically compliant with the ISO quality standards, since the completion of every step is mandatory in order to move to the next one.

The K SYS dApps use the KSYS ERC20 token to reward the suppliers that have submitted the parts, and/or the documents required by the project, and uses IPFS to store the actual data (transport documents, drawings, emails, CAD files, invoices, CAM part programs etc.), they have a built-in penalty system for the suppliers or workers whom do not deliver on time, at the requested rate or at the required quality level.

K SYS dApps can operate on private blockchains and private IPFS clusters of nodes.

K SYS 1 is based upon:

- *The ETHEREUM blockchain (but may go to EOS in the future)*
- *ETHEREUM Smart Contracts (but they could be EOS SCs in the future)*
- *The «Inter Planetary File System» (IPFS) (we do not plan to change this).*
- *An enormous amount of experience in the IT security business and the Aero Spatial, Automotive and EN 9001 quality fields.*

2. Abstract

AS9100 (BS EN 9100) is the aerospace industry standard for quality and risk management.

Benefits of implementing the standard can include a reduced risk of product and service mistakes and fatal failures and, mostly, securing a license to trade.

The production workflow must proceed alongside the quality and risk management to push the output at the very top levels.

The K Sys dApps are designed to help industries delivering AS/EN9100 or ISO/TS 16949 certified parts seamlessly.

3. The big problem

Implementing a formal QMS (Quality Management System) in an organization that doesn't have one, but hopes to be ISO 9001 compliant or certified, presents a unique set of challenges.

Blockchain is the solution, and K Systems LTD provides the dApps to achieve amazing results, we do that (achieving amazing results within the layer 7, 8 and 9...) since 1996.

A few of the challenges companies must face while attempting to implement the ISO quality standards without the K SYS QMS dApps are:

- Context of the organization - requires an understanding of the external and internal factors that could impact the organization's ability to meet its objectives.
- Identification of Stakeholders and Interested Parties - Although self-evident, the revised standards enlarge the group of stakeholders and interested parties beyond customers and owners / shareholders of the organization.
- Risk-based Thinking - An added dimension to decision making at all levels within the organization and encourages the consideration of risks and opportunities with achieving the desired objectives. Process level analysis has been present in sector specific standards; however, for many organizations the requirement to demonstrate risk-based decision making is challenging.
- Process Approach - A challenge even before the 2015 revisions. Organizations continue to address their management systems on the obsolete clause basis and are in the journey of thinking along business

processes. Identifying business processes at a relevant level and assigning process indicators for effectiveness, has proven to be of great value to those organizations that have successfully made the transition.

- **Out-sourced Processes** - The applicability of these requirements has not changed and yet the type of control to be exercised over outsourced processes includes consideration of the environmental aspects and impacts over the life cycle of the product or service.
- **Leadership and Commitment** - The requirement to demonstrate commitment to the organization's quality or environmental management systems and ensure the integration of those requirements into the organization's business processes has drawn in executive responsibilities in the certification processes. By engaging top executive management in such decisions, organizations are now able to demonstrate the value of an effective management system in assuring business success. Complex structures and large organizations have the difficulty of assuring and demonstrating such leadership engagement and commitment for processes previously delegated to the "quality" or "environmental" department.
- **Multi-Site Coordination** - Larger organizations have an increased level of complexity with multiple locations and assuring consistent roll-out of business processes across the locations. Especially when the focus is in awareness, training, and competency development in the requirements such as risk-based thinking across all levels of the organization. Technology can be a great friend for such organizations in deploying the knowledge across multiple locations.
- **Timing** - In many large organizations, the timing decision on planning and implementing upgrades to the latest revision is made at a corporate or divisional level. While global or corporate processes are more conducive for changes with a short lead-time, it is often a challenge at site / plant level to deploy the information and changes with short notice. Deployment of internal assurances like internal audits, corrective actions, and management reviews requires planning prior to undertaking the upgrade assessments. A project plan that includes timing of awareness, education, training, and gap assessments could make the journey more predictable and less prone to risks.

- **Terminology** - The revised standards indeed include new terminology for business concepts currently in place. Most organizations practice some version of risk-based thinking in their decision making; however, building awareness and implementing risk-based thinking into all levels of the organization and into all the business processes is challenging. Similarly, integrating terminology such as context of the organization, stakeholder's needs and expectations, and life cycle approach into current business practices is an evolution into the new requirements.
- **Outcomes and Performance** - One of the significant changes is the focus on "output matters" and "performance". With the essential requirements for leadership commitment, risk-based thinking, and stakeholder expectations, organizations can focus on the achievement of intended results, i.e., output and performance. Organizations that have relied on volumes of procedures and documents that cover up inefficiencies may find it challenging to demonstrate the effectiveness of their business processes. The 2015 revised standards enable a strong focus on business outcomes and environmental performance such that value and return on investment in a certified management system is clear.

The K SYS dApps are here to help businesses overcome those difficult challenges.

4. Our Solution

Our dApps combine the use of these technologies to solve the various issues related to being EN 9001 Quality Compliant while maintaining the highest level of data security:

a. Blockchain Technology

By using blockchain technology as database, the K SYS dApps can permanently store each and every transaction made during the production of an industrial component, including commercial agreements between the parts, delivery time, penalties, etc. Every transaction has a specific timestamp and digital signature and cannot be modified. Also, the production workflow (DNC CAM machinery etc.) is validated in this way in every phase (i.e.: milling, piercing, etc.)

b. Inter Planetary File System (IPFS)

IPFS is used by the KSYS dApps to store the actual data, securely, privately and forever. For instance, all the PDF files regarding the commercial proposals, the projects' CAD files, the orders, the invoices, etc. In addition, by using our IPFS Data Storage Engine, companies no longer need to spend lots of money for storage (NAS, Cloud...) and backup policies. And their data becomes automagically immune to the Ransomware Viruses like the infamous Cryptolocker.

c. ISO 27001, the international information security standard

ISO/IEC 27001:2013 (ISO 27001) is the international standard that describes best practice for an ISMS (information security management system). Our dApps (the Smart Contracts and all the code), undergo a deep security audit based on this standard before going into production: We deal with very sensitive data.

5. The Working Prototype

In December 2017, a trial version of K SYS 1 was created in cooperation with I.A.T. S.r.l. in Turin, Italy.

This pilot project showed that K SYS 1 represents an absolute innovation in the field of industrial production and quality control of flight components of the aerospace industry.

In this phase, it was also clear that the target market of K SYS 1 is not just limited to the suppliers of large aerospace corporations, such as GE AVIO, Leonardo (FINMECCANICA), Boeing etc., but also to themselves.

6. An Example of K SYS 1 Implementation

Imagine that you run a high precision manufacturing company that we will call Z. Among other customers, there is a big aero spatial enterprise which is a leading manufacturer of commercial jetliners and defense, space and security systems. We will call this company "X". You can work for X because you are "certified" to do so and because you can produce the parts that they require, while meeting the highest quality standards. Now, let's say that another 20 companies like yours are involved into a project for X, for instance, the project X-YYY. Your company is busy producing high precision engine components, others are

busy building the electrical systems, a few others are building the structure of what will be the latest jetliner.

X uses K SYS 1 DApp to version, store and track the projects data, so all the suppliers involved in project X-YYY must comply and use K SYS 1 as well.

Project X-YYY, in K SYS 1, is a smart contract that is deployed on the X blockchain. Data is stored using IPFS and is retrieved when needed thru the X-blockchain explorer (that keeps track of every transaction, in every block of its blockchain, forever). What does this contract do? It is used for many purposes, as we will see.

All suppliers upload their data to the contract and X has a perfect overview of the work progress which is being made. For instance, the smart contract for X-YYY has, among the other functions, the capability to execute an operation when a condition is met: In this case, your company delivered the parts and the quality control report on time, so the contract X-YYY executed the function "Pay Z for the work done".

Another X's supplier, T, a company from southern Italy, has delivered the parts on time, but some dimensional control reports are missing from the contract's data storage. The contract itself is now requiring the supplier to upload this data, before it can execute the function "Pay T for the work done". A few days later, the data has been uploaded and verified, so T gets its money. Company H, from Poland, was supposed to deliver the sit belts on January 5th, 2024, but the smart contract did not get any data regarding this delivery and began charging H a penalty the following day, as instructed by its coding. One month later, the sit belts were delivered, and the contract updated, so H got payed but much less than what it was supposed to get. X-YYY contract was also coded to obey to its owner(s), so H was not included in any other future project by X.

Project X-YYY became reality on June 8th, 2029. The brand-new jetliner took off for the first time and immediately Saudi Arabia ordered 500 of them. Things went well for X-YYY, and by 2032 more than 2000 of them were flying passengers around the world.

But on August 18th, 2033, an X-YYY flying from Paris to New York, crashed in the Atlantic Ocean. There were no survivals. The investigations began immediately, and it was clear, after finding the black box, that an engine explosion caused the accident. By accessing the data stored in the X-blockchain, the investigators could quickly see that all the part programs and the procedures followed by Z were correct. Z was also using

K SYS 1 DApp on their own blockchain, so the investigations continued there.

By browsing the data on Z blockchain, it appeared clear that one batch of parts had its heat treatment done by a company called F. The part that caused the explosion was coming from this batch, as well as another 15. By looking again at the data on the X blockchain, investigators found out which planes had this components on board and grounded the affected aircrafts. After further inspections, it became clear that F did not treat the parts at all, and that after a few thousand hours of flight, these components would detach from their original position, possibly causing an engine explosion.

7. Conclusion

The K SYS dApps are meant to become the future standard for quality and production management within the aerospace and automotive industries.

The K Systems dApps are already changing the way high precision components for planes, cars or even satellite modules are conceived and built.

