



MANUFACTORY

Building the Manufacturing Blockchain



Innovative decentralised smart manufacturing

SEPTEMBER 2018
WHITEPAPER VERSION 0.9

MANUFACTORY.AI

*“If you always do
what you always did,
You’ll always get
what you always got.”*

Henry Ford



Executive Summary

Every manufacturing facility must solve problems that negatively affect their production activities whilst finding ways to maximise their capacity. They also have the challenge of competing in a global manufacturing environment by becoming more efficient whilst maintaining quality and reducing costs.

Industry 4.0 (Industry40, 4IR) and the Industrial Internet of Things (IIoT) are beginning to make a minimal impact within larger manufacturers, although the full benefits of which are not yet being realised. This technology is also currently out of reach for small to medium sized manufacturing companies where it is needed the most due to the inhibitive costs and expertise required.

The key to maximising the advantages of this revolution is by combining Blockchain, Artificial Intelligence (AI), automation and cyber-physical systems. This will produce energy efficient Intelligent Manufacturing Systems (IMS) that can react to demand changes and production disruptions in seconds without impacting deliveries or costs.

The Manufactory vision is not just about the Blockchain but about building a decentralised manufacturing ecosystem which combines all of the technology that Industry 4.0 can provide. Such strategic innovation will disrupt the manufacturing industry in its current form, creating the conscious factory.

The MFR token will be used to facilitate the manufacturer-customer interaction using smart contracts, which will ensure that order requirements are met. Manufacturers will be able to use the token to buy material, tooling and machinery and the customer will be able to purchase their required components from the correctly qualified suppliers. Users will have the option to have the token automatically converted to a Fiat currency (Government declared legal tender) once they have finished their transaction.

The decentralised nature of the platform means that it will be available to all manufacturers of all sizes so that they can more effectively and efficiently compete in a global marketplace.

Our core team consists of manufacturing experts and entrepreneurs. All with significant experience in creating and supporting growing businesses, global supply chain operations and technologically advanced manufacturing processes and techniques.



Contents

Executive Summary	ii
Contents.....	iii
The Manufactory Vision	1
What are the Issues with Manufacturing today?	2
The Manufactory Solution	16
Who can benefit from the Manufactory Project?.....	24
Competitor Analysis	26
Market Opportunity and Growth Potential.....	29
The Manufactory Token (MFR)	31
Marketing Strategy.....	33
The Manufactory Team	35
Token Distribution Event	38
Roadmap.....	45
Legal Disclaimer	46
Restrictions for Investors and KYC	47



The Manufactory Vision

Manufactory is developing the blockchain model for the manufacturing industry ecosystem.

Our vision is to facilitate the digitisation of manufacturing data through Industry 4.0 and the Industrial Internet of Things (IIoT) and to provide an intelligent decentralised ecosystem that allows cyber-physical systems to easily interact with it.

This will empower manufacturing facilities to maximise the efficiency of their assets and create intelligent manufacturing systems allowing any size enterprise to produce an exceptionally smart factory on a level not seen before.

“We will be the Enablers

for the Factories of the Future.”



What are the Issues with Manufacturing today?

Global Manufacturing is currently going through a technical revolution which has become known as “Industry 4.0”. There is increasing focus on smart factories and intelligent manufacturing systems that have a greater integration between the physical and digital processes, thus creating “Cyber Physical Systems”.

Progression in technologies such as big data, artificial intelligence, edge computing, automation and the Blockchain has shown growth in output, increased income and resource optimisation. All of which are now a current and future requirement for any manufacturing supply chain.

The idea that a swarm of connected, intelligent machines could combine to revolutionise factories and production processes promises a new industrial revolution, the fourth such transformation in the history of manufacturing, otherwise known as Industry 4.0.

This term was first introduced and defined in 2011 at the Hannover Messe trade fair by the German Federal Government. The German Trade and Invest (GTAI) defines Industry 4.0 as:

“A paradigm shift . . . made possible by technological advances which constitute a reversal of conventional production process logic. Simply put, this means that industrial production machinery no longer simply “processes” the product, but that the product communicates with the machinery to tell it exactly what to do.”.¹

The figure below shows an overview of the history of the industrial revolutions:

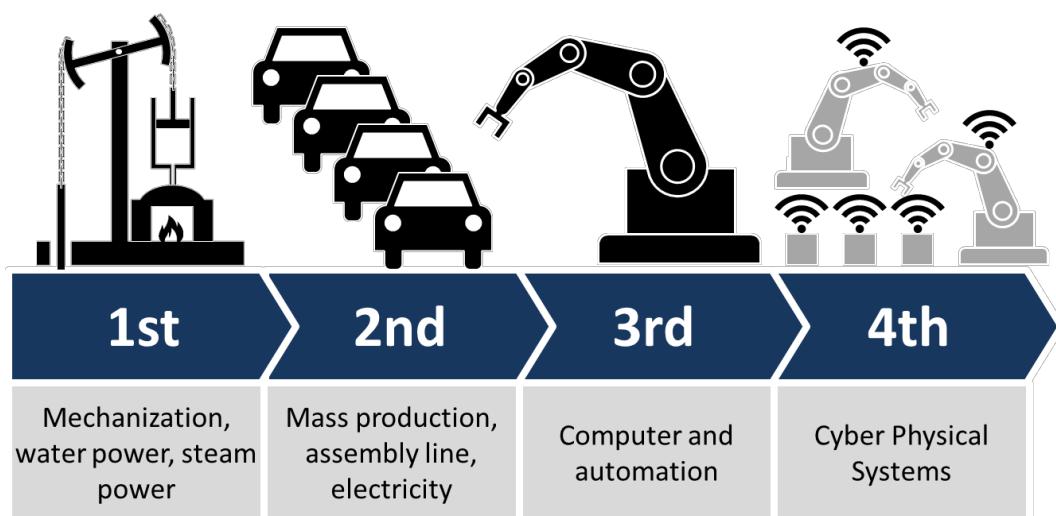


Figure 1 - Credit: Christoph Roser at AllAboutLean.com.

¹ Source: Germany Trade and Invest, “INDUSTRIE 4.0—Smart manufacturing for the future,” July 1, 2014. <https://www.gtai.de/GTAI/Navigation/EN/Invest/industrie-4-0.html>

Industrial Revolution 1

Mechanisation from water and steam power that drive centralised shafts used to drive multiple machines.

Industrial Revolution 2

Mass production assembly lines and the introduction of electricity. Initially electric motors were used to drive the shafts until manufacturers realised they could decentralise.

Industrial Revolution 3

Computers and robot automation used to create efficient production lines.

Industrial Revolution 4.0 (Industry 4.0, 4IR, IR4)

The introduction of the Internet of Things (IoT), Industrial Internet of Things (IIoT) and Machine to machine communications (M2M).

Mass integration of machines to create "Cyber Physical Systems" coupled with "Big Data" Technology, Artificial Intelligence and the application of Swarm technology create Intelligent Manufacturing systems and supply chains.

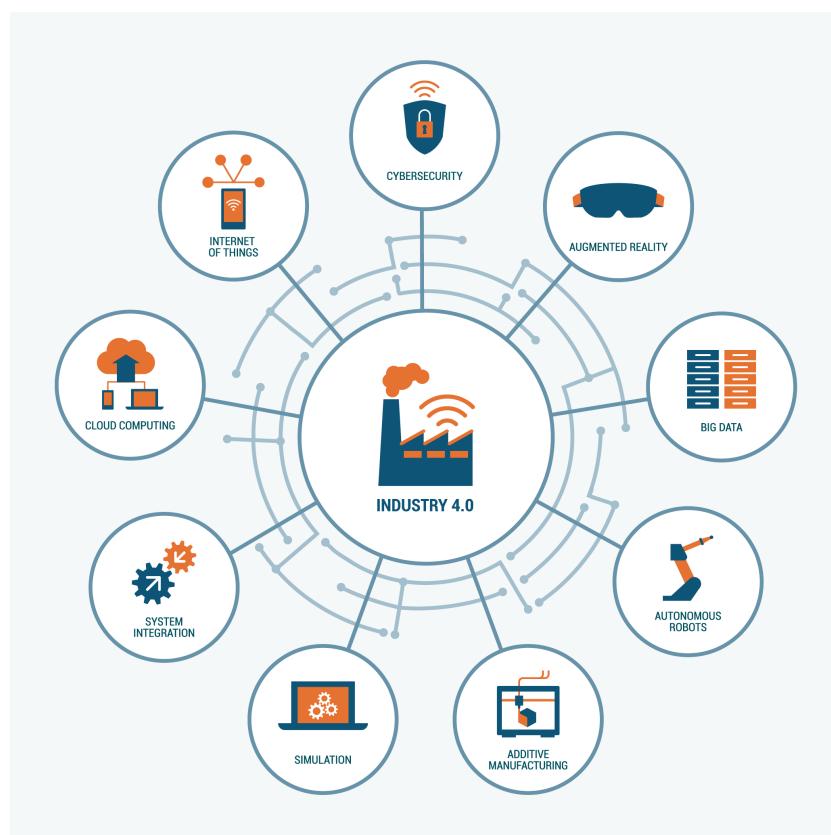


Figure 2 - Industry 4.0 Technologies



Obtaining Value Through Industry 4.0

Although there are clearly advances for a manufacturing company that invests in Industry 4.0, research by Accenture reveals that companies are not getting the value that they believe they should from their digital investments.

"Companies the world over recognize that to drive down costs or forge new revenue streams, digital technologies are imperative. Most, indeed, want to be digital leaders.

Many, however, aren't getting the value they expect from their digital investments. According to a recent Accenture survey of executives, only 13% of companies are exploiting digital for greater efficiency as well as new growth. "Leading in the new," as Accenture defines it, plainly isn't easy.

Why? Because most companies are still investing in digital in a piecemeal fashion. They simply aren't realizing the full value impact of taking a combined approach."²

In short, organisations that invest in the technologies individually will not realise the full benefit that these tools can deliver.

"Combining these technologies is the only way to realise the full potential that Industry 4.0 can deliver."

² Source: Accenture Industry X.0 Combine and Conquer 2017, <https://www.accenture.com/us-en/insight-industry-digital-reinvention>



Outdated & Unreachable Technology

Some larger companies are addressing these issues but Small to Medium Enterprises (SME's) find it difficult to break the innovation barrier because of a lack of resource and capital, making this technology unreachable for the majority of SME's.

Many are using outdated processes and need the efficiency step change that Industry 4.0 can provide. Adoption of this combined technology will result in the entire manufacturing supply chain improving.

How Visible Is Your Supply Chain?

The entire supply chain should have information readily available in order for manufacturers, procurement and supply chain designers to enhance their processes and mitigate the risk of a supply chain failure.

A KPMG report on global manufacturing outlook³ states otherwise, according to their research only 13% of manufacturers have complete visibility of supply and capacity information across their suppliers and logistic partners.

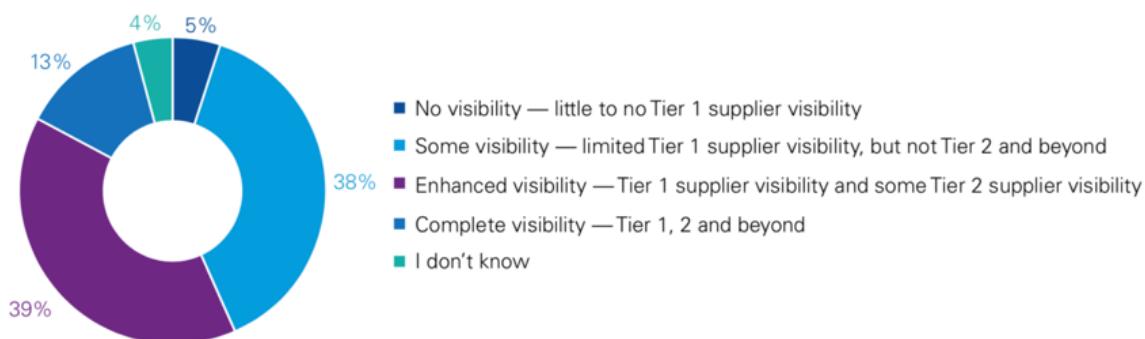


Figure 3 – Percentage of Manufacturers with full supply chain visibility

A Blockchain system will promote a transparent, visible supply chain which increases trust, effectiveness and productivity.

Unproductive Supply Chains

All manufacturing plants see ineffective capacity and demand planning, process bottlenecks and unexpected equipment downtime and failures due to antiquated and traditional

³ Source: KPMG Global Manufacturing Outlook 2016,

<https://assets.kpmg.com/content/dam/kpmg/pdf/2016/05/global-manufacturing-outlook-competing-for-growth.pdf>



processes and methods of manufacture. This results in longer production times, low yields from material input, lost revenue and poor-quality output.

In addition to this, manufacturers are also constrained by obtaining both skilled and un-skilled personnel. The younger generations have lost interest and the older more experienced employees are retiring without passing on their knowledge.

Productivity (the time it takes to make a product) more often than not will compromise quality for most manufacturers. Purchasers will push suppliers to deliver by a certain date, because of poor capacity planning this often sacrifices quality, resulting in the supplier making mistakes and producing low quality products.

Automation, cyber-physical systems, training and AI powered predictive maintenance are all key to providing faster feedback loops and therefore eliminating these issues.

Have You Manufactured A Component Correctly?

Economically critical and strategic manufacturing sectors such as Aerospace and automotive require quality management systems to be in place. These ensure certain procedures are followed so that full traceability and history of a given component is available to inspect by a customer or auditor.

"A quality management system (QMS) is a collection of business processes focused on consistently meeting customer requirements and enhancing their satisfaction. It is aligned with an organization's purpose and strategic direction (ISO9001:2015). It is expressed as the organizational goals and aspirations, policies, processes, documented information and resources needed to implement and maintain it."⁴

QMS's are typically audited by professionals once a year and are normally a paper and stamp-based system. The system relies on trust from all involved, from the raw material supplier right through to the final dimensional inspection. If all procedures are followed then the history of the component is trustworthy, but as with any system that relies on human interaction or input, mistakes can and do happen which can go uncaptured and subsequently delivered to a customer. Some components are critical, such as those in the Aerospace and Gas Turbine industries, which if they fail can cause catastrophic results.

Forgery and counterfeit components are also a significant issue to the aerospace and defence industry supply chains. According to a report from Accenture on "Blockchain

⁴ Source: https://en.wikipedia.org/wiki/Quality_management_system



Certified Supply Chain"⁵, the estimated volume of components in the US armed services machinery that are counterfeit is 15% with a total counterfeiting global economic value of US \$0.6 trillion.

The quality system for any component should be completely trustworthy and unchangeable. The perfect solution to this is Blockchain technology. A significant benefit of the Blockchain is traceability and security, it can have any number of participants in the system without compromising its efficiency. It is completely secure, can be private or public (dependant on the user) and is immutable, therefore creating a “Digital Passport” for any manufactured component.

All transactional data can be incorporated, including suppliers, material certificates, which machines were used, what their capability was and a full inspection history. Every transaction is permanently documented and therefore the unique identity of a product is recorded. This significantly reduces time delays and human errors within the supply chain and manufacturing system.

Access can also be granted to multiple stakeholders to inspect the quality system in real-time. This will make quality accreditations easier to obtain and create visibility to a supplier's credibility securely.

What Do You Do When You Produce Non-Conformance?

All manufacturing processes can create non-conformance to the original specification both visually and dimensionally. Even if the process is capable and stable, machine variation created by temperature, humidity and wear can create sudden or gradual changes.

In some instances, the non-conformance can be acceptable but requires a process that includes evaluation and approval by the designer or inspection in which a concession is raised. In the majority of companies this is a manual process which on some complex parts can take weeks to approve, particularly in sectors such as Aerospace. This area presents a particularly large opportunity for improvement to free up the manufacturing system to deliver components.

An automated concession assessment system that was created by Inviso Technologies for a global gas turbine supplier resulted in inspection and raising of concession's reduced from

⁵ Source: Blockchain Certified Supply Chain,

https://www.accenture.com/t20171213T172359Z_w_us-en_acnmedia/PDF-68/Accenture-Certified-Supply-Chain-Infographic.pdf#zoom=50



7 days to 2 minutes which would result in a £2.4 million saving per year from increased capacity to meet demand and inventory reduction⁶.

The evaluation process can be automated by specifying a set of rules to apply to the data and the approval process can be managed by a smart contract and Blockchain solution.

Can You Control Your Processes?

Process control systems are used to ensure that manufacturing processes are carried out efficiently, reliably and as proficiently as possible. Manufacturers rely on them to help maintain throughput, quality, yield and cost.

The systems are used to measure and monitor manufacturing processes with the more advanced systems providing feedback to control the process. They will identify and correct any variations or abnormalities from the specified values which can be either manually or automatically corrected. The aim of the system is to ensure that the process is as lean and as consistent as possible.

Although process control technology has advanced significantly since the 1980's the full benefits of machine to machine (M2M) communications, Internet of Things (IoT) and big data processing technology are not being realised.

Industry 4.0 is dependent on connected, intelligent systems that are able to communicate, understand and react to the given information in real-time. Process control is the essence of any manufacturing process and it is therefore critical to Industry 4.0.

Although some areas are being addressed by a small amount of companies there isn't a platform that combines all of this data into one intelligent system that can also communicate with the machines to provide a closed loop feedback system.

Combining data from machine tool performance, capability, environmental factors and inspection output will realise benefits in delivery performance, asset utilisation and lower manufacturing costs whilst improving quality.

⁶ Source: Industry 4.0 Case Study: Automated Inspection Software offers £24 million saving, <https://medium.com/@Manufactory/industry-4-0-case-study-automated-inspection-software-offers-24-million-saving-eb424ab83ef3>



How Much Capacity Does Your Factory Have?

Capacity planning is essential to the success of any manufacturer. It is the process of determining the production capacity needed by a factory to meet the changing demands of its customers.

The difference between the capacity of an organisation and the demands of its customers results in inefficiencies which manifest themselves in under-utilised resources or poor delivery performance. This is caused by unfulfilled deliveries leading to unhappy customers. The purpose of capacity planning is to minimise this disparity.

Increasing the utilisation of the manufacturing systems capacity is accomplished by measuring the Overall Equipment Effectiveness, more commonly known as OEE.

Currently in the majority of companies, OEE is collected via manual methods and usually results in poor quality data which in turn creates poor quality decisions. With the advent of the Internet of Things (IoT) and the Industrial Internet of Things (IIoT) monitoring machine performance and environmental changes will become easier to analyse and identify opportunities for OEE improvements.

Cyber security advancements in IIoT software and hardware coupled with cloud computing have enabled this technology to become a secure solution for any size of business.

It will also allow a manufacturing facilities capacity to be known in real-time allowing for more effective planning. This will allow customers to scale their production requirements either up or down in seconds and see the effect on delivery dates immediately.

Additionally, this means that an Artificial Intelligence (AI) system can use the data to plan the manufacture and routing of components based on a manufacturers machining capability and capacity. This may result in one order being spread over several facilities or suppliers if delivery is required urgently for instance.

Research from Deloitte⁷ has found that the benefits of implementing a smart factory or network of machines is exponential, as shown in Figure 4 below.

⁷ Source: Deloitte, <https://www2.deloitte.com/insights/us/en/focus/industry-4-0/smart-factory-connected-manufacturing.html>



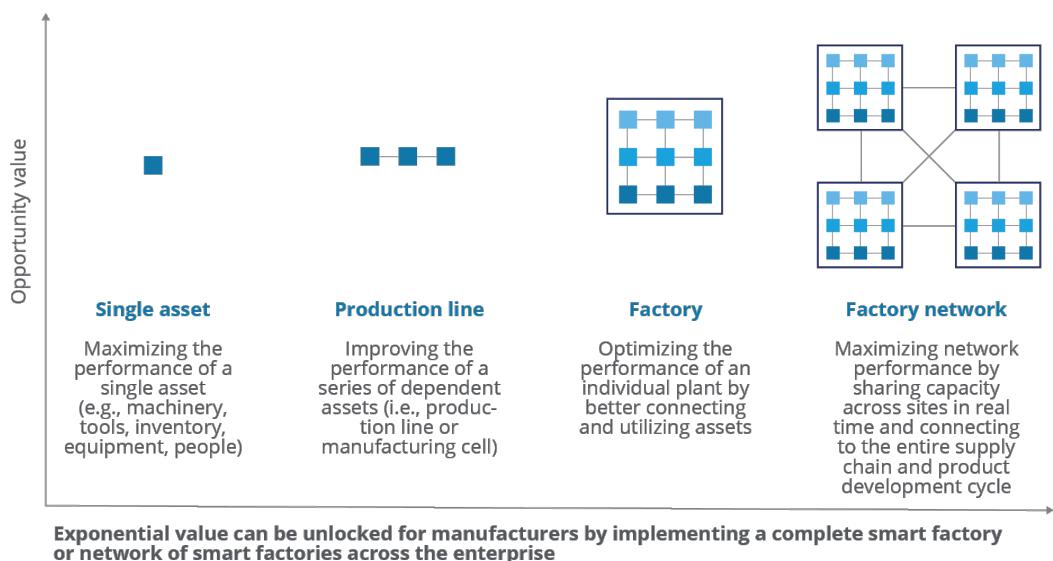


Figure 4 - Source: Deloitte

Creating an innovative platform that combines AI, IoT, Blockchain systems and smart contracts will remove all resistance to a manufacturing system that can instantaneously scale to meet any production demands that are required.

An additional benefit to this technology is that if all of the machinery in a country was connected to a system, entire nations manufacturing output could be monitored in real-time.

How Healthy Is Your Machinery?

Changing your machines to Cyber Physical systems provides continuous data from sensors as well as the machine itself. Monitoring this data for anomalies and applying machine learning technology to recognise patterns will allow the manufacturing system to predict when there is going to be maintenance issues.

As part of GE Aviation's digital transformation, they partnered with the global industrialists GE Digital business unit to move maintenance to condition or machine use based rather than schedule-based maintenance. This allowed them to apply key resources more efficiently.

The maintenance teams now get access to data and analytics visibility in real-time which provide insights into machine health and enable them to predict machine failures before they happen.

GE Digital implemented its asset performance management (APM) solution to model 260 connected machines' data with their maintenance history. This enabled the team to have a framework for predictive maintenance recommendations and diagnose health conditions.

- *"The APM tool has helped us support the work of the Operations and Technical teams to reduce re-work from 8-10% consistently to less than 1% in just the last few months.*



- 25% of preventive maintenance activities shifted to condition-based from schedule-based.
- 5% cycle time improvement.
- APM supported teams to accelerate first time yield improvement and loss reduction⁸.

This lets the manufacturing facility make data driven decisions that also show the root causes of the issues and resolves their maintenance problems more proactively.

How Energy Efficient Is Your Factory?

Running production processes more intelligently and at speeds that reflect the current demand will have huge benefits to any manufacturer. Making use of cyber physical systems to monitor production processes and conditions in real-time is essential for managing smart factory energy effectiveness.

The first industrial revolutions essence was the use of water and steam power to drive machinery. But as illustrated in Figure 5, since then the amount of carbon dioxide that we produce globally has increased by around 40% as of 2009, and methane levels have increased by around 150%.

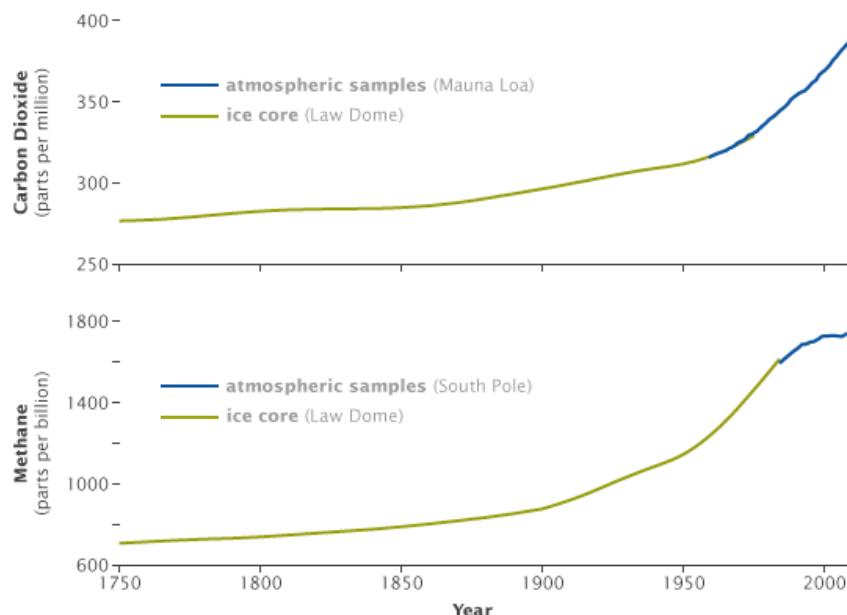


Figure 5 – NASA, Carbon Dioxide and Methane Levels⁹

⁸ Source: GE Aviation Moves to Condition-Based Maintenance with APM,
<https://www.ge.com/digital/stories/ge-aviation-moves-condition-based-maintenance-apm>

⁹ Source: NASA, <https://earthobservatory.nasa.gov/Features/GlobalWarming/page2.php>



Today, manufacturers have access to a range of renewable and sustainable energy solutions that combined with technology such as AI can greatly improve performance and profits.

Aerospace manufacturers such as Rolls-Royce¹⁰ have invested over £10 million in energy efficiency projects which has resulted in a 17% reduction in their global energy use over the last 4 years with an aim to reduce it by 30% by 2020.

Being able to understand their energy use has been key to them identifying inefficiencies and opportunities for improvement. This has led to energy initiatives such as the engineering giant's Project Sunshine¹¹ which has seen a 3.42-Megawatt solar panel array installed on top of the Bristol, UK site's multiple factory roofs. The installation will generate 3 million kWh (kilowatt hours) of electricity per year for the next 25 years which would be enough to power 900 average UK homes.

The electricity generated will be used to power the manufacturing plants directly below the installation. This has had an immediate reduction in the electricity costs as well as protecting the future cost variations that have a direct effect on the cost of manufacturing its gas turbine components.

Google's DeepMind division is a world leader in AI and machine learning research. Their work has led to major breakthroughs in the energy efficiency of Google's data centres.

*"by applying DeepMind's machine learning to our own Google data centres, we've managed to reduce the amount of energy we use for cooling by up to 40 percent...Possible applications of this technology include improving power plant conversion efficiency (getting more energy from the same unit of input), reducing semiconductor manufacturing energy and water usage, or helping manufacturing facilities increase throughput."*¹²

To put this another way, Google now gets 3.5 times the computer processing power from the same amount of energy. Their data centres are among the most advanced in the world which makes this an even more significant step forward.

Both the Rolls-Royce and Deepmind examples have had a significant impact for both companies current and future energy efficiency and combining these technologies will see a significant technological shift in manufacturing energy control systems.

¹⁰ Source: Rolls-Royce Sustainability Targets, <https://www.rolls-royce.com/sustainability/operations-and-facilities.aspx#section-operational-performance>

¹¹ Source: Rolls-Royce "Project Sunshine", <https://www.rolls-royce.com/media/our-stories/discover/2017/project-sunshine.aspx>

¹² Source: DeepMind AI Reduces Google Data Centre Cooling Bill by 40%, <https://deepmind.com/blog/deepmind-ai-reduces-google-data-centre-cooling-bill-40/>



Equally, SME's and large manufacturers have to embrace both energy and AI computing technology to become truly smart factories. A platform that rewards this kind of innovation should be developed to encourage the adoption of Advanced Manufacturing Energy Control Systems (AMECS).



Summary

For any manufacturer, under and over estimating demand leads to lost revenues, this is especially true for smaller factories. This can take the form of lost sales due to poor delivery performance, sub-standard quality, stagnant inventory, energy usage effectiveness and/or under-utilised assets.

In short, the largest inefficiency in any manufacturing system is in its inability to be flexible.

Better monitoring of machines, energy usage and adaptive control will allow suppliers to increase the productivity and flexibility of a single machine. Likewise, improved overall system performance and planning will result in producing more product on the same number of assets, therefore improving flexibility and productivity.

Manufacturing plants and factories around the world must rely on automation, machine learning (and other forms of AI) and the Blockchain to meet the rising global demand and transform the way we order, control quality, manufacture and deliver components.

Imagine being able to scale your manufacturing operation in the same way that cloud services such as Amazon Web Services and Microsoft Azure scale their capacity to meet or reduce demand on websites or eCommerce solutions in milliseconds.

Intelligent De-Centralised Adaptive Manufacturing is essential for the future of manufacturing systems.



“Lightning in a bottle”

Benjamin Franklin



The Manufactory Solution

We will be building a decentralised trust, reputation and payment marketplace utilising smart contract technology. A smart hardware device will allow manufacturers to connect any machine to the blockchain and communicate directly with it.

Manufacturers will be able to accept MFR tokens in exchange for components produced and will be rewarded for producing the parts as energy efficiently as possible using our incentive engine. Manufacturers and customers will be able to participate in global decentralised production with complete trust, produce quality components and provide accurate deliveries.

The Manufactory mission is to build a public-private blockchain that will:

- Enable a decentralised global manufacturing supply chain ordering platform.
- Develop a trust and reputation engine for quality control and quality management systems.
- Make the payment and escrow process as simple as possible.
- Provide a real-time manufacturing capacity availability platform.
- Create an incentive engine based on how energy efficiently the component has been manufactured.
- Build a decentralised marketplace that will enable OEM's to build their own applications to connect to The Manufactory eco-system.

In summary, our mission is to develop and deploy the best manufacturing supply chain system that evolves Industry 4.0 to the next level and is available to every manufacturer regardless of size.



A Global Decentralised Manufacturing Platform

Given the issues previously described within the manufacturing supply chain and its quality management systems, the Manufactory Blockchain project has been created to make the latest technology easily obtainable to manufacturers and therefore enabling the factories of the future.

The original objective of Blockchain technology was to facilitate trusted fiscal transactions between any two parties without the necessity for a third party such as a bank to be involved, enabling faster and less expensive transactions. Due to the security and immutable nature of the Blockchain it also has complete integrity as the transactions are verified by the system itself.

With the advent of Industry 4.0 and Blockchain systems we will be able to build a transparent, decentralised, interconnected Supply Chain and Digital Passport system that eliminates any barriers to entry.

Manufactory will resolve the complex problems of manufacturing systems with three key technological innovations detailed in the following sections.

1. Component Digital Passports

By digitising Manufacturing Quality systems using the Blockchain we will create a registry and catalogue system for recording, tracking and monitoring any component across all supply chain members. This will be a system for creating a digital passport for every component manufactured.

The information stored will replicate the manufacturers own quality management system specifications by being able to record multiple types of transactions or documents. These can range from product specifications, purchase orders and intellectual property details to raw material certificates, non-conformance details and inspection results.

Connecting equipment to the system via a Smart device or OEM software will enable the machines themselves to record and validate any operations that they carry out on a given component, therefore securing the integrity of the Quality management system and providing a consensus mechanism that creates a tamper proof audit trail.

Accreditations and Certifications

A manufacturing organisations quality performance will be monitored in real-time and therefore at any given time can be tested for conformance to the Quality system requirements for a particular industry or requirement i.e. Aerospace accreditations.

Being decentralised adds the benefit of transparent operations that allow an auditor or customer to carry out an instant check of a supplier's conformance to process. A multi-echelon distributed ledger system will be created that allows user-based permissions to audit the supplier.



Intellectual Property

Implementing a Blockchain eco-system to create a digital passport allows intellectual property to be easily and securely shared. Component design, methods of manufacture and production schedules can all be distributed among suppliers, manufacturers and customers with complete trust. Buyers and manufacturers will have the option to create and perform transactions anonymously protecting any participant differentiation and competitive advantage.

2. Data Driven Production Optimisation

The project will provide a hardware solution to connect any machine to the Manufactory Blockchain eco-system and allow it carry out transactions, monitor processes and provide machine status. Making machines into cyber-physical systems and combining the data generated with artificial intelligence and automation will enable the manufacturing system to self-optimise.

Manufacturing System Eagle Eye's View

The status of an entire manufacturing system will be able to be monitored with a high level of granularity. An eagle's eye view of any organisations manufacturing facilities will be accessible with multiple levels of user access with the data tailored to each person's role.

Manufacturing engineers will be able to observe Statistical Process Control (SPC) data for each product and feature that a machine tool produces in real-time. This will result in faster reaction times. Engineers will be able to carry out root cause analysis and corrective actions immediately. An advanced feature of the platform will be to provide a closed loop feedback system enabling the machines to act autonomously to correct process drifts.

Plant managers and production leaders will be able to view the manufacturing system at a higher level which will deliver an overall status of the manufacturing facility. An alert system will also provide system status wherever they are in the world.

Voice Integration

A smart voice enabled device using technology such as Amazon's Alexa will be integrated into the platform to enable production leaders to interact with the system instantly and without disruption. For instance, a Production leader may be given a voice message that a machine has stopped, and he/she can respond with an instruction to request maintenance lead-time. They will also be able to state a reason code so that the Overall Equipment Effectiveness (OEE) data can be updated.

Smart Hardware Device and Predictive Maintenance

An intelligent hardware device with custom sensors will collect environmental data such as temperature, humidity and vibrations as well as machine output and inspection results. This will enable the Manufactory system to implement a machine learning algorithm on the data



collected to predict when machine maintenance will be required and automatically order the required parts.

When issues occur with machine breakdowns, Machine to Machine (M2M) communications will be able to automatically adjust delivery lead times and re-route the current queue to a similarly capable machine so as to disrupt the delivery commitments as little as possible.

What if the part is not correct?

If non-conformance is generated it can be automatically assessed for suitability to the product specification requiring an approval from a designated authority such as a designer, stress engineer or chief engineer. The decision made will either result in the parts being accepted or rejected. This information will be integrated into the smart contract that the customer generates when setting up their requirements.

This information will be stored on the digital passport that will be created for each individual component adding an additional layer of sensor and inspection data that is currently not available.

3. Dynamic Supply Chains

Manufactory will disrupt the traditional supply chain management structure by utilising a transparent decentralised smart contract eco-system.

Smart contracts have the ability to use rule-based intelligence to perform supply chain functions. Blockchains support the construction of smart and trusted code that is embedded securely into the system. Participants can use this to specify terms, conditions and any other logic into their transactions, thus creating a smart contract.

A Manufactory smart contract between a supplier and buyer would consist of a computer package that is executed on the Blockchain and is then applied by the entire Blockchain eco-system. Its code would consist of the terms and conditions of the contract and will be secure and unchangeable, therefore providing the trust that is required in the current complex control and auditing methods used today.

Blockchain smart contracts can have the same level of detail as a traditional purchase order and quality accreditation do with the current methods but will have the added functionality of being able to perform tasks automatically, such as monitor capacity levels or negotiate prices.

Commercial partners can monitor delivery times, quality status and costs in near real-time and create, negotiate and complete transactions automatically.

Combining this with Industry 4.0 smart device enabled equipment will reduce costs and maximise efficiency by empowering machines to communicate with each other directly, (Machine to Machine, M2M), without a centralised control mechanism to slow them down. Production decisions will be made autonomously allowing factories to make quantum leaps in efficiency and flexibility.



Supplier Suitability – QCD Engine

Manufactory's Quality, Cost & Delivery (QCD) engine will be used to determine the appropriateness of a manufacturer to meet a customer's specifications. The QCD engine will also factor in the location of the manufacturer(s) in relation to the customer if it is required.

The scoring system will act as a numerical selection process where customers and suppliers will be allocated a score between 0 and 100 to determine their suitability for the smart contract fulfilment. For a client looking for a supplier, the QCD engine will provide a score based on their history within the Manufactory Blockchain and provide a risk analysis. The higher the score the more likely the supplier is to meet the specifications and deliver on-time to the level of quality expected.

Manufacturers will also be rewarded for use of efficient and sustainable energy generation methods such as solar panels to provide the electricity to their machinery. The Manufactory platform will allow the efficient management of assets via an artificial intelligence engine to conserve power usage and maximise machine utilisation and profits, providing this data will also result in a reward for the manufacturer.

Recycling of scrap materials will also be monitored and recorded by the Manufactory Blockchain. Efficient recycling of waste materials such as compressing swarf to bricks or granules before recycling will generate a reward via the QCD engine.

The client's requirements are the essence of the QCD engine and will be generated with the smart contact. The score will be created from as many sources as are possible, examples are given below for each element:

Q - Quality Score

- Does the supplier have the correct quality accreditations?
- Does the supplier have a history of using the Manufactory Blockchain?

C - Cost & Capability Score

- Does the customer have a positive history of paying promptly on completion of work?
- Has the supplier provided a fair quotation for the work required compared to their competitors and relative to their QCD engine score?
- Has the supplier got the correct machinery capable of manufacturing the component?

D - Delivery Score

- Has the supplier answered the requirements of the request for quotation (RFQ)?
- Does the supplier have a history of delivering components on time?



The Manufactory QCD engine will generate a value in real-time to reflect the current market status when a customer creates a requirement. By doing this the system will always be up to date with the latest data and customers will be acting on accurate information.

The constant evolution of a supplier's QCD score will incentivise them to provide the best possible service to customers at all times. Better performing suppliers will be able to charge a premium for their services and still win orders, maximising profitability.

Artificial intelligence systems will also be employed by the QCD engine that will evaluate the customer-supplier interactions to maximise the accuracy of the score. The data will come from the Manufactory Blockchain and customer feedback as well as publicly obtainable information such as Quality accreditations.

Scalability to meet demand

As an illustration of how a smart contract would work, take the example of an aerospace manufacturer issuing a smart contract onto the Manufactory marketplace that includes precise terms and conditions for a wing spar that is to be manufactured from Aerospace grade Aluminium. Along with this they have included the exact component specifications with delivery and payment requirements.

Any supplier on the Manufactory forum can bid for the contract as long as they have the correct quality credentials and machinery that is capable enough to manufacture the component.

If the delivery timescale is not satisfactory then the contract can automatically distribute the requirement across multiple qualified suppliers to achieve the required delivery date. Therefore, allowing buyers to dynamically scale the manufacturing system to meet their requirements.



Software Technology Stack

The Manufactory project will create a software solution that will evolve the current industrial revolution further. We will achieve this by merging current software technologies to create a decentralised marketplace and platform that will realise the true benefits that Industry 4.0, Blockchain and AI can deliver.

The software solution will have the following key features.

- Public-Private Blockchain
- Smart Contract Order Placement and approval process
- Scalable Capacity Planning
- Non-Conformance process management
- Process Monitoring
- Predictive Maintenance (AI)
- Factory Performance Monitoring including energy performance (AI)
- Blockchain Quality Management System
- Multiple User Access Levels
- Ability to develop decentralised applications that can interact with the Blockchain.

The Blockchain solution will be built upon the Hyperledger Fabric Blockchain framework provided by the Linux Foundation and IBM. The back-end system will be built on Elasticsearch and the front-end will be created using HTML5, CSS3 and React.js.



Universal Blockchain Connector

In order for all machines to be able to connect to the blockchain we will develop a hardware device that turns any machine into a smart connected device. It will be able to communicate with the machines around it as well as interact with the secure ledger platform.

Hardware Stack

The Manufactory smart device hardware will have the following features:

- WIFI
- Bluetooth
- Camera (With option to disable)
- Touchscreen for user interaction and status alerts
- QR code Reader
- RFID Tag reader
- Barcode scanner
- Ability to print to local printers
- Plug and Play

Software Features

Connecting an industrial machine to Manufactory will allow it to have remote access and to be able to perform the following functions:

- View the machine's status (Machining, Idle, Waiting for Material, Maintenance Mode or breakdown).
- View the machines output in terms of process control.
- Monitor inspection output.
- Allow component sentencing when non-conformance appears (Accept, Reject, Raise Concession, Assess Manually, Rework).
- Observe capacity schedule and status.
- Communicate with the machines around it to decide upon the most efficient routing.
- Wallet integration to send and receive orders
- Monitor environmental factors such as temperature, humidity and vibrations.
- Receive maintenance alerts.

The device will not only permit the owner of the device to see their manufacturing capacity and capability in real-time, but it will also allow the Manufactory platform to build up a picture of global production capacity and machine availability.



Who can benefit from the Manufactory Project?

Buyers

Buyers have the complex task of sourcing, approving and ordering manufacturing capability and sometimes taking a chance on a new supplier without knowing their full history or potential. The Manufactory eco-system will enable buyers to match exacting specifications with the perfect supplier capability.

The Manufactory smart contract will also allow them to automate tasks such as ordering, payments and logistics easing the burden on the buyer and creating better performing industries and supply chains.

Manufacturers

Connecting to the Manufactory eco-system will give manufacturers the ability to monitor the efficiency of their equipment to a high level of granularity. Enabling them to identify bottlenecks immediately and react accordingly, this will give the manufacturing system greater flexibility to react to changes in demand. They will be selected for projects for their performance and technical ability rather than just the price and be given opportunities that they would not normally be considered for.

The Manufactory business model will positively impact their growth and exposure to the market, creating more efficient methods of doing business and higher levels of trust between parties.

Entire Industries

The Manufactory project will provide entire supply chains with end-to-end transparency and capacity planning tools that will change the fundamental way of doing business for entire industries. For example, the Aerospace industry would have huge benefits from adopting secure Blockchain tools to manage and control high value inventory levels as well as providing complete audit trials for every component that goes into an aircraft.

The Blockchain

Distributed ledger eco-systems are the future for many industries, most of whom have not yet realised the true potential and what problems can be solved by this technology. By the Manufactory project being successful, this will raise awareness of the Blockchain and smart contract methodology and introduce it to new industries.



Future Generations of Manufacturing Engineers

The Manufactory community of practice clusters will provide industry expertise and advance the knowledge of the manufacturing industry as a whole. Facilitating knowledge transfer from these experts to all manufacturers will increase the efficiency of the global eco-system and ensure the future of manufacturing by building a complete knowledge base for the next generation.



Competitor Analysis

Industry 4.0 and IoT has seen high adoption rates and has been a rising area for investment for large organisations. The companies that are investing are focusing on the capture of data that will identify factory inefficiencies and detect areas for improvement.

Although, so far there hasn't been a project that has combined all of the required elements (Blockchain, IoT, AI and automation) and focused on an industry specific solution. Therefore, there are few companies that can be directly compared with the Manufactory project due to its combination of these elements into one distributed ledger system.

The team of manufacturing experts and advisors with the knowledge and experience to know exactly what is required by a project such as this will also give this project its uniqueness.

The following companies and projects have been identified as being similar in concept or mission to the Manufactory project.

IOTA

IOTA is re-imagining the Blockchain for the Internet of Things. One of the distinctive parts of IOTA is the tangle technology they have developed. Building on the concept of a distributed ledger, the tangle has become a new kind of data structure that does not rely on mining, blocks or a peripheral consensus mechanism. This allows transactions to occur directly between cyber-physical systems in a self-regulating means.

IOTA's main objective is to create a new kind of Blockchain for the Internet of Things with zero transaction fees, which although this can include manufacturing systems is not their main focus. The IOTA ICO was one of the first but also one of the most successful especially when you take into consideration ICO's were not commonplace in 2015. Their market cap currently stands at \$2Billion.

The success of the IOTA project shows that the Internet of Things is here to stay and will be an integral part of the future of Machine to machine communications.

General Electric (GE)

GE has made the Predix platform available to anyone with the focus on the capture and analysis of machine and environmental data to predict maintenance issues before they happen. This in itself is a major step forward for Industry 4.0 and IoT.

However, they don't have a Blockchain solution or a platform that combines this data with inspection and process data together. GE is predominantly focused on identifying and improving their manufacturing processes with this technology and external rollout is not a priority.



Productivist

The Productivist project is based in Dubai and France. Its core goals are to build upon their existing Freelabster.com platform by integrating it with the Blockchain and providing an Intellectual Property protection solution.

Although the whitepaper mentions all types of machinery (via service providers) it is clear that the main focus for them is Additive manufacturing (AM or 3D Printing) and not subtractive manufacturing technology where Blockchain and its benefits are yet to be realised.

The Freelabster.com website provides an interactive platform which pairs consumers with 3D printing service providers creating a virtual marketplace. The business model is based on service provider platforms using the PROD token to deliver their services. It currently has 3,500 certified 3D print services registered with its platform which gives the project a good foundation for its ICO.

SyncFab

SyncFab is operating from California in the United States and has been providing its supply chain management platform since 2013. The main use of the platform is the same as Freelabster.com but it provides more processes including subtractive manufacturing and welding.

Their location in Silicon Valley gives them an advantage for attracting funding and also to cater for the American market which is currently not available to ICO's in the rest of the world. This is due to the ongoing stance on legal nuances which limit US investment. Along with the United States laws on Intellectual Property and Export Control, this can also be a hindrance to the project as they will find themselves restricted to the US market and segregated from the larger global manufacturing market.

SyncFab has strong industrial partnerships with key US manufacturing trade bodies and associations as well as Blockchain alliances. It also has an existing platform to build upon for its ICO, which has reached its soft cap. The project is now well into its product development with full Blockchain integration planned for 2019.

Summary

All of the projects above have elements of the Manufactory solution but none of them combine all of the technologies together in one platform that will provide the greatest benefit to manufacturers.

The Productivist and SyncFab solutions both claim to be the first peer-to-peer manufacturing platform but Productivist is targeting the global market and SyncFab is focused on local manufacturers providing services on a broad platform.

There is a cross-over of objectives between both Productivist and SyncFab with Manufactory but the main element that distinguishes the projects is the functionality of an integrated



Quality management system and data driven production optimisation. Both of which are fundamental requirements of subtractive manufacturing techniques and will enhance the more advanced additive manufacturing method of production. These are also elements that are necessary to larger manufacturing organisations and currently restrict their access to distributed ledger systems because they do not have the required functionality.

The success of these competitors, both from an initial coin offering perspective and the project objectives, indicates that the Manufactory project is needed and will be successful in creating its vision for the manufacturing eco-systems of the future.

The Manufactory's team strong connections within the manufacturing sector with world class industrialists will also enable it to stand apart from its competition and give it an advantage when forming strategic alliances and acquisitions. Its expertise within manufacturing and operations will also create a platform that will be sought by all sized manufacturers.



Market Opportunity and Growth Potential

A Price Waterhouse Cooper (PwC) report¹³ on Industry 4.0 commitment proposes that investment is already significant and global industrial companies will invest \$907bn per year until 2020. It also states that companies across every industrial sector expect a yearly cost reduction of \$420bn, making Industry 4.0 a very attractive technology to invest in.

Other PwC research¹⁴ shows that 9 out of 10 companies are investing in digital factory technology with 98% of those expecting an increase in production efficiency from their investment with a payback of between 2 and 5 years. It also states that 33% of the companies surveyed invested in Industry 4.0 in 2017, rising to 72% in 2020.

Blockchain implementation is currently considered to be at the early adoption stage on the diffusion of innovation curve, shown in Figure 6. Based on this the market penetration rate would be considered to be at 16% rising to 50% over the next few years.

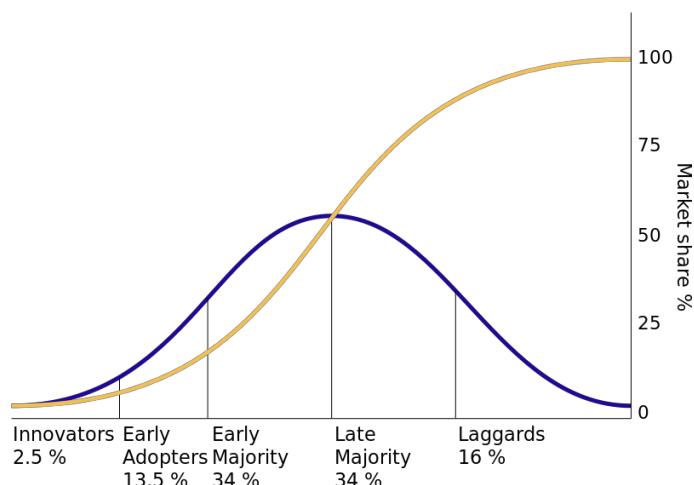


Figure 6 - Credit: By Rogers Everett [Public domain], via Wikimedia Commons

Assuming a linear market penetration rate based on Blockchain adoption, this would give a market size of \$326 billion in 2020, a seven-fold increase from 2017.

¹³ Source: Price Waterhouse Cooper (PwC), Industry 4.0: Building the digital enterprise: <https://www.pwc.com/gx/en/industries/industries-4.0/landing-page/industry-4.0-building-your-digital-enterprise-april-2016.pdf>

¹⁴ Source: Price Waterhouse Cooper PwC), Digital Factories 2020: Shaping the future of manufacturing. <https://www.pwc.com/gx/en/industries/industrial-manufacturing/publications/digital-factories-2020.html>

Industry 4.0 Global Market Value

Source: PwC

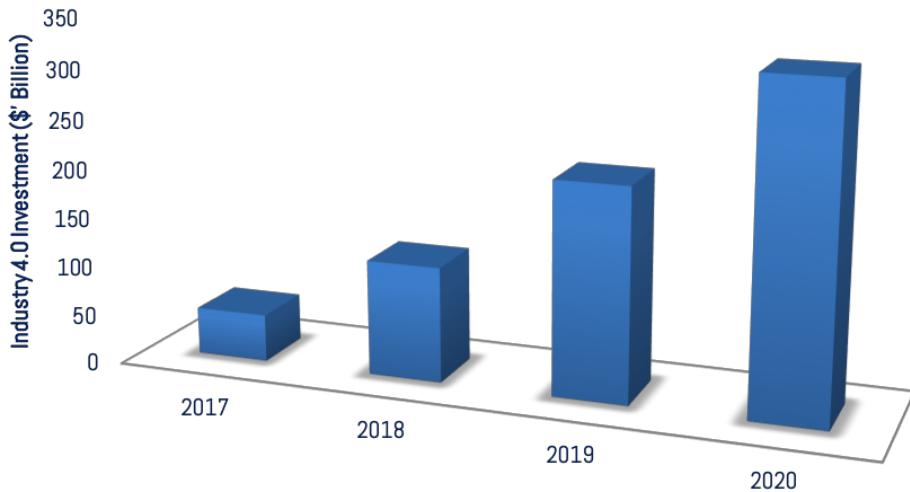


Figure 7 - Industry 4.0 Global Market Value

Taking this analysis into consideration and the fact that the Manufactory project has elements of one of the most successful ICO's to date (IOTA) and is also a key enabler for the rapidly expanding sector of Industry 4.0, it can be deduced that the potential for growth is immense.

Based on this information we expect the value of the token to increase by at least ten times the token launch rate over the next 3 years.



The Manufactory Token (MFR)

The Manufactory projects key vision is to create a diverse global eco-system consisting of manufacturers, buyers and experts that are actively and consistently participating in the smart contract Blockchain structure.

The MFR Token will be used to enable participants to create transactions within the Manufactory eco-system. It will be the main currency for the Blockchain with an aim of ensuring that transactions occur automatically and also to keep operational costs to a minimum.

Initially, incentives will be required to encourage the use of the MFR token. These may take the form of rewards for items that are currently carried out without compensation, such as responding to quotation requests or placing an order.

The value of the MFR token will help the project to develop strategic alliances with key industry partners. This in turn will give exposure to the project and increase the value further. It will also be used to expand the adoption of the partner network and support the continued development of the Manufactory Blockchain eco-system.

Tradeable and Liquid

The Manufactory token will be ERC-20 compliant which will make it available to all exchanges and therefore create a liquid and tradeable marketplace.

Value Evolution

The Manufactory token value will be associated with the expansion of the eco-system and related marketplace. The larger the eco-system, the higher the demand for the MFR token, which will in turn increase the value.

Rewards for Manufacturers

Manufactory is planning to encourage competition between manufacturers by awarding tokens to them for registering their production capacity onto the eco-system. Long term the project is intending to build strategic partnerships with machine tool builders so that tokens can be used as part or full payment for new assets.

The project is also planning to provide incentives for the use of intelligent energy management systems to plan and optimise the use of energy within the manufacturing facility.



Rewards for Buyers

To inspire buyers to join the eco-system a stepped system of discounts correlated with order value will be offered for new users. This is required to help buyers to transition from the traditional method of placing orders to Manufactory.

Rewards for Community Contributions & Knowledge Sharing

A key strategy for the development of the Manufactory eco-system is to build community of manufacturing practice clusters. Experts will be able to collaborate with manufacturers, buyers and other experts to create process best practices and give advice on projects.

Manufactory users with expert knowledge that is shared with the community will be rewarded with MFR tokens for their technical contributions. This will be correlated with their Manufactory reputation and other user's votes.



Marketing Strategy

There exists a pressing requirement for Blockchain technology to be implemented in the manufacturing sector by giving access to the technology to as broad a market as possible. This will create opportunities for individuals and businesses alike, who can be rewarded for their involvement in the eco-system.

The intention of the Manufactory project is to create a manufacturing eco-system that removes the technological barriers to entry for any manufacturer regardless of their capability, size or location. Having all manufacturers across the world connected to a distributed ledger system with the ability to autonomously govern quality, capacity and costs will facilitate data capture on a level never seen before. For example, a government statistics office would be able to monitor in real-time the manufacturing output of a country (Gross Domestic Product or GDP).

In order to meet the requirements of the Manufactory eco-system and its customers, manufacturers will be allowed to join and contribute regardless of their location and capability. The creation of a global manufacturing eco-system will be the core objective of the project.

We plan to market the Manufactory token internationally to achieve this goal and build upon the expertise that the team already has. With an aggressive expansion plan we will develop into new geographic markets by implementing key strategies and engaging with experienced Blockchain marketing professionals. Our marketing channels will include the traditional press outlets, word of mouth, product representatives and social media mediums such as Twitter, Facebook and Instagram.



"Great things in business are never done by one person; they're done by a team of people."

Steve Jobs



The Manufactory Team

Executive Team

The Manufactory Blockchain project consists of a strong & highly experienced team who have a broad spectrum of experience in starting and growing technology start-ups as well as working for and with blue chip manufacturing companies.

Ben Bartholomew

Founder, CEO



A Multi-disciplined engineer and entrepreneur with over 26 years' experience in the manufacturing industry from the shop-floor to the boardroom. Always at the cutting edge of manufacturing technology and innovation, including creating and growing one of the first 3D printing bureaus in the UK. Ben has also created manufacturing specific software that utilised big data technology and automation. This revolutionised a blue-chip Aerospace manufacturers production processes, saving millions of pounds. Ben has a strong background in innovative and disruptive manufacturing techniques across a very broad spectrum.

Russell Ranford

Founder, COO



An experienced entrepreneur with a background of working within Local Government, Large Private Companies and PLC's.

Russell has subsequently established a number of successful businesses and continues to guide Consultancy, Development and Property Investment Companies in residential and commercial property markets.

His extensive business management experience and his ability to deliver complex projects will see him adopt a cost aware and pragmatic approach to guiding Manufactory initiatives.



Advisory Team

Jay Bartholomew

Manufacturing Operations Specialist – Rolls-Royce Plc.



Working in the Gas Turbine Industry since 1995, Jay has worked her way up from the shop-floor to become a leader of a specialist manufacturing plant within the gas turbine industry. With a Master's Degree from Warwick University in Engineering Business Management, Jay has a deep understanding of manufacturing operations management and the issues that can be caused by a complex manufacturing plant.

Her focus will be to ensure that the Manufactory system will address all the aspects that are required to run a successful and efficient factory.

Tony Bartholomew

Aerospace Manufacturing Expert



Tony has been at the forefront of Aerospace special process manufacturing for over 30 years. He built the UK's largest Electro-Discharge machining (EDM) centre which became a first-tier supplier to Airbus. Supplying a critical component on the fastest moving aircraft assembly line in the world.

Tony's experience in starting and building new technology companies and manufacturing processes will be invaluable to the Manufactory project.

Adrian Bukowski

Manufacturing Engineering Specialist – Rolls-Royce Plc.



Adrian started his manufacturing engineering career as an engineering apprentice in the Aerospace industry. Having worked his way up from the shop floor to his current position as an engineering management undergraduate. He has worked in multiple specialised areas including managing a laser drilling technology process that is used to produce complex features in high performance gas turbine components. He also project managed a 3D printing process that revolutionised the production of sensitive composite parts.



Adrian is also an accredited Lean Six Sigma Green belt practitioner which has led to him producing significant savings in his roles. Adrian joins the Manufactory team as a keen blockchain enthusiast and his broad knowledge of manufacturing processes and management will be vital as we create the Manufactory community.

Liam Palmer

Manufacturing Engineering Specialist – Rolls-Royce Plc.



An experienced manufacturing engineer, Liam specialises in subtractive machining technology. Liam's role as a process manufacturing engineer has seen him revolutionise methods of manufacture for specialist components in difficult to machine materials. Realising major cost savings and lead-time improvements for manufacturing sub-systems has resulted in him being a respected member of the manufacturing community.

Liam's expertise will be used to ensure the Manufactory project embeds the latest manufacturing best practice into the eco-system.

Philip Dyke

Electronic Design Engineer - Bespin Research Ltd.



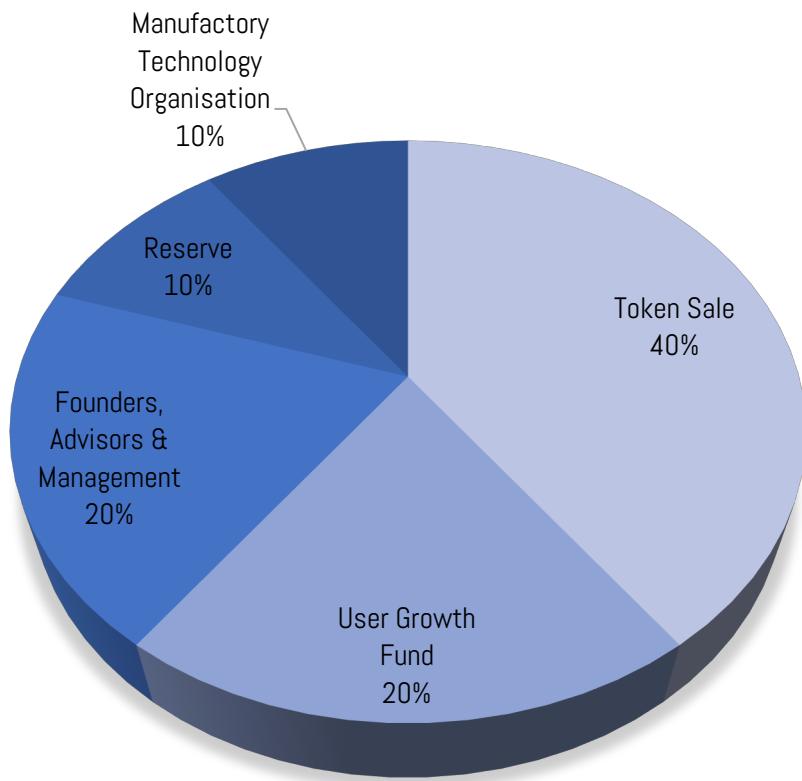
Phil is a knowledgeable and skilled hardware and software design engineer with over 7 years' experience in designing and manufacturing complete solutions for a plethora of electronic devices. His work includes performing all aspects of system design and development for over 22 Internet of Things (IoT) devices from a wide range of industries including manufacturing, remote monitoring and smart devices.

Phil also has a very keen interest in Blockchain development and his comprehensive experience will be vital in developing our universal hardware Blockchain connector.



Token Distribution Event

Token Distribution



The Manufactory token distribution event provides an opportunity for anybody to participate in the technological revolution known as Industry 4.0. The MFR token will allow manufacturers and technology innovators to be incentivised to participate in the project.

The Manufactory team reserve the right to extend the token distribution event if the hard cap has not been met. The end date can be extended by up to 1 calendar month on each occasion with the maximum number of occasions being 3 times. If the token sale soft cap has not been reached once the end date has been reached, then all contributions will be returned, and the project will not proceed.

In order to obtain your MFR tokens, an ERC-20 compatible token wallet, such as ['MyEtherWallet'](#), will be required. Using a non-compatible wallet will result in the loss of your tokens.

Tokens will be distributed once the public token sale has ended. Users will be required to provide further information for Manufactory's Know Your Customer (KYC) and Anti-Money Laundering (AML) processes to verify their identity. The Manufactory project reserves the right to reject any MFR token distribution participants.



Token Summary

A finite quantity of 325 million MFR tokens will be distributed. 40% of these will be made available for the token distribution event.

Token Name	The Manufactory Token
Symbol	MFR
Total Supply	325,000,000
Platform	Ethereum
Decimal Places	18
Protocol	ERC-20

Pre-Sale Details

Pre-Sale Token Supply:	16,250,000
Pre-Sale Soft Cap:	1,400 ETH (£0.25 million)
Pre-Sale Hard Cap:	7,000 ETH (£1.25 million)
Pre-Sale Accepted Currency:	Ethereum (ETH)
Exchange rate:	1 ETH = 1,500 MFR

If the pre-sale soft cap is not reached all funds will be returned to the token pre-sale participants and the project will not proceed. If the soft cap is exceeded, all proceeds will go towards a full token sale.

Sale Details

Sale Public Token Supply:	130,000,000
Sale Soft Cap:	16,000 ETH (£2.8 million)
Sale Hard Cap:	80,000 ETH (£14 million)
Sale Accepted Currency:	Ethereum (ETH)
Emission:	No new tokens will be created
Exchange rate:	1 ETH = 1,500 MFR

If the token sale soft cap is not reached funds from the token sale will be returned to the participants and the project will not proceed.



User Growth Fund

This token allocation is to allow a bounty and referral program to be launched. Details of which will be published in a separate document to be made available on the website.

Vesting

The vesting plan for the Manufactory team is linear vesting over a period of 2 years.

Bonus Structure

Private Pre-Sale

The private pre-sale will be for industry specific long-term and strategic partners who have conveyed an interest in taking part and associating themselves with the Manufactory project. For example, Original Equipment Manufacturers (OEM's) such as machine tool builders, CNC controller manufacturers and material suppliers will be offered exclusive access to the Manufactory eco-system.

Individuals who wish to invest more than £20,000 (or 100 ETH) will also be welcome to join the project at this stage. Bonuses for large investments will be discussed with individual prospective buyers.

Public Pre-Sale

The minimum amount to participate in the public pre-sale is 1 ETH.

The bonus structure for the public pre-sale will be based on a single tier of 100% for the duration. Therefore, the exchange rate for this phase of the token distribution event will be:

Bonus = 100%, therefore

$$1 \text{ ETH} = 1,500 + 1,500 \text{ Bonus} = 3,000 \text{ MFR tokens.}$$

Public Sale

The bonus structure for the public token distribution event is based on a simple tier system. Tier 1 will see a bonus of 30% until the soft cap has been reached.

To enable participants to take advantage of the bonus system after the soft cap has been reached there will be a further 2 tiers of which the thresholds will be a 10% bonus until 40% of the hard cap is reached and then 5% until 60% is reached. The table below summarises the bonus structure.



<i>Tier</i>	<i>Bonus</i>	<i>Exchange Rate</i>	<i>Limit</i>
1	30%	1 ETH = 2,000 MFR tokens	Soft cap
2	10%	1 ETH = 1,650 MFR tokens	40% of hard cap.
3	5%	1 ETH = 1,575 MFR tokens	60% of hard cap.
4	0%	1 ETH = 1,500 MFR tokens	Hard cap.

Unsold Tokens

Manufactory will not generate any new MFR tokens once the token sale has been completed. Any unused tokens after 6 months from the end of the public token sale will be sent to the Manufactory Reserve or the Manufactory Technology Organisation (see separate sections). The Manufactory team reserve the right to burn tokens if it is deemed necessary to maintain the liquidity and functionality of the token.

Manufactory Reserve

The Manufactory reserve funds will be used for any unforeseen costs associated with the start-up and running of the organisation. It will also be used to perform initiatives, future MFR circulations and offer incentivised platform promotions, for example, bonuses for clients and manufacturers for certain milestones (Quality accreditations, energy efficiency awards, etc.).

The reserve will also be used to address the problem of the value of the MFR token fluctuating against Fiat currencies during the manufacture of any parts. Without this mechanism there may be an impact on the ability for clients and manufacturers to engage in transactions on the Manufactory platform and is therefore critical.

We may use the Manufactory reserve to trade MFR Tokens on the open market to ensure that this does not have an impact. We may also deem it necessary to burn tokens in the future to maintain the MFR network.

The Manufactory Technology Organisation

It is the aspiration of the founders that a portion of the proceeds from the Token offering be used to invest in the future of the global engineering sector. This will be enacted by creating the Manufactory Technology Organisation (MTO) which will ascertain and contribute to various engineering related charities and institutions across the world. Its mission will be to act in the best interests of, and to ensure the future of manufacturing technology is continually advanced. This will proceed once the token sale has been completed and the soft cap has been exceeded.

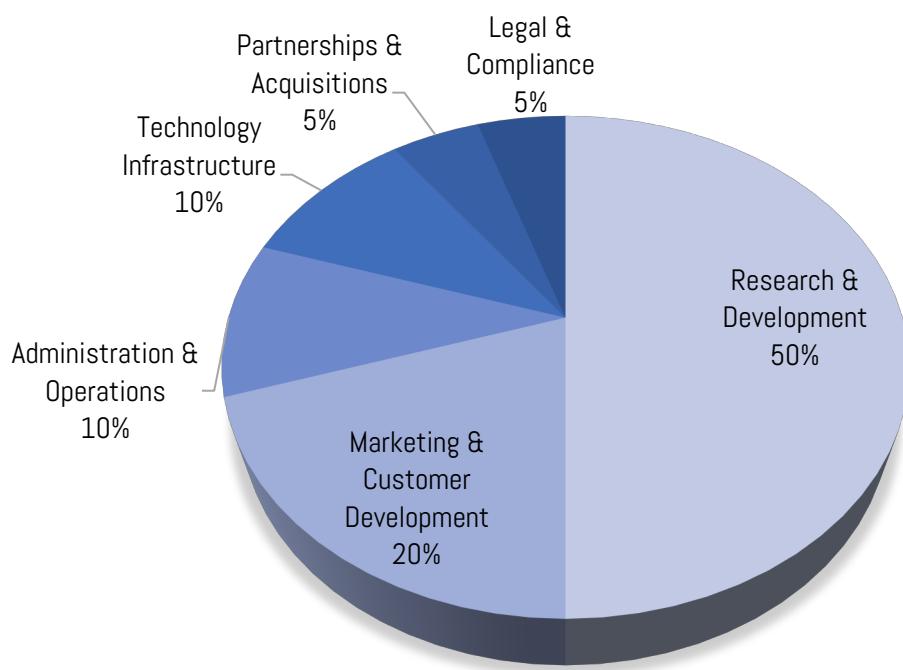


Risks in Participating in the Token Sale

The token offering involves and relates to the development and use of untried software and technologies that may not come to realisation or achieve the objectives specified in this white paper. The purchase of tokens represents a high risk to any contributors. Participants in the Token sale should consider the potential risks before taking part.



Use of Funds



Proceeds of the MFR Token sale will be used to accelerate the network effect of our token distribution and develop the Manufactory platform, marketplace and hardware solution.

Achieving the hard cap target will allow the Manufactory project to compress it's time to develop the software and hardware platforms by employing a larger development team. It will also enable the project to make bigger investments in strategic acquisitions and partnerships within the software and manufacturing sectors.

Manufactory will also support data providers and developers that decide to build on the platform throughout their development phases. This will be a critical part of our development strategy after the completion of the token sale.

Research & Development

A significant share of the funds raised will be used to research and develop the core of the platform which will be the Blockchain and smart contract creation. These elements are crucial to creating an efficient, flexible and autonomous forum.

Manufactory will continuously develop the eco-system by enhancing the user interface and experience. The project will also develop decentralised applications (dApps) for use upon the peer-to-peer network. Hardware research & development is also included within this funding section.



Marketing & Customer Development

The Marketing and customer development fund will help to expand the adoption of the platform within the manufacturing industry by offering incentives for use of the platform by different types of members.

Our marketing efforts will be directed towards raising awareness of the project and expanding the adoption of the platform and its community. For more details please see the 'Marketing Strategy' section in this white paper.

Administration & Operations

This is required so that it can be used to ensure that the Manufactory organisation and structure are correctly administered. This will be used to create and maintain an efficient and cost-effective company management and security standard.

Technology Infrastructure

Key to running an efficient decentralised marketplace will be the technology infrastructure. This will be required to help expand and maintain a fast-growing development team who will need the latest technology to ensure efficient progress.

Partnerships & Acquisitions

The Manufactory project proposes to utilise strategic industry partnerships and acquisitions that will enhance and cultivate the Blockchain eco-system. This part of the funding will be used to facilitate this aim.

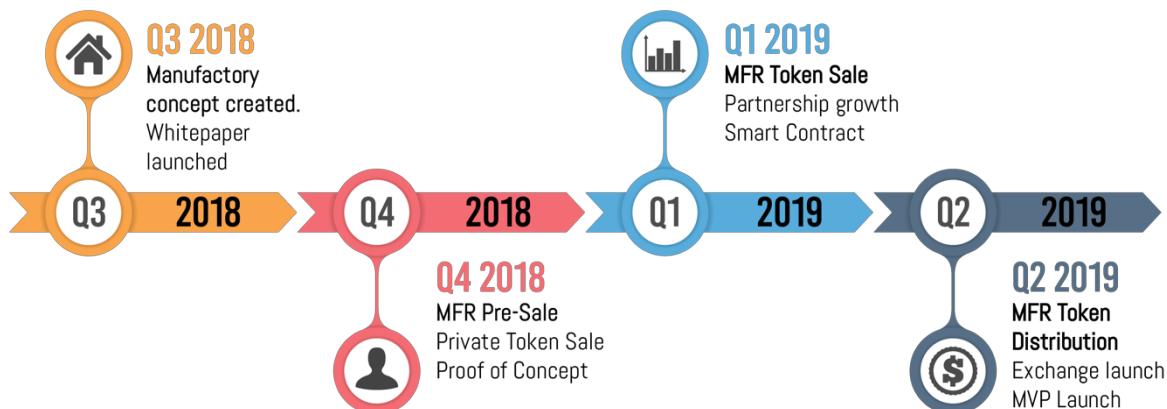
Legal & Compliance

Legal and compliance funding is needed for company incorporation, regulation and continuing operation. The project will employ the services of a third-party specialist company as regulation within the Blockchain community is constantly developing.

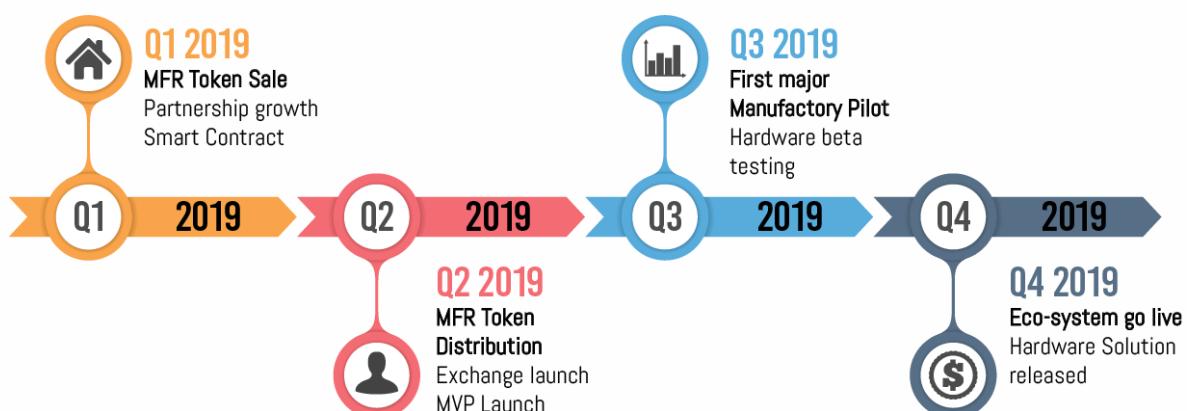


Roadmap

Roadmap – Pre-TDE



Roadmap – TDE



Let's get on with it

We would like to thank everyone that has contributed to this whitepaper and helped to evolve the Manufactory vision for the factory of the future. This includes all the people that work behind the scenes but haven't been mentioned directly in this whitepaper. They have been vital from the inception of this project.

We would also like to thank all of the future manufacturers and customers without which this vision would not be possible.



Legal Disclaimer

This is not a prospectus of any sort.

The purpose of this White Paper is to present the Manufactory project, its business model, technology and the MFR token to potential token holders in connection with a proposed pre-sale or token distribution event (TDE).

This document and any other documents published in association with this whitepaper relate to a possible token offering (i.e. the MFR token) to persons (contributors) in regard of the planned development and use of the network by various participants. This document does not constitute an offer of securities or a promotion, invitation or solicitation for investment purposes. The terms of the contribution are not intended to be a financial service offering document or a prospectus.

The token offering involves and relates to the development and use of untried software and technologies that may not come to realisation or achieve the objectives specified in this white paper. The purchase of tokens represents a high risk to any contributors.

Tokens do not represent equity, shares, units, royalties or rights to capital, profit or income in the network or software or in the entity that issues tokens, or any other company or intellectual property associated with the network or any other public or private enterprise, corporation, foundation or other entity in any jurisdiction.

The token is not therefore intended to represent a security interest.

This English-language whitepaper is the primary official source of information about the MFR token. It should be noted that the information contained herein may be translated into other languages or it may be used in the course of written or verbal communications with existing and prospective community members, partners, etc.

In this respect it should be recognised that in the course of any such translation or communication it is possible that some of the information contained in this paper may be mislaid, corrupted or misrepresented.

The accuracy of such alternative communications cannot be guaranteed. In the event of any conflicts or discrepancies between such translations and communications and this official English-language whitepaper, the provisions of the English language document shall prevail.



Restrictions for Investors and KYC

The token distribution event will follow the Know your customer (KYC) and anti-Money Laundering (AML) regulations and best practice.

Tokens will be distributed once the KMC & AML processes have been finalised and the Token Distribution Event has concluded.

People from the following countries will be excluded from participating in the Token Distribution Event:

- United States of America (except for accredited investors participating in Private Sale)
- People's Republic of China (except for Hong Kong, Macau and Taiwan)
- Cuba
- Crimea Region
- Iran
- North Korea
- South Korea
- Syria

If the information provided by the purchasers within the KYC & AML procedures are not adequate, inaccurate or misleading, or the purchaser is deemed to be a restricted person the same conditions will apply.





THE MANUFACTORY PROJECT

manufactory.ai