

# McFly.Aero White Paper

Technology and Business Incubator for the urban air taxi market: services, businesses, operators and solutions.

McFly Token will enable device owners (aerial vehicles, chargers, landing pads) to get rewarded for granting temporary right of use to authorised passengers. Blockchain.aero Technology stack will make every device a potential service to be traded by entrepreneurs in the McFly Community on the open market, in real time.

This document is not a proposal for investment or of financial services, it is a mission statement. At the same time, however, this document is intended **EXCLUSIVELY** for the attention of individuals who are regarded as qualified investors in their respective jurisdictions, with the determination that the qualified investors have the skills in the field required to fully comprehend its contents. Reading this document beyond this paragraph is a **CONCLUSIVE ACTION TO CERTIFY** that you a) understand what 'qualified investor' designates in your respective jurisdiction, and b) you are a qualified investor in your respective jurisdiction and is therefore skilful to the degree to fully understand the implications of this document, especially of it representing neither a proposal nor solicitation of any kind. Nothing in this paper shall be construed as an offering, proposal, solicitation or a legally binding obligation.

*Ver. 29-JANUARY-2019*

# Abstract

**McFly.aero is a Technology and Business Incubator. It aims to integrate products of its Blockchain.aero Consortium members into a technology stack for the urban air taxi management system and a marketplace. It also facilitates the development of businesses along the supply chain, which will supply vehicles-as-a-service. McFly.aero offers the benefits of a global expert and entrepreneurial community, as well as of portfolio strategy on the emerging global air taxi market. It incubates the core technology and a multitude of businesses that will operate and sell a) passenger transportation service in key cities worldwide, as well as b) related products, technologies and services along the end-to-end value chain. That value chain largely spans from R&D for aerial vehicles to landing pads, mobile apps and additional services that can be sold by the grid to external users.**

McFly.aero aims to put the flying car into mass use in cities. For safety reasons an aircraft has to be prevented from operation after a fixed flight-time. McFly.aero's ingenious suggestion is to use the blockchain to control that this happens. Only the transfer of McFly tokens into the vehicle's wallet will enable physical flight of the vehicle: 1 token per 1 minute. Over its lifetime a vehicle will only accept a fixed number of tokens, after which its operation shall be restricted. Tokens will also be used to reward other devices in the infrastructure and their respective owners. Token transactions will also contain flight parameters and records of vehicles' maintenance.

Holdings of tokens incentivise people in key markets to prepare landing pads, chargers, and related services. Such activity increases the value of the vehicle for both shared and private use. It is the way to develop a 'glocal' market presence and to set up distribution channels within diverse local circumstances. It also creates unique entrepreneurship opportunities for people all over the world to benefit from industry emergence and growth.

We are already several aircraft developers who want to deliver to the growing number of cities, where maturing communities of token holders are building presence, getting ready with the infrastructure, explore and lobby for regulation.

*"The distinguishing feature of a networked incubator is that it has mechanisms to foster partnerships among start-up teams and other successful Internet-oriented firms, thus facilitating the flow of knowledge and talent across companies and the forging of marketing and technology relationships between them. With the help of such an incubator, start-ups can network to obtain resources and partner with others quickly, allowing them to establish themselves in the marketplace ahead of competitors."* —

<https://hbr.org/2000/09/networked-incubators-hothouses-of-the-new-economy>

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# Why and How

You might be skeptical of new technology. This is entirely normal. So don't feel too bad about that. Darryl Zanuck, executive at 20th Century Fox, once said in 1946, "Television won't be able to hold on..."

Meanwhile, in 1977 Ken Olsen, Founder of Digital Equipment Corporation, said "There is no reason anyone would want a computer in their home."

Last year, Elon Musk, Founder of Tesla Motors, said "Flying cars have issues..."

Indeed, there are issues in areas of technology, business, regulation and market adoption. We hear "You will not make it fly!", or "It will not be you, who will make the money!", maybe even "They will never be allowed in cities!" and "People will be afraid to use them!"

That's why a global Business and Technology Incubator is required for the Air Taxi industry. McFly.aero is incubating the Air Taxi Management System and an international community of its developers, operators and end users.

Why now? A new type of aircraft is emerging, an affordable urban electric vertical takeoff and landing vehicle. We believe that by efforts to make it consumable as a taxi service, we're placing ourselves on the right track at the right time.

At the same time, deal traction is hot. In 2017, and already in 2018, we saw multimillion dollar investments made into the electric VTOL developers, at sight of a full-scale prototype, all done by automakers, aircraft manufacturers or the prime names in the Silicon Valley.

- Volocopter — Daimler Ventures (\$30m)
- Terrafugia — Geely/Volvo (\$89m)
- Lilium — Tencent Ventures (\$90m)
- Aurora — Boeing Ventures (n/a)
- Joby — Intel Capital, Toyota Ventures et al (\$100m)

Regulators are on top of the matter: in 2017 the air taxi system and regulation were tested in Dubai, the FAA in the US is up for testing air taxi in Dallas, SF & LA in 2020.

Market adoption seems easy too: we are familiar with airlines and chartered flights, on one hand. On the other — car sales drop, as taxis are cannibalizing car ownership, offering a more valuable scenario of vehicles as-a-service.

That's why McFly.aero is the incubator for such a particular supply chain and market channel for the eVTOL, that must be able to deliver a growing variety of aerial vehicles as a service. We all know stories of strong brands like Nokia, Blackberry and Kodak, fading as result of choosing product ownership over a service-oriented ecosystem.

An air taxi service has to be provided in a growing number of cities in compliance with growing discrepancies in local circumstances, however, in a still unified manner. In order to achieve that, a service-oriented ecosystem needs to be incubated, comprised of turnkey compatible infrastructure solutions and players made aware as to how to implement it.

Why is an incubator the preferred choice? The incubator is the only way to ensure compatibility and scalability for something that is emerging as completely new. What are the alternative ways to the incubation model when compatibility and scalability is needed? It may be an industry association model, like the one Uber is following with its Elevate Program. Regulation and Policy makers may take the early lead, like they did in Dubai and Abu Dhabi. Or, a series of “format wars” between private companies, like Joby or Lillium, may define the shape of our future urban flight service.

We believe that self-regulation through industry associations or leaning to central policy-making are tools fit best for industries that already exist. In the new industries, proprietary format wars are costly for end users and may lead to worse technology adopted. Incubation is a classic way to catalyze new technologies and business-models, while a successful incubator benefits all industry and market players.

There is a fair number of shapes an incubator may take: government grants, venture capital, research and development labs. We chose a marketplace model.

The marketplace is one of the best methods of incubation, as it’s capable of involving large numbers of participants, and avoiding bottlenecks of usual organizational structures. Marketplaces create awareness and demand, as well as validate multitude of business models very fast (think Amazon, eBay, Alibaba, et al.). They also reduce transaction costs and lower entry barriers for developers, manufacturers and final users (Think how emergence of Android Market, unlike iOS Appstore, enabled wider variety of devices, developers and manufacturers in all price ranges, catalyzing growth and adoption (think ‘Xiaomi’)).

McFly.aero is already uniting 10 Technology Consortium members, willing to develop compatible components for the infrastructure, more than 50 experts supporting developments to propel growth and adoption, more than 1000 entrepreneurs in various cities of the world willing to learn how to make money by using the emerging technology. The marketplace incentive already motivated more than 15,000 tasks performed — all in less than 4 months.

McFly.aero has two strategic goals: 1) to develop a selection of compatible hardware and software from Consortium members for an integrated air taxi management system, and 2) to ensure rapid adoption through a global community (evangelists, experts, volunteers) that supports technology entrepreneurs in building air taxi-related businesses.

McFly.aero aims to incubate a) business models within existing players, and b) completely new business models and types of players. New business models can be developed by existing players in areas of Hardware Development, Software Development, Manufacturing, Navigation, Autonomy, Real Estate Development, Architecture, Law. Completely new business players are thought to be: Fleet Managers, Gridmasters, Lease-per-use, Insurance-per-use, Pilot-as-a-service, E-commerce for grid’s additional services.

McFly.aero does not incubate what does not pertain to mass urban air taxi service, i.e. developments like Jet packs, Gyrocopters, Thermonuclear Reactors, UAV delivery drones and 1-seater vehicles.

We hope for McFly.aero to be successful in delivering Air Taxi Management Systems and Urban Flights. If not McFly, then urban flight may be delivered by either OEM manufacturers, like Ford or Boeing, or by platform operators (think GAFA) or Gridmasters, like Uber or Lyft, and/or, last but not least, local businesses.

McFly.aero will provide low barriers of entry and fast scaling for all: manufacturers, entrepreneurs, and city managers alike. Compared to the scalability and level of entry barriers Gridmasters enjoy, platform operators may enjoy easier scalability, while higher entry barriers, local businessmen, on the contrary, may have lower entry barriers, but face difficulties to scale beyond one city, and OEM manufacturers, as we see, may get stuck in 'format wars,' presenting them with high entry barriers in certain markets and additional difficulty to scale. McFly, as designed, aims to combine for its participants the high scalability of a unified technology solution with the lowest entry barriers which only local businesses could enjoy.

In order to achieve that, we have organisational and technological competencies, early mover advantage and a proven tool to reach hundreds of thousands globally and engage them in action meaningful for our cause.

As far as competencies are concerned, a blend of international teams of corporate Consortium members are coupled with strong and engaged internationally recognised advisors. While on the operational level, governance is performed by individuals with proven track record in each line of Incubator's work. The ecosystem allows for an immediate global reach to local knowledge and ability to engage large talent pools.

The early mover advantage rests on the intent to collaborate on standards early on within a credible technology Consortium and expert Community, as we all together attract entrepreneurial and engineering talent, while serving a point of entry for increasing number of pioneers in the new exponentially emerging industry.

We have a proven ability to engage thousands globally, as the McFly Token is catalysing growth over the last 4 months, with the current numbers: 10 companies, 30 cities, 1000 people, 15,000 tasks done, and a 200,000-person audience reached.

The token is not only technologically a minute of flight, but it's an incentive mechanism. Imagine if Linus Torvalds had a token in the ecosystem to reward every line of code written, to charge for every execution, to incentivise every installation... Then, he most likely would be a billionaire, and early adopters would be millionaires, and we would be typing this using a Linux-operated PC.

The Incubator aligns the best interests of market and industry participants. Why join the Consortium if you're a technology developer? An alternative to having only a few customers (Uber, Dubai, et al.) the company through McFly.aero may become a service provider to thousands of awaiting customers in dozens of the world's cities.

Why join the Community? By doing so, one can explore business models on the new market, test new technologies, gain social capital locally and internationally, earn McFly Tokens as reward for efforts and contribution, have international community support your actions. For an early-bird local air taxi entrepreneur McFly.aero may be perceived through a combined metaphor of a franchise-MLM-affiliate network provided on a freemium model.

For a city, McFly.aero is an opportunity to have traffic jams resolved at no cost, with only the regulatory guidance required for a new type of passenger aircraft and the use of mass airspace above the city.

For you, the McFly Token is:

an indicator of success,

- 1 minute of flight;
- a core piece of technology;

- a direct result of your action and contribution, as well as that of the Community;
- a utility growing within the ecosystem created for the exponential and life changing industry.

Don't hesitate and get McFly Tokens today. Join the Community and lend a hand towards growing the business and building the future.

# Preface

It may take effort to grasp how seemingly unrelated technologies intertwined behind the beauty of McFly.aero and the Blockchain.aero Consortium. Incubators are used for both solving corporate challenges in developing new technologies and business models, they are used to help investors find best startups, they are used to help startups make leaps in development by providing networking, supporting environment, access to experts and talent.

To understand the opportunity of McFly.aero one must see how it is at the intersection of a number of trends in various industries.

## Supply Chain

The key concept here is that supply chains are no longer only the logistics and transport. It is about adding value to the product by improving its availability: place, pricing model, packaging. For example — making it a service. A taxi company is part of a supply chain for an automaker, allowing to administer the product (car) to the customer as transportation service on demand. Such administration is rewarded making the purchase of new cars pay back in less than ~1.5 years on average. What if no managers are required to administer the supply chain?

<http://www.supplychainshaman.com>

<https://www.linkedin.com/pulse/critical-look-blockchain-bright-new-shiny-object-lora-cecere>

## Marketplaces

Marketplaces are part of the supply chain. Owners of marketplaces are rewarded for combining the usefulness of wide choice of products with immediate and convenient location. After gaining the first suppliers to take part, the marketplace starts gaining customers. After a while by selling large numbers of customers to suppliers they can drive the purchase prices down. At the same time, they can still sell at premium products to customers, if data science shows those can pay. So, marketplaces then can not only gain premium, but also become political. They can drive our tastes. What if suppliers could deliver directly to customers and a marketplace could exist without control from its owner, who is biased by its own business interest to maximise profits?

<https://blog.usejournal.com/the-anatomy-of-a-marketplace-16b9d4ee8174>

<https://medium.com/@jgolden/four-questions-every-marketplace-startup-should-be-able-to-answer-defb0590e049>

<https://medium.com/point-nine-news/will-blockchain-s-eat-the-marketplace-stack-cf5952889aa0>

## Decentralization

The general concept of centralization came about when large systems emerged to be jointly used by parties who don't trust each other. Coordinate efforts of workers to build a road. Administer property registration for the benefit of all users of the system. Govern the budget distribution on those items needed by community as a whole. Where authority was delegated to

administer the creation of public good, lead to gains of political powers, and abuse was only around the corner. What if parties that inherently don't trust each other could still deal without the "trusted third party"?

<https://medium.com/@ryanshea/the-internet-of-the-past-present-and-future-51b10c765d8d>  
<https://hackernoon.com/8-thoughts-on-blockchain-cryptocurrency-decentralization-after-another-three-months-down-the-448b916138b8>  
<https://hackernoon.com/outgrowing-our-internet-caught-between-the-intranet-and-the-decentralized-web-707c532abbe2>  
<https://hackernoon.com/decentralized-internet-on-blockchain-6b78684358a>

## **Blockchain**

Blockchain is a value transfer technology, which removes the third party from administering transactions. We call internet a result of developments in Information and Communication Technologies. Now information spreads freely without the involvement of a "third-party", say, a telegraph company or a post office, for 1:1 communication, or a newspaper editor for a 1: many communication. Now it is many-to-many (almost) unhindered information transfers. What if the same could apply to value transfers?

<https://hackernoon.com/what-can-blockchain-do-for-you-746ed436a371>  
<https://medium.com/@FEhrsam/blockchain-governance-programming-our-future-c3bfe30f2d74>

## **Internet-of-things <—> Big Data <—> Machine Learning <—> Artificial Intelligence**

Once a coca-cola vending machine used copper wire to inform it was empty and refill engineer came to service it. Fast forward we have millions of sensors and information networks available to connect them to tell us zillions of things we never could know. So, we have the data and we can notice trends that we never could notice before. Then we can also discover (and what a discovery it is!) interrelations between trends, correlation patterns between hundreds of events which we never could even hold in one's mind. Now what if the computer could act based on those discoveries, introducing new things (designs, informational patters, news visibility) to test how it results in human behaviour and learn iteratively how to create better environments for us?

<https://blog.iota.org/iota-data-marketplace-cb6be463ac7f>

## **Smart-City**

What if the city knew better how to make us comfier than any of elected mayors?

<https://ixn.intersection.com/these-6-technologies-are-redefining-the-smart-city-ddee2dda530>

Now, what if you pick the best from what those verticals offer?

You then create an incentive for entrepreneurs in cities to come together and comprise branches of the Global McFly.aero Community. They will take technologies developed by the Technology Consortium members and deploy a truly community-driven supply chain, or, from a

different angle, a decentralized marketplace. Through that marketplace anyone can sell devices, provided by Consortium members, as services. Every owner of each such IoT-connected device would be rewarded by McFly token every time the device is engaged as part of an orchestrated flight. Flight will be ordered and consumed by a passenger in the city, and the bill will include payment for each device's service: vehicle, landing pad, charger, etc. And that will be done based on real-time supply and demand, and no third party would intervene the transparency to exploit the monopoly position between the technology providers, entrepreneurs and passengers. And, it will come for free for the cities, on the contrary creating unheard of business opportunities for local small-medium sized companies in an exponentially growing life-changing industry of air taxi.

<https://medium.com/world-ly/autonomi-the-anti-uber-415bd361f13b>

# Background

## One: Blockchain for Transport

“Banking and payments aren’t the only industries that could be affected by blockchain tech. Law enforcement, ride hailing, and charity also could be transformed.” — said the subtitle of a publication by CBInsights called “Banking Is Only the Start: 27 Big Industries Where Blockchain Could Be Used.”

For the car leasing and sales industry, the report quoted a use case already developed: “The prospective customer chooses the car they want to lease, and the transaction is entered on the blockchain’s public ledger; then, from the driver’s seat, the customer signs a lease agreement and an insurance policy, and the blockchain is updated with that information as well.”

Another solution “makes its own proprietary digital currency — like bitcoin — which is recorded digitally using blockchain technology. Instead of using a centralized network to call cabs, people may use the [decentralised system for] finding other people traveling similar routes and exchanging coins for the rides. These coins can then be used for future rides. Users earn (or “mine”) these coins by letting the app track their locations.”

## Two: Blockchain for IoT

IoT was quoted as another industry enabled by blockchain, mentioning use cases developed by several groups. In one solution, “a blockchain would serve as a public ledger for a massive number of devices, which would no longer need a central hub to mediate communication between them.” Another solution is, “a decentralized network using the blockchain (among other things) for sensors to communicate with each other.”

## Three: Blockchain for aviation

According to Accenture in its report, “Beyond the Buzz: The potential of Blockchain Technology for Airlines”, there is a very strong similarity between the airline industry operations and what blockchain technology has to offer. Therefore “it is fair to say that blockchain and other distributed ledger technology has the ability to improve transactional flows, improve trust and provide immutable record retention”. It further states, “Using blockchain technology for enhanced reconciliation and data sharing is a compelling value proposition for this industry. The most creative and disruptive possibilities go beyond pure financial transactions.”

Capco, the global business and technology consultancy for the financial services industry, has conducted a report for the International Air Transport Association (IATA). The research focused on determining how blockchain may be used by the airline industry. They have concluded that blockchain can make the industry faster and more cost efficient, enhance customer experience and the value of the industry.

“Blockchain is a disruptive technology and represents a great opportunity for digital innovation. Every single industry, from the financial sector to aviation, is trying to understand where this

technology will best fit and where to start the innovation journey. Distributed ledger technology – including blockchain – is already proven to reduce transaction fees when transferring money across borders and currencies. That represents a great promise, particularly for global businesses and industries.” Assad Mahmood, senior consultant, Capco.

“The value of having a single ‘source of truth’ that all business partners trust can dramatically simplify reconciliation, invoicing and settlement in our industry,” commented Juan Iván Martín, IATA head of Innovation, Financial and Distribution Services.

The German airline Lufthansa has introduced the BC4a initiative to bring together software developers, aircraft builders, MRO (Maintenance, Repair and Overhaul) service providers, logistics, leasing companies and regulators and develop the use cases for blockchain in such areas as identity management, security, ticketing, loyalty, luggage custody-change tracking, maintenance, air cargo, other use cases, such as: in-flight entertainment, traveller compensation, flight planning, etc.

“Blockchain technology will continue to take flight in airlines over the next decade. Use cases not even conceived of today will become every day, reducing complexity and costs while improving the travel journey with real-time travel experiences,” summarises Accenture.

# Some History

The community of decentralized urban flights was formed by several dozen enthusiasts of urban mass aviation, and the Technology consortium was initiated by the industrial blockchain project community and developers (Emercoin), aircraft developers and manufacturers (Bartini) and the designers' community (CreativeRussia).

The vision for McFly.aero, is to be the community of customers and businesses bringing closer the future of the shared use of aerial vehicles for mass passenger urban aviation and to accelerate the creation of both aerial vehicles, the community-maintained blockchain solutions and other infrastructure for their use — technological, legal, and social.

The community has created McFly tokens for itself and its members, to share, work for and benefit from a) the common vision of owning urban flights that become a reality within 1-2 years and b) tokens becoming a lasting feature making urban flight mass-affordable.

While many fintech blockchain projects aim to tokenize assets, projects or products, McFly.aero tokenized the utility of the flight itself, including all parts, functions and values of infrastructure required to make the mass urban flight an affordable commodity. One token shall technically be equal to roughly one minute of flight — a unit in which all value across the mass urban flight value chain shall be measured for a decentralized community-backed mass urban aviation system to emerge. Thus, it becomes the common denominator for the community's effort and all involved projects.

In today's world, one minute of flight may generally be valued between USD 15 and USD 60 on a chartered helicopter (and Uber estimated the flight tariff to equal initially at Uber-Black service rates and to go down to UberX rates). This is the value that society puts on vertical takeoff and landing functionality and that is the value with which the McFly token shall compete.

The aim of the mass urban aviation McFly.aero community and the Technology Consortium is to make McFly token affordable. Effective distributed supply-chain operation and crowd-management of the infrastructure (including the vehicles) will establish the economic system of fractal marketplaces establishing fair tariffs for each component or service. Ironically, the McFly token may be the only token that shall reduce in its relative value, while urban flight rebrands itself from exclusive service available only to the privileged into a mass-available commodity.

# A Word from Bartini

*McFly Token is a reward for any owner of an aerial vehicle, take-off pad or electric charger for every time their devices engage in serving air taxi flight.*

*McFly.aero incubates entrepreneurs who will purchase devices to connect them to the city grid for profit. These entrepreneurs will also make the driving force to get the city officials acting sooner than later.*

*Blockchain.aero is a Technology Consortium comprised of companies that manufacture devices and components, and which committed to getting their reward in McFly tokens too.*

*Bartini, Inc. is one of the members, the aircraft developer that wishes to establish a market channel for its future products. It has committed the first 3000 vehicles to McFly.aero through Blockchain.aero Technology Consortium. Therefore first 1.8Bn McFly tokens are Bartinis' flight minutes. The vehicle will technically not fly unless McFly token is transferred into its wallet. Heperd by Avianovations LLC is another aircraft manufacturer committing to the same principles.*

*You should care, because you will get cheaper flights sooner and in more places. You are invited to become part of the effort and get rewarded in McFly tokens when helping fast-forward to this future in your city or globally.*

The main choice we are facing is this: whether we as an aircraft manufacturer want to be in the market with a) few competitors, b) long b2b sales cycles, c) just a couple of large corporations with high bargaining power as clients, and d) slow-growing demand in a handful of cities where e) flight is still a semi-luxury available maybe to upper middle class.

Or we want to be in the market where a) many competitors, local and global, swarm with various designs of flying cars in b) increasing number of cities, c) flights are becoming more and more affordable every day, because d) **aircraft manufacturers** are able to **sell** the **product** immediately **as a service**, while e) **no third party** controls the distribution channel.

The first scenario is a given in today's world. So, we decided to support also the second scenario by becoming one of the founding members of the Blockchain.aero Technology Consortium to materially back the McFly.aero initiatives. Now in less than half a year it comprises 10 companies, including two other aircraft manufacturers. We believe in our future product, so we chose increased competition to bet for more free and transparent market with an access to everything through the use of the blockchain technology.

We are Bartini, Inc., the flying car developer founded by Russian airspace engineers with over 15 years of design certification experience building large passenger jets. We have safety and certification requirements deep at heart.

Flying cars for a too long time have been a dream. Last year they have become the firm plan. In April, Uber on its Global Elevate Summit gathered experts, researchers, city managers, aircraft manufacturers and venture capitalists to validate that technology has matured to make the

urban eVTOLs feasible, and to announce its plans for **1,000 vehicles** in each of the **300+ locations**. Some cities introduced their own independent systems.

From the technology perspective, it is no longer a question whether flying cars will fly. What still intrigues us, however, is which design will fit best to the city. That may be somewhat slower but extremely safe and easy to steer electric multicopter “helicopters” like Volocopter, Passenger Drone or Hepar. Or maybe the lower noise but also lower efficiency impeller engines on a tilt-shift wing, like Lilium. Or perhaps the full tilt-shift ducted fans on an aerodynamic body, like Bartini. Or maybe all of them will be operated, comprising a variety of models akin to the one we observe in automobiles.

What is the main challenge for this new industry, with the market estimated only by Uber’s announced demand at possibly over \$100Bn? It is the absence of the market channels. The challenge, but also the opportunity, is to be able to sell the product as a service and tap into a **market worth over a trillion dollars**.

In the general scenario, a large corporation or a city will spend monies to establish the infrastructure and will require that monies be paid back with premiums. Imagine highly paid managers of traffic operator negotiating rental agreements for rooftop landing pads with real estate developers and landlords! It will take ages and those salaries and bonuses will be in the flight fare, as well as the investors’ dividend for both of the companies.

Now imagine the real estate developer can on its own connect rooftop landing pads into the system to get rewarded every time they are used? Or, if it is a shopping mall — compete for inbound traffic by setting lower fares to attract landings on its station by all those who need to visit the local neighborhood? Yet another landing pad may be operated by a local entrepreneur who also bought and installed a capacitor to charge the aerial vehicles faster than directly from the grid.

The vehicles are also connected to the grid by flight providers — a type of entrepreneurs who get vehicles from the manufacturers. Software developers design convenient mobile apps to order services from the grid.

The whole system of connected devices is managed through a set of smart-contracts on the blockchain. The system tracks the usage of every device and the reward is based according to the current load of the grid in a **transparent supply and demand** game.

That technology makes redundant, any third party that would usually settle between passengers and providers, own the “order button”, repackage devices into services and controls the fares.

The blockchain technology and the token create the reward system that motivates all players to jointly create and operate the grid. The city then sees how the network can emerge and grow by the efforts of local entrepreneurs and at no cost. The certification & safety guidance will be required from authorities, which still will emerge faster with more players having a stake and providing expert contributions to the policymakers.

Markets emerge faster where opportunities are realized by many. The 1.2 trillion market of urban flights can emerge as an industry with high entry barriers, controlled fares and the limited supply of product.

For the first time in history, **people can jointly control and operate** what would usually become a **monopoly**, build their own businesses within it based on small or large pieces of that distribution grid.

For Bartini it means market access and greater development opportunities. For our investors, it means less risk so more capital will be available to make Bartini even better faster. For all of us, it means larger infrastructures will emerge sooner and in more places with a wider variety of vehicles, servicing all needs and at lower fares.

# Traction

At the time of writing the half-year operations of McFly.aero Incubator has already catalyzed growth and developments, as well as awareness for the new industry. The Concept of marketplace has reached and appealed to many people, who became part of the cause without bottlenecks of traditional corporate hierarchies.

- 10 companies are supporting the effort
- Entrepreneurs in 30 world's cities are
- Community of more than 1000 people
- More than 15,000 tasks done advancing the McFly cause
- An audience of at least 200,000 people has been meaningfully reached

Therefore, it has been established that the MVP of the McFly.aero Technology and Business incubator — the marketplace as incentive for the community to advance the development of the industry — has been validated prior to the Token launch.

# White Paper Overview

***Sections of this White Paper intentionally repeat certain concepts from other sections. It is widely known that only a few read long documents in their entirety, so it has been the explicit intent to make every section understood by a fractional reader.***

The “first-ever” White Paper — the one that would lead to thousands of people to contribute time, effort and finance and create what may be now deemed as world’s largest distributed datacenter — was only 9-pages long.

*“A 9-page whitepaper spawned a \$150bn cryptocurrency, a computer network bigger than the top 500 supercomputers by 10,000x, and a diverse ecosystem of developers, users, and companies. This was arguably one of the highest leverage actions in human history. It showed the power of blockchains as networks that can connect everyone and bootstrap themselves into existence if well-constructed.” —*

<https://medium.com/@FEhrsam/blockchain-governance-programming-our-future-c3bfe30f2d74>

This White Paper will start by sharing the *Vision* where we describe the desired use cases McFly.aero aims to provide to the system participants. This is our ideal world and our cause, for which we join our forces, talent, time and resources.

In the next section, we will look at the McFly.aero Incubator through the usual *Problem—Solution* framework, although the Incubator, as an ecosystem, serves different solutions to various problems experienced by current and future industry players. We will also explore subjects of people, involved in the *Community*, the *Roadmap* and *Tokenomics*.

Should you wish to dive deeper, in the next section we will outline to contours of the *Technology* to be incubated, part of which already exists as MVP, other parts need to be bundled together in order to provide meaningful use case. We will also discuss the possible limitation of existing blockchain protocols against the business requirements the system may impose.

Further, we will explore which *Businesses* are needed or may appear along the supply chain of this new industry and the market. Some of the businesses are related to building the system or to preparing ground for its implementation. We will outline here the working model of the *Air Taxi Readiness Index* through which we explore the opportunities in various cities of the world and which guides the local communities of entrepreneurs. This will lead us to describe *Governance*.

We will then return to the subject of *Token* and discuss its utility in various use cases and then look into more detailed *Roadmap*.

*Regulation* will be the subject of the next section and even further we will assess and analyze the future Market for passenger flights.

After *Concluding Remarks* in *Appendices* there are the *Manifesto*, which the Technology Consortium members share, and the *Terms and Conditions*, including the descriptions of risks.

# Vision

## Passenger

You go out on the street in your city and you have some McFly tokens. You can use them to order an aerial vehicle (electric vertical take-off and landing, autonomous or semi-piloted) to the nearest landing area or directly to your house roof and you use your mobile device.

At times, you may wish to get priority service (for example, in case of a temporary lack of available vehicles in your area). Then you do it in two ways:

- With the number of tokens in your wallet, you may “vote” requesting higher “class of service” and thus get priority service as large token holder, or
- Agree to a higher tariff as determined by demand and supply ratio at the moment. (The decentralized system will allow you to see real-time load of the grid and changes in the current demand and supply in your area and your fair trading will form the final flight price).

The aerial vehicle then arrives to take you to the desired destination and some tokens are transferred from your wallet into the "current" (operational) wallet of the vehicle. From this wallet the vehicle autonomously settles all associated costs of the orchestrated urban flight and its ecosystem and infrastructure:

- Battery recharge costs,
- Landing pad rent,
- Service and maintenance,
- Air traffic control,
- Pilot
- Insurance, etc.

The vehicle may track cabin damage inflicted by passenger or other excessive use of its resources and issue additional bill on the smart contract basis.

## Entrepreneurs

With McFly.aero you will be able to start your own business along the air taxi management system. If you have a lawn, a parking place near your house or a suitable roof, you would be able to quickly learn how to equip the space and connect it to the unified grid, so that it can be used as a landing and takeoff pad. You may buy a compatible electric charger and equip your landing pad so that you could also provide that service.

You control the offer rates and service levels for the devices you contribute. You may have your landing pad sponsored by advertisements and thus its service offered at zero fee. Alternatively, you may secure a prime location for your landing pad which would allow to charge premium those who would like to use it.

Every time your landing pad or your charger is engaged by the grid, you earn McFly tokens.

## City Manager

As a City manager at some point you will be contacted by a local entrepreneur suggesting deploying the McFly air taxi management system. Generally, you will have to provide policy and regulatory guidance on:

- Airspace use and air traffic control
- Certification of the new type of aircraft
- Land use
- Compliant architectural solutions for the landing pads.

The air taxi will appear and grow rapidly at no additional cost to the city, by the effort of McFly local entrepreneurial community, while creating jobs and facilitating value created by the SMEs.

# **Business Support System**

## **Vehicle**

Upon landing, the vehicle settles all costs related to its service by transferring respective number of tokens into its internal “total flight” counter called "resource wallet". This is the life time “meter” of each vehicle, much like the odometer is used to measure the lifetime of the automobile. Tokens on the resource wallet represent the total flight that the vehicle has already performed. Therefore, capacity of the resource wallet is the indicator of the remaining vehicle’s lifetime. It is counterfeit-proof as the information is stored on the blockchain.

For illustration, total lifetime of a Bartini 4-seater vehicle will correspond to 700,000 McFly tokens on the resource wallet, and of the 2-seater — to 500,000 tokens. As soon as this amount is reached the vehicle is recycled and tokens are then transferred to the manufacturer as payment for the new replacement vehicle for the city.

The exact number of tokens to be transferred from the current wallet to the resource wallet for any particular trip is determined by an open calculation algorithm based on the usage rate of each technical component and of the whole vehicle.

## **Landing Pad, Charger, Other devices and services**

Devices generally will have two wallets — operational and resource wallets.

Operational wallet will function for collecting McFly tokens as service fee, and resource wallet will be to receive so many McFly tokens from the operational wallet, as to reflect the depreciation of the device. It is the resource wallet that triggers service maintenance or replacement of each device in the grid, providing that there are always enough funding for such actions.

# Incubator

## Problem

Last year urban air taxi infrastructure was tested in Dubai, while automakers invested hundreds of million dollars into the passenger electric VTOL manufacturers. Emergence of air taxi infrastructures in the world's largest cities is only a matter of months. However, a whole new market of mass urban air taxi worth over 1 Trillion USD has only a handful of places for entrepreneurs to get support, for investors to get guidance, for experts to sync-up, for regulators to receive feedback. Specifically, technology developers need to develop standards and products that will be mass-deployable as a tightly-knit bundle, interchangeably, to comprise the grid that serves flight-per-order in a multitude of local environments and regulatory requirements.

## Solution

McFly.aero is a Technology and Business Incubator. It offers benefits of global expert and entrepreneurial community, as well as portfolio investment strategy. It aims to incubate businesses that will sell and operate passenger transportation, as well as related products, technologies and services along the end-to-end value chain, that spans from R&D for aerial vehicles to landing pads, mobile apps and additional services that can be sold by the grid.

## Token Implementation

The McFly token is a reward for human and machine services within the common shared marketplaces — business and technology incubator (now) and the air taxi marketplace and management system (later). McFly token is a unit of value, that reflects development of the concept, participants, the Incubator and the industry as a whole. McFly token is also, technically, a measurement of and a right to 1 minute served by grid-connected aerial vehicle developed by Consortium participants. Thus, it has intrinsic value as a unit of measurement for device use, record of rights to use, a ticket to ride, an ignition key, and a unit of billing for any service available on the incubators' marketplace from humans or machines.

## People

McFly.aero Incubator includes Corporate partners (who want to see where the industry goes), Consortium members (who want to make their products integrate into a unified air taxi infrastructure), Entrepreneurial community, organised in City-focused Chapters (who want to use that technology to earn, i.e. sell that technology as a service, as well as develop other business models). Therefore:

1. a growing Board of industry executives and their respective engineering teams are involved in decisions related to technology architecture and device bundle;
2. a governing Council makes decisions on which incubator development tasks are offered at which reward levels;
3. the Advisory Board comprises senior, experienced and known individuals to oversee and guide specific lines of work according to an established advisory agenda;
4. a growing community of regional evangelists looking to become entrepreneurs along the supply chain offer regional expertise and recommend localisation strategies for all participants of the incubator.

## Roadmap

The goal is to incubate technologies and businesses, incentivised by McFly token as core value, aiming to offer the air taxi management system and its users: entrepreneurs and passengers. The more leverage in terms of attention, contribution, participation, the project attains, the more cities will be included, the more participants in the consortium, the more depth and inclusion in each line of work.

**The Technology Consortium has grown from 0 to 10 companies in half a year. Of which, 3 are aircraft developers, the Community has grown into more than a thousand participants with more than 15,000 of goal-oriented tasks were fulfilled through the McFly token-enabled incentive marketplace were fulfilled.**

The nearest key milestones on the roadmap for year 2018 are:

1. showcase emerging aircraft prototypes from Consortium members operated through a blockchain-based software, test mobile app;
2. grow the number of Consortium participants, McFly.aero chapters in cities, participants in chapters;
3. scale the public awareness campaign and McFly token distribution.

# Technology

## Incubator for the Marketplace

McFly.aero Incubator develops a marketplace for services from people and devices required to build, deploy and operate the air taxi management system.

Therefore, a technology solution shall comprise software and hardware that will operate jointly as a marketplace for:

- tasks, jobs, and services relevant to building, deployment and operation of the system (from architects, builders, promoters, pilots, maintenance specialists, insurers, et al);
- devices to offer their services for the orchestrated flight (vehicles, chargers, landing pads, et al).

While it is the joint task of Consortium members to deliver the technology bundle for the air taxi infrastructure, there is a growing variety of tasks that need to be performed in order to create the readiness in the cities to deploy the Air Taxi Management System.

*“Incubators bring benefits to all stakeholders in the innovation process. Their role is to create shared prosperity. Entrepreneurs gain a range of benefits that help them increase their chances of creating sustainable companies, while early-stage investors benefit from accessing a bundle of high-quality startups that have already received professional advice. Corporations are also starting incubation programs, as it provides them with a pipeline of potential acquisition targets. And professional services companies can build their future client book by providing free advice to new businesses. The role of startup incubators will continue to evolve. As well as helping new businesses survive, incubators are beginning to add value to startups and benefit the wider business ecosystem.” — <https://www.theguardian.com/small-business-network/2015/apr/04/evolution-startup-incubators-entrepreneurs-community-business>*

## Marketplace as an Incubator

There is a variety of tasks that need to be done in order to incubate technology and its market channels. A growing number of typical tasks have been identified.

In different cities executing on a task may result to different approaches and results, which still may be considered useful. Some cities would require tasks done that are redundant in other cities. Tasks are incentivised with McFly tokens. A range of task boards is used to communicate tasks and reward levels to the Community of the Incubator. One task board per every city.

A Council has been established to determine which tasks are to be promoted on the task board. Community members can apply to perform a task and get tokens upon execution. Community members can also suggest new tasks to be listed on the task board for the city or even a meta task board. Suggesting new tasks for the boards is also an activity which is rewarded. There is a progression mechanism for Community members to get more influence over which tasks and at which reward levels are to be listed on various boards.

Thus, operates the Incubator marketplace for services people offer to the common grid in order to build, deploy and operate the Air Taxi Management System. This marketplace will include an expanding number of services from people (e.g. piloting, maintenance, et al.), devices (e.g. charging, parking, flying, et al.) and businesses (e.g. insurance, lending, et al.)

## **Air Taxi Management System as a Marketplace**

The Air Taxi Management System will operate as a decentralised marketplace. Technology Consortium members are committed to bundle their technologies

Together into an integrated infrastructure solution. Aerial vehicles, charging stations and landing pads (of potentially various design from growing number of suppliers) will be able to connect to each other and to the software. It is envisioned that anyone would connect their device to the grid and be able to sell services of the owned device. The reward will be received in McFly tokens every time the device is engaged to serve end-to-end passenger flight service. The final fee to the passenger will include reward for all devices booked for the flight service, as well as people: pilots, service personnel, who will also be able to offer their services to the grid.

The marketplace will use open algorithms to match supply and demand for various devices, bundle most efficient services together to book an end-to-end flight service for the passenger, and distribute the fee received among devices and people engaged for the flight.

The business logic will be reflected in a series of smart-contracts for the IoT connected devices, their owners and users, on the blockchain.

# Blockchain

*“Porsche is currently testing in-car blockchain applications. The company announced that it will be the first major carmaker to implement and successfully test blockchain technology in a car. “We can use blockchain to transfer data more quickly and securely, giving our customers more peace of mind in the future, whether they are charging, parking or need to give a third party, such as a parcel delivery agent, temporary access to the vehicle,” said Oliver Döring, Financial Strategist at Porsche. “We translate the innovative technology into direct benefits for the customer.” —*

*<https://bitcoinmagazine.com/articles/porsche-and-xain-testing-iot-ai-blockchain-technology-solutions-smart-cars/>*

## Use case: Proof-of-flight

Blockchains are growing data ledgers located on many users’ machines. The data contained in blockchains are:

- Checked for veracity,
- Confirmed by consensus,
- Tamper resistant and protected against unauthorised change.

There are various types of blockchains for different usecases: for transfer of units of value (“coins”), for executing code, for keeping protected records, etc. The task of McFly.aero is to incentivise working out a blockchain for the implementation of the Air Taxi Management system and the IoT marketplace for the urban mass use worldwide.

The kind of “record” to be kept, or the “transaction“, on the blockchain McFly.aero will support is **the fact of the flight**. The blockchain will also have to keep records of how all grid-connected devices, not only aerial vehicles, are consumed “as services”.

**Proof-of-flight (PoF) is meant to be an algorithm designed for McFly.aero Air Taxi grid, where the creator of the next block is chosen as a consensus function of hash signatures of all wallets of all devices and people that were involved in and therefore signed off the actual act of flight: passengers, pilots, vehicles, landing pads, charging stations, dispatch organizers, air traffic control systems, service and maintenance personnel.**

Below are examples of use cases to be reflected in the blockchain solution.

User	Use case
Passenger	Order an air taxi, pay for the flight, leave feedback, consume and pay fees for additional services.
Infrastructure provider (people, including service suppliers in the broader sense, including owners of aerial vehicles — flight providers)	Connect and register elements of infrastructure on the grid, including aerial vehicles, establish rates and fees at which the device is available to be engaged, receive fees.

Aerial vehicle	Register flights (from order to landing at final destination), pay fees to all engaged infrastructure elements, pay fees to people (pilots, service and maintenance) and for additional services (insurance-per-flight, et al), record the vehicle's total available flight (lifecycle) remaining after the flight and until the replacement vehicle would be required.
Manufacturer of aerial vehicles	Connect new vehicles to the grid and get rewarded by tokens for contributing new minutes of the total flight to the grid, connect replacement vehicle and receive tokens accumulated by replaced vehicle, monitor the usage of total flight and every component through the records on the blockchain, record service and maintenance.
Private owner of the vehicle	Having an amount of tokens equal to the total available flight remaining on the vehicle, pledge those tokens to secure exclusive use of that lifecycle of the vehicle locked to personal use.

Each phase of the flight service — ordering, provision, embarkation, transportation, disembarkation, maintenance — triggers execution of various tasks by various participants. Within the mass urban shared air taxi grid, Proof-of-flight records not only the fact of an actual flight of every vehicle, but also the confirmation that every participant performed on the required job and received reward:

Once a passenger was transported from A to B, and the parts of the infrastructure, which was used in this flight, rendered respective services, wallets in all devices of all parties to the flight were identified: that of the passenger(s), vehicle, flight provider, landing pads, pilot, charger, insurer, et al.

The fact of the flight is traced with devices where the wallets are installed, their changing geolocation, confirmed by sensors and cameras in the aerial vehicles and landing pads.

Every participant has their own wallet, and recombination of these keys forms an action, recorded on the blockchain, confirming (signing) the fact of the flight. The Proof-of-flight protocol accounts for a number of actions required for the flight and additional maintenance and confirms that the flight took place, and that the technical, operational and financial network resource was engaged and utilised during this flight.

In this system it is also worth mentioning the role of such additional actions as:

- Flight order — the confirmation that the flight was ordered through the shared valid system;
- Flight approval — the confirmation that the ground service and the air traffic control services cleared the flight and provided the route, and

A passenger and a pilot can fly without the flight approval and the flight order on the blockchain, if they use the aerial vehicle outside the grid, if the vehicle was previously locked for personal exclusive use. However, the vehicle will not fly unless the corresponding number of tokens is transferred to it, in order to record the expense and reduction of its total available flight, as well as other conditions of the flight, and that flight shall be recorded on the common blockchain. This does require general connectivity, while also allowing temporary offline operations.

## **Protocol: Technical Requirements**

According to Uber's estimate for a full-featured urban aviation system for a city size of Dallas 1000 aerial vehicles are required. They will operate on a schedule 15 mins of flight per every 5 minutes on the landing pad. The daily utilization rate shall be fall between 20% and 50%.

These assumptions allow us to assess that at peaks the system has to sustain up to 1000 transactions per minute per one city of operation. Which makes it 1 million transactions per minute for a network of 1000 cities. That is only for the city operations — the business support system side. This should no longer be viewed as unattainable as the Bitshares or Universa blockchains are able to handle even more transactions.

Increased speed levels may be indeed required for the OSS-side (operation support system), which may have to reflect future transaction happening on the component manufacturing, assemble, tests and handling, maintenance of the vehicles and the infrastructure.

As such, we may establish that current technologies already allow speeds required for the operations of McFly.aero Air Taxi grid.

As far as the data storage requirements are concerned, there may be various approaches to it, including storing only hashes of data contents per each transaction, while storing data on external systems. It may also however be feasible to design the system to be able to contain large portions of data, as it is our belief that the system shall not to rely on any externality.

## Aerial Vehicle

Aerial vehicles of various designs emerge worldwide. By the time of writing institutional players invested more than \$0.5Bn in the more advanced tier of 4-6 eVTOL developers, which are characterized by developed 1:1 size prototype.

Other approx. 30 companies may be considered second tier of developers, at various earlier stages of prototyping, most of which will be emerging throughout the 2018.

The business is being propelled by very rapid prototyping techniques developed by the industry, as well as the availability of venture capital intensely entering the field, recognizing the maturity of the industry by observing the efforts of several cities in advancing the regulation and infrastructure, as well as certain companies building the market channels.

One may even look at a diversity of designs through the lens of early developments in the automotive industry. While eventually designs of cars largely converged over the years, this may or may not happen in the aviation industry.

Design of aircraft is largely use-case-driven and task-oriented: cargo or passenger, small or large, short distance or far reaching, etc. There is a lot of speculation about the emergence of the autonomous (pilotless) passenger aerial vehicle. We believe that while pilotless flight may eventually be allowed, mass urban passenger aviation on new types of electric aircraft will be operated by pilot.

Initially the vehicle will be 1) a more affordable version of helicopter, with 2) lower pilot qualification requirements and 3) bearing no fuel, and with 4) low noise, which would make landing pad friendly to any neighbourhoods, while existing business aviation regulations and infrastructure shall provide easier market entry and initial adoption in cities, where it exists.

From the pilot's perspective the core difference from the existing aircrafts including helicopters is that the vehicle shall not require human effort to stay airborne, as its airborne functions will be performed by automated pilot controller governing the motion of the vehicle's propeller plants.

The vehicle developed by Bartini is the two and four-passenger self-navigated aircraft (or a cargo aircraft carrying 400kg), sedan-sized, combines quadcopter with carrying wing. Passenger inputs the destination, the vehicle takes-off vertically from any surface, tilt-shifts engines to "airplane" (horizontal) flight mode, which allows to cover distances up to 150 km at 300 km/h on one battery charge (over 600 km on hydrogen fuel-cells), then lands vertically on arrival.

Technology and configuration (coaxial variable pitch propellers in a quadcopter convertiplane with aerodynamics of the carrying wing, patented) decrease power consumption up to seven times and ensure long-distance flights at altitudes comparable to small helicopters or airplanes. Expected market price may stay within \$100k due to absence of complex components, wings, ailerons, chassis, moving airframe parts, as well as simple assembly processes. A high degree of body-shape variability within the aerodynamic solution, no need for take-off/landing infrastructure, safety due to 8 motors and coaxial propellers in 4 engine groups and human-factor reduction, noise-levels within urban regulation are aimed at by the design projection.

# Business

## Community and Consortium

To expedite the future, many developments shall come related to infrastructure developments, aerial vehicle manufacturing, regulation and certification rules, websites, PR and promotion, administration, technological components such as aerial vehicles engineering, fuel cells, interiors, motors, landing sites, autonomy systems, mobile apps, tokens, blockchain, technological solutions for its integration into the entire infrastructure and various commercial solutions.

The community aims to expand and include and develop the required technologies in parallel with the aerial vehicle's engineering and regulation appearing in the key markets, including blockchain technology. To do this, the community created tokens, which are already an integral part of the future technological infrastructure, as well as websites, models, prototypes, drawings, certification requirements, visions of interiors, etc., which are already in existence. Tokens make an integral part of the technology that can already be provided today for the community to maintain it. McFly.aero Incubator shall become the platform to tokenize the functions along the value chain for the technology developers to integrate them for the mass urban aviation network. Tokens are already an existing unit of the growing technological complex, as other relevant units to come, and are containers of the system's complicated functionality and business models.

The community has recognized that the effective collaboration of various businesses is required to expedite the future of urban aerial vehicles' ride-sharing network.

To embrace its business agenda was the Technology Consortium established. The Consortium aims to coordinate the activities of those community members, who develop and manufacture components of the integrated technology stack for the Air Taxi Management System, as well as influential business participants.

The current and future members of the Consortium are of the following types:

- Blockchain software developers
- Experimental aircraft developers and manufacturers
- Aircrafts interior designers
- Serial aircraft manufacturers
- IT integrators
- Investment funds
- Research organizations
- Prototyping centers
- Flight providers (vehicle owners and operators)
- Landing pad owners and operators,
- Traffic operators
- Entrepreneurs for various functions across the value chain
- Legal consultants
- Decentralized communities developing blockchains for various implementations (banks, petrol stations, mileage, property, etc.)

**Various tokens adopted among the groups of innovators and startups other than that of the urban aerial vehicles community may be exchanged for McFly tokens in order to involve this larger number of people into development of the McFly.aero Incubator and Technology Consortium.** Thus we are advancing the decentralized, multifaceted, high-tech and transparent environment of the future urban aviation in our cities.

As in almost any new industry or vertical, there are many new possibilities emerging, including but not limited to:

- Become expert and grow with the industry
- Develop as blogger, newsmaker
- Develop new businesses which will grow with the market
- Grow network, including the high-ranking individuals
- Influence the official or business agenda
- Establish as a local link to the international community.

There are a few ways anyone in a city can develop with and within the McFly.aero ecosystem:

- to be on the cutting edge of understanding the technology reshaping our lives,
- deep interconnection to the international communities all over the world,
- connection to the like-minded people, executive/expert level, entrepreneurial background, investors and artists, and future oriented high-net-worth individuals.

Here are some thoughts on how various individuals and professions can benefit from McFly.aero in the city:

- Advisors: share your experience in Blockchain, Internet-of-things, Macroeconomics, Air Safety regulation.
- Investors: Consortium members are on the cutting edge of the new market, entrepreneurs explore new business models.
- Educators: author an educational course in the blockchain-based internet of things empowering the new infrastructure development; alternative policy making; aircraft prototyping; new urban environments.
- Evangelists: spread the good news that flying cars operated by smart-contract on the blockchain are coming to offer its services in an open market which no one controls.
- Bloggers: dive into the realm of new industry and whole new market, where once the MOOC course is announced more than 700 people subscribe within days.
- Architects and urbanists: explore and brainstorm how future city may look like if there were absolutely no need for cars and proximity is no longer critical.
- Anyone: explore all the opportunities that emerge with the new life-changing industry and be an early mover.

## City Air Taxi Readiness Index

*“Imagine communities who act with purpose, fuelled by their own currency, provided with transparency and living with more trust in their currency than what you can get from just about any government.” —*  
<https://hackernoon.com/blockchain-based-communities-will-be-the-new-superpower-for-so-called-funny-money-beaf3b9a88b0>

The Community within McFly.aero Incubator includes enthusiasts from cities of the world — and the focus is on cities already having a system of air taxi or the practice of helicopter use for city passenger transportation. McFly.aero Community is working to improve the Air Taxi Readiness Index to guide local communities in strategic understanding which advances are useful to fast-forward to implementing the emerging technology stack in their respective cities.

- Track 1: Regulation — how much effort will be required to make the air taxi grids possible in terms of local regulation (air safety, device usage, urban requirements for chargers / pads, etc)?
- Track 2: Political support — is there full understanding and support from the city managers to support the systems?
- Track 3: Entrepreneurship — are there high-tech entrepreneurs, investors, support systems for them to take risks in making new things
- Track 4: Competence — is there enough competence in the internet-of-things, flying cars, and blockchain?
- Track 5: Infrastructure — is there at least some parts of the infrastructure available: chargers, landing pads... Is air taxi on helicopter habitual?

At the time of writing, the City Air Taxi Readiness Index is an integral assessment of where the city is on the following assessment axis:

1. The city managers have recognized the future to be preparing for —> city managers have put up high the agenda to prepare the city to the introduction of the flying taxi, and perhaps even started discussions with aircraft manufacturers
2. Regulators are unaware —> Regulators are ready principally to open the air and allow the system —> Regulation is ready for the system to operate —> air taxies exist (for example using helicopters)
3. There is a program for landing pads to be set up —> there are landing pads and clear understanding how to expand the grid —> operators are in place.
4. Electrical chargers are available (22 kW —> 140 kW —> 450 kW)
5. Entrepreneurship culture in the city is low —> is high
6. Awareness of entrepreneurs how to build businesses in decentralised environments is low —> is high

7. Technology innovation level in local entrepreneurship is low → is high
8. General attitude to risk taking and failure is discouraging → is encouraging
9. Free to use roofs, lawns, etc. are not permitted → Regulation exists to permit → Generally permitted by default
10. Innovation support ecosystem of entrepreneurs, angel investors, education courses, government support is weak → is strong
11. General predilection to use taxi, ride-sharing systems by the public is low → is high
12. General availability of high-tech product evangelists, general perception that science and innovation is cool, general growth of expertise in innovation, expressed in public attention, events, engagement is low → is high
13. Links to international communities, openness of society is low → is high

When assessing the city, one may also assess how badly the air taxi is required in the city by looking at such parameters as:

- Rerun ratio
- Average road speed
- Air quality
- Noise levels

## Business Models

There are many business models that can be developed along the value chain of the air taxi industry and passenger flight market — in a much broader sense than only those of Technology Consortium participants.

Such business models include but are not limited to the following, already identified ones.

- Architects may wish to understand the requirements for the landing pads and design those that can be implemented in various cities according to the local regulations.
- Lawyers may wish to learn the airspace use and air safety requirements, participate in policy making and sell services to local entrepreneurs willing to deploy the future technology stack of the air taxi management system.
- Flight providers may learn how to secure future fleets of vehicles and lend them to the grid to serve passenger flight.
- Landing pad operators may learn how to refurbish real estate into landing pads with the emerging stack of technologies and architectural designs that cities may approve in the future.
- Charging station operators may research which power specifications shall the grid require and understand the local connectivity circumstances to equip landing pads with future chargers.
- Pilots may emerge as the vehicles appear to match the growing demand for urban passenger flight
- Pilot training operators may wish to learn how the pilot training software and hardware is being developed and match the growing demand for pilots with the training facilities.
- Insurers may wish to explore new business models of insurance-per-flight at varying costs compared whether or not the flight is serving passengers or is an empty hop.
- Security-on-board operators may be required in various cities and landing pads to provide additional security surveillance and checks on passengers and pilots.
- Grid component manufacturers may wish to explore emerging business models allowing their devices to be operated and charged for as-a-service
- Aircraft manufacturers may wish to learn how they can benefit from the business models of “grid component manufacturers” as well as additional business models associated with possibilities to tokenize the lifecycle (or total available flight) of their respective vehicles.

# Aircraft Manufacturers

## Flight as “intrinsic value” for the McFly token

Bartini’s goal within the Technology Consortium is to develop, manufacture, provide and put in operation the 4-seater and 2-seater urban aerial vehicles. For other eVTOL manufacturers in the Consortium their commitments are based on the same principles. Blockchain technology will be used to make the vehicles’ flights available to holders of McFly tokens. eVTOL manufacturers in the Consortium intend to operate on the premise that one unit of measurement can apply to both the technical lifetime of the vehicle and the value of its function.

There are several considerations behind this.

Firstly, conventional lifetime measuring in flight hours or kilometers is hardly applied to a vehicle which is effectively comprised of two — a hover and a cruiser. A synthetic unit of measurement is required.

Secondly, for safety reasons, an aircraft has to be prevented from operation after fixed flight-time. McFly.aero will use blockchain to control that this happens. Only the transfer of McFly tokens into the vehicle’s wallet will enable physical flight of the vehicle: 1 token per 1 minute. Over its lifetime a vehicle will only accept a fixed number of tokens, after which its operation shall be restricted.

Thirdly, future decentralized use of urban aerial vehicles (ridesharing in a larger sharing economy) in different geographic markets, as well as most current technological trends, push for keeping all the information across the whole value chain on one blockchain.

Finally, blockchain tokens, being an integral part of the blockchain technology, can be used both a) to measure the aerial vehicle’s available flying resource and its consumption in different flight modes, under different loads, and b) to be accounted for in wallets held by both passengers and vehicles themselves.

# Governance

## Aims and Strategy

*“Blockchains may teach us more about governance in the next 10 years than we have learned from the “real world” in the last 100 years. ... Two Critical Components of Governance: 1. Incentives, 2. Mechanisms for coordination” —*  
<https://medium.com/@FEhrsam/blockchain-governance-programming-our-future-c3bfe30f2d74>

The McFly.aero Incubator develops a decentralised system of IoT (Internet of Things) comprising elements of infrastructure of city aero taxi, created to:

- Safely plug in devices (eVTOLs, landing pads, chargers) to one network
- Convert technological resource of such devices into service, tradable realtime
- Provide for the standard interaction “man-machine” and “machine-machine” on the basis of smart contract.
- Upon development and deployment of mcfly.aero it shall become possible to connect 1) eVTOLs 2) landing pads and 3) chargers to the market of direct sale of services, such as a) passenger transport, b) charge, maintenance and repair and c) dispatching flights in every city.

Therefore there are several aspects of McFly.aero activities that are subject to governance.

1. Platform for “tokenization”: order registration, performance and reward for useful functions of the IoT city network of mass passenger aviation like chargers, landing pads, VTOL vehicles, sensors, call/order and dispatch services, systems of settlements between the participants (persons and machines).
2. Incentive scheme: the token for city community members preparing the infrastructure and the market for aero taxi services including evangelists, lawyers, certification bodies, entrepreneurs owning landing pads, chargers, or fleets of flying vehicles.
3. Technological consortium: alliance of business players interested in development and work in the new market of passenger aviation with value above 1,2 trillion USD per year.
4. New economic relations: crypto enthusiasts and proponents of decentralised approach to community cooperation to solve major challenges through incentivised volunteering to avoid the bottlenecks of the traditional organizations.
5. Global network coordination: separate systems will emerge in cities with differing economic conditions (comparative prices for different components), differing regulatory conditions (requirements to different system components), but these will be built on unified principles. Decentralisation may allow to attract more people and technical resource of devices to the networks within the shortest time frame under conditions of fair reward for the use of those devices and services from people.

## Procedures

To incubate technology bundle and a universe of businesses along the value chain more than one team is required and several types of decisions to be made:

1. Decisions on overall technology bundle architecture
2. Decisions specific to each product and technology and its integration
3. Decisions on business system architecture
4. Decisions on which exactly tasks that are required and reward level for their fulfilment, on whose application to perform tasks to accept, on whether the task is fulfilled, and reward is due.
5. Decisions on who is included to make decisions.

Of the McFly.aero Incubator's corporate partners, 10 (and growing) are committed to making their products bundled into the air taxi management system and marketplace. So there is a networked team of developers and CEOs focused on that task. The strategy and vision for the technology is discussed by that Industry Board.

Respective development teams in every company are responsible to make specific technology related decisions.

Decisions on the business system architecture are made by the growing Council under intense influence from Consortium members, guidance from Advisors and ever-increasing feedback from the local communities in the cities.

The same Council sets tasks and rewards for various tasks in a human <> human marketplace. This is done through a task management system based on blockchain technology with tokens representing reward units and recognition points. Thus, new businesses are incubated through a growing international community of networked local communities (or chapters, when more mature), who are can do tasks and get recognition in tokens.

Tasks advance the city on the Air Taxi Readiness Index and are grouped into three stacks according to the general aims to: 1) build the community, 2) grow expertise and influence of the community and 3) do actionable entrepreneurship.

# Tokenomics

## Air Taxi Management System and a Marketplace

### Operation

The total number of McFly tokens will always relate to the amount of Total Flight. Total flight may be either already available from all connected devices, or it may be committed to the system by the manufacturer of future devices to be connected to the system.

Any vehicle that has recorded the use of its total lifecycle through accumulation of the number of tokens on its internal wallet is restricted from flight. The tokens then are distributed from the disconnected vehicle to the provider of the new vehicle into the grid, which may be a manufacturer or an owner of the vehicle. Such a connection shall be subject to verification of the technical conditions of the vehicle by an independent technician.

### Growth

#### New vehicles

For operational purposes (records of flight and maintenance, control of lifecycle of the vehicles, safety, etc) it is important that 1 token remains equal to 1 minute of flight. However, as more vehicles get connected to the grid, the more tokens shall be available through the system reflecting, in direct ratio, the growth of the total available flight. Generation of such tokens shall only be possible through the grid-connected manufacturing, when every new vehicle is indeed connected to the grid.

Here is the vision of the protocol that shall incentivise growth while balance the growth rates of systems incentivising 'fair' distribution of available flight resource.

Each flight, and even every transaction in the current (operational) wallet shall generate new tokens by the section of the proof-of-flight protocol. In addition to replacing the depreciated vehicles, which shall be paid for by tokens accumulated on the vehicles' resource wallets, the act of flying from point A to point B shall create new tokens in the system. The rate shall be determined by capacity of grid-connected manufacturing facilities. These additional tokens shall be generated by vehicles in certain cities and therefore the delivery of vehicles manufactured beyond replacement requirements shall be directed to those cities, where more additional tokens were generated, i.e. more flights happen, i.e. where the network is comparably more loaded.

The volume of tokens accumulated on all resource wallets (total flight metering wallets) will also adjust the ratio of the proof-of-flight additional token generation. This works as the proof-of-age component of the proof-of-flight protocol. In practice that will mean that the system will automatically adjust so that more new vehicles will be delivered preemptively to those cities where aerial vehicles fleets are on average older.

Every time the new (additional) vehicle is generated through additional tokens in the system, it shall be determined to which city it shall be delivered by a decentralized voting by:

- Tokens on resource wallets (so that additional vehicle tends to be delivered to the city with older vehicles)
- Turnover on current wallets (so that additional vehicle tends to be delivered to the city where the lack of vehicles makes an average flight more expensive and the network more loaded)
- Tokens on passenger wallets (so that additional vehicle tends to be delivered to the city where the weighted demand is higher).

This way, the act of flight is in itself the main part of a decentralized and self-regulating economic system, where flight demand and supply allows the community to shape out all the necessary infrastructure on decentralized principles.

## The Bill

For illustration purposes only, we have modelled how an 'ordinary' passenger bill may look like, once urban flight become 'ordinary', i.e. once there is a landing pad 10-minutes' walk in any direction. For this calculation it was assumed that the comparative value of 1-minute of flight within the grid is 10 times less than the today's cheapest helicopter ride. That might make 1 McFly correspond to \$3, while the prices for electricity, land rent, dispatch services etc. that were used for modelling are within very widely defined "average".

10 minutes of flight will trigger transactions:

- Vehicle operation:  $1 \text{ McFly} \times 10 \text{ minutes} = 10 \text{ McFly}$  (to the vehicle\*)
- Electricity: 20 KWh = 0.5 McFly (to the electricity provider)
- Charger station usage: 1 charge = 0.1 McFly (to the charger owner)
- Pilot: 5 McFly (to the pilot)
- Take-off / Landing: 10 mins = 0.25 McFly (to the pad owner)
- Vehicle provision base rate: 1 McFly (to the vehicle owner)
- Peak Priority Vehicle Provision: 1 McFly (to the vehicle owner)
- Take-off base rate: 0.2 McFly (to the 1st pad owner)
- Landing base rate: 0.2 McFly (to the 2nd pad owner)
- Peak Priority Landing: 1 McFly (to the 2nd pad owner)
- Order flight mobile app: 0.01 McFly (to the software developer, no ads)
- Sandwich on board: 1 McFly (to the catering provider)
- Traffic control: 0.01 McFly (to the city traffic control)
- Insurance for the flight: 0.03 McFly (to the insurance company)
- City airspace base rate: 0.02 McFly (to the city)
- City airspace priority corridor: 0.04 McFly (to the city)

TOTAL: 20.36 McFly for 10 minutes (~40 km of flight Bartini-served or ~20 km of flight Heparid-served)

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\*) these McFly fill the internal vehicle's technical wallet that is used to measure also the vehicle's lifecycle. For a 4-seater Bartini once the internal wallet reaches 700,000 McFly the vehicle is discharged and the accumulated tokens are offered to the best-bidding manufacturer in order to procure the replacement new vehicle. The residual McFly (as the case may be) will be transferred to the owner of the vehicle once the vehicle is scrapped.

\*\*) all services required to orchestrate flight are purchased by smart-contracts at the time of flight planning per the order that passenger placed in the system. Prices were based on the open market supply and demand at current grid

load levels subject to pricing models provided by independent device owners and service providers. The route was also optimised according to passenger pricing settings and other preferences.

## **McFly.aero Token Launch**

A total of 1.8Bn McFly Tokens (hard cap) shall be distributed during the Token Launch Phase 1, corresponding to the commitment of 3000 Bartini flying cars into the emerging grid, which represents 6% of the planned first year's mass manufactured vehicles. Remaining flight of 47,000 Bartini vehicles shall be tokenized to match the output of the first year of mass production. Aerial vehicles from other manufacturers, further production years may also be tokenized on McFly.aero for the benefit of the decentralized mass urban aviation market.

Total flight of one 4-seater is 700,000 tokens and of the 2-seater is 500,000 tokens. This means that a holder of 700,000 McFLY tokens will be able to "lock" the entire lifecycle of a 4-seater Bartini (or 500,000 McFLY tokens for a 2-seater) all for himself, resulting in effectively owning the aerial vehicle. It is assumed that equal amounts of 2- and 4-seaters will be contributed at the initial stage. Other vehicle manufacturers may introduce different pre-tokenization programs within McFly.aero Incubator.

Of the 1.8Bn tokens 70% shall be available for distribution, including the 15% bonus pool to incentivise larger contributions. 10% of tokens shall be vested to the incubators most active community members (team), 5% to advisors, 5% shall be available for bounty programs, of which 2% for online activities and 3% to incentivise offline activities in the key cities, 1% shall be airdropped and 9% shall be reserved.

There is no soft cap for the Token Launch Program. The participants-aircraft manufacturers anyway must have 1) a technology to measure wear and tear for billing purposes, 2) an opportunity for direct access to the far larger market of air transport services, which gives the general understanding that the project will move further and be supported by the Technology Consortium. The wider the Token Distribution's reach is, the more cities will be participating, the more geographic coverage, the better adaptation to the local circumstances there will be for the McFly.aero Incubator.

## McFly.aero Incubator

McFly.aero Incubator allows to exchange tokens of other blockchain development and, broader speaking, decentralization focused communities for McFly Tokens. Therefore a holding of various tokens may emerge as result of such exchange. That holding may be expressed in different denominations. Such denominators may be subject to volatility, temporary availability, various levels of distribution and acceptance in various communities.

McFly.aero Incubator uses McFly Tokens and other cryptographic tokens in various communities to incentivise activities pushing forward the common cause

— emergence, deployment, operation and maintenance of the Air Taxi Management System and Marketplace in majority of cities worldwide.

More specifically, the Incubator distributes its efforts, focus and token holdings on the following activities:

- 30% for the aircraft development and integration;
- 13% for infrastructure development in the cities;
- 10% for the Blockchain and software development;
- 10% for general operations and administration;
- 9% for awareness building in the public relations;
- 8% for managing communities, 6% for government relations and policy advice;
- 5% for scientific research;
- 5% for unexpected items;
- 4% for general legal matters.

# Roadmap

There are several grand tasks to be solved, so the project is comprised of several roadmaps:

- Aerial vehicle development roadmap
- Blockchain development roadmap
- Infrastructure and regulation development roadmap

While these tracks will be disclosed further, the general roadmap rests on several important milestones which may be considered achievable today at writing hereof:

## 2017: The Launch (Innovators Stage)

- Total flight of 3,000 expected Bartini vehicles is offered for McFly tokens.
- Cross-industrial workgroup for the business and technological requirements for McFly.aero core blockchain is established.
- First entrepreneurs in key cities join the development of McFly.aero Incubator.

## 2018: The First Flights (Innovators Stage)

- Functional prototypes of Bartini vehicles are made, tested on ground and in flight
- Construction of takeoff and landing pads is discussed between cities and McFly Entrepreneurs to determine and develop first locations
- eVTOL developers learn about McFly.aero and express interest to use McFly landing pads for test flights
- First proof-of-flight blocks are recorded on the blockchain

## 2019: The First Takeoff and Landing Pads (Innovators Stage)

- Architectural designs for landing pads are made
- McFly Entrepreneurs start equipping the landing pads
- Alpha version of McFly.aero custom blockchain for the urban mass aviation
- Application layer and APIs become available, first mobile apps are tested
- BSS/OSS software for the air taxi management and usage is designed and prototyped
- More eVTOL developers join the system

## 2020: The First Fleets (Early Adopters Stage)

- BSS/OSS software is developed and in use.
- McFly Entrepreneurs introduce flights in the first cities.
- 2-seater Bartini or other vehicles become available for test flights within the system.
- Fleets are registered on blockchain.

## 2021: The Growth Curve (Early Adopters Stage)

- Urban traffic operators are adopting the decentralized technologies of McFly.aero

## 2025: Early Majority Stage

- Urban traffic operators massively deploying systems with numerous landing pads, chargers and aerial vehicles.

## Aerial Vehicle Development

Engineers from the Russian aerospace industry designed an affordable, easy to mass-produce, urban electric autonomous aircraft (e-VTOL, aka “the flying car”). They developed the product concept, constructed the small-scale model to flight test the aerodynamics and energy consumption, and established the market availability of the required components (batteries, engines, body materials, etc.), started a company to advance the development as a venture-backed technology company.

Bartini, Inc. has committed to the blockchain technology and to measure the lifetime of its vehicles as 700,000 McFly tokens for the 4-seater AAV and as 500,000 McFly tokens for the 2-seater AAV.

The vision for Bartini, Inc. is to have:

- a 2-passenger vehicle
- the manufacturing facility producing 150 vehicles p.a.
- 4-passenger vehicle
- Mass production facility (50,000 units p.a.)

McFly.aero invites other aerial vehicle developers to join forces to make flight affordable.

## Blockchain Development

The blockchain solution is to provide the backbone for the operations support and business support systems for the mass urban flights. A token, mathematically representing one minute of flight, will become the central container for several systems:

- Distributed database supporting the operation and maintenance of the physical networks, systems, vehicles and infrastructure components
- Tokenization platform of all the value functions across the value chain
- Representation of value flows corresponding to network usage and load, motivating its maintenance and enhancements

The vision for the Blockchain aspect of the project is to have:

- Independent blockchain solution
- Mobile app for passenger <> AAV interaction
- Key infrastructure functions and their providers tokenized on the platform
- Test flights using McFly tokens to measure system's lifetime and load

## Infrastructure and Regulation Development

While in some locations development of infrastructure is responsive to technological developments and innovation, in others it is proactive pre-empting of future developments and challenges, and yet in the third type of locations it is the result of direct political will. By all means, the future of mass urban aviation is inevitable and whether it will be a result of a centralized action of a commercial player or a result of decentralized communities pushing for change — is yet to be seen.

It is largely regarded that while centralization and political will to improve city landscapes may set the scene and shape the landscape, for flight to become affordable, not only large-scale availability is required, but undistorted action of market forces. It is in the best interests of everyone, as future passengers to take the lead in shaping the industry by entrepreneurial effort and community strength.

It is envisioned therefore that strong communities shall develop in key cities that will take the lead in adopting the new technology and systems, and the following developments shall be seen, even notwithstanding the efforts of McFly.aero Incubator:

- Regulation guidelines (Dubai, FAA, et al)
- Several cities tested the flight networks
- Adoption of affordable electric VTOLs replacing helicopters
- AAV certification requirements cleared out in key locations
- Networks come into operations in cities

# Regulation

Regulation is one of the keys to understanding where Air Taxi Management Systems may be deployed first. The regulation covers urban airspace use, aircraft certification and safety, air taxi infrastructure requirements.

## Aircraft Safety

Vehicles will have to be certified as piloted passenger aircraft suitable for commercial operation.

This covers most issues with aircraft safety and passenger use — solid body of policies and certification requirements exist, and aviation authorities have procedures to adopt new aircraft designs. Largely missing regulation for unmanned delivery drones in many places of the world is irrelevant to McFly's scope of work until such time when passenger aviation is allowed to go 'pilot-less' — although the vehicles and technologies for autonomy of flight are closer than for autonomy of driving, we can only dream that fully autonomous passenger flight may happen between 2 and 5 years of full scale piloted operation.

Some countries have more liberal certifications of experimental aircrafts, or small aircrafts, or aircrafts used in certain areas only. Passenger aviation providers may at times require no more complex licenses than 'shared use of personal aircraft at own risks'. In any circumstance, this is largely for entrepreneurial communities in specific cities to understand and test the waters with their respective regulators.

As such, we generally aim at all cities where entrepreneurial communities, availability of talent, capital and technology competences will drive the exploration of the innovative business models along the decentralized air taxi service supply chain. However, there are already cities where luxury helicopter taxi service exists, this demonstrates that at least airspace use by private operators may be clearly regulated.

## Urban Airspace

Helicopter charters operate in quite a few cities of the world, while scheduled helicopter-based air taxi services is more rare, although is developing. The most recent cities to open the service are Tokyo and Bengaluru. These are examples of vertical takeoff and landing passenger aviation systems to draw expertise from. As new types of aircraft emerge, which would make more mass-use economically feasible, city managers will try to adapt to the new user scenarios both for civil and rescue/law enforcement needs. Those efforts will most likely coincide with regulatory developments in mass cargo delivery drones (unmanned aerial vehicles, UAVs).

Therefore, in many cities the new challenge is recognized to develop the unified legislation for joint airspace use by manned and unmanned aircrafts of different sizes. Dubai is one notable example where such regulation is drafted to include all current and prospective airspace users, including even base jumpers.

## Urban Infrastructure

The emergence of a completely new infrastructure elements, that need to be integrated into urban landscapes in richly diverse cities, is a challenge. From a regulatory standpoint that may be considered the least developed part. It is also an area of the industry highly influenced by local circumstances.

It is clear that for the system to operate it has to be purely electric. Landing/ takeoff pads must not bear fuels to be safely located in convenient places. Still, quite high volumes of electric power that will have to be delivered to the vehicles' batteries within very short time frames between landing and next takeoff.

The certification requirements and safe use of high-capacity chargers in public spaces will have to emerge. Requirements on location and equipment of landing/takeoff pads with regards to passenger flows in public and private spaces, noise, and surrounding neighbourhoods will have to be developed. Further, passenger identification, insurance and other issues pertaining to

operation and maintenance of the vehicles and the grid will have to be developed.

This regulation is largely unavailable. Striving entrepreneurial communities supported by political agenda — be that aimed to be innovative or to solve transportation bottlenecks — will drive its development.

The technology will be appearing anyway — no matter how centralized or decentralized market channels or supply chains will be. And that will engage the regulator. However, it is the important public good of McFly Incubator that local entrepreneurs may create a greater push for it after they identify the business opportunity. That will result in wider networks with more affordable flights available sooner than later to all of us.

# Market

The Flying Taxi is coming.

In 2017 they showed it in Dubai, in 2018 as many as 30 prototypes may leave various labs all over the world. Five large corporations will be revealing promising details of hundreds of millions of investments they made, more deals will follow. McFly Token is one of the ways to get exposed to the emerging new industry and market, as well as to contribute to the decentralised barrier-free community driven supply chain development.

Uber alone, as a potential user of such vehicles, estimated that they need 500-1000 vehicles per each of 300+ cities. Each manufacturer at this time estimated the initial price to fall between \$250-450k, which sets demand from only Uber at 50-100 billion USD.

It is expected that mass produced vehicles will eventually be priced at ca. \$80-100k (and thereafter even \$40k). There will be increase in private purchasing, as well as more demand will come from other urban public/private transportation organizers. We may compare the market size for that purpose with the market for premium automobiles, which is estimated to be 360 billion by 2020.

This way, the OEM business (original equipment manufacturing) for electric VTOLs is already a promising new business, prone to grow exponentially over the next years.

The mass urban passenger transportation market, if Uber Black fees are applied (as that company outlined their intent), based on the above benchmark avg. 750 vehicles per each of 300 cities for only Uber, will generate more than \$1.2Tn in fees. Based on assumptions:

- Number of vehicles: 750
- Number of Cities: 300
- Uber's market share: 33%
- Average fee per minute: 8 USD
- Average load per vehicle: 50%

In that model there will be only 675,000 vehicles operating worldwide, which number may, as it seems, be even achieved in the first year of moderate mass production by only 10 out of 30 aircraft manufacturers.

Within the ecosystem created by the McFly.aero Incubator, every minute of flight in the city shall cost 1 McFly Token transferred to the vehicle for its function and, as our modelling shows, additional ~1 McFly Token for all the auxiliary services required to orchestrate the flight. The token is available at ~\$0.03 now. When first systems are deployed the competition shall be helicopter based taxi systems where flight costs \$30-100 USD per minute. This competition shall be the driving force for the business and the entrepreneurs willing to earn tokens by contributing their assets to the system and offer them as services. This will make systems grow faster in more places and wider coverage, and flight shall become more affordable.

# Conclusion

In 2017 they tested the air taxi system in Dubai. Uber started eyeing roofs in largest US cities. In 2018 it is estimated that at least 20 companies all over the world will open labs and show their urban eVTOLs. 2018 will be the year when the new market will suddenly appear and start soaring to \$1Tn.

McFly.aero Incubator's Technology Consortium consists of companies which supply aerial vehicles, chargers, pilot training equipment and blockchain solutions

— component of the technology stack needed to build the air taxi system. McFly.aero community of entrepreneurs in various cities worldwide will use those to jointly deploy the air taxi systems, operate and earn.

As soon as a passenger orders a flight, an orchestra of services from various connected devices is bundled. The owner of each device will earn fees in McFly Tokens.

McFly tokens will also meter the flight, or depreciation of the vehicle, and also signal for maintenance. 1 McFly will correspond to one minute of flight performed. The vehicle will not operate unless a corresponding number of tokens is received on its internal wallet, thus establishing a "trusted odometer".

This technicality will support the intrinsic value of a McFly Token. Today city flight costs on average \$50 per minute, however, when the air taxi technologies mature and grids expand beyond the initial deployments in pioneering cities, that must go down. The service fees for connected devices shall also go down, but prior to it, will reward with dramatic growth of business those early adopters, who have proactively been building the system.

McFly.aero may denote many substances:

- air taxi grid powered by blockchain
- solution to the "who-owns-the-button problem" in the urban air taxi market
- decentralized supply chain transforming the vehicle into a tradable service
- a bottom-up incentive scheme for the entrepreneurs to build the market channel for aircraft manufacturers
- decentralized marketplace to sell services that devices can provide if connected to a unified grid
- a way to use smart-contracts to orchestrate passenger flight
- a blockchain-powered platform to sell devices-as-a-service
- an IoT system for the Smart Cities deploying air taxi services
- the consortium of developers and manufacturers of all things that the new industry will need
- a truly decentralized token in an ecosystem of many participants of industrial blockchain implementation
- a way to get exposure to the emergence of the new industry and market potentially worth \$1.2Tn

Due to McFly.aero Incubator and the Technology Consortium entrepreneurs in various cities create infrastructure with transparent rules and low entry barriers for all. The system will reward those who contribute to its growth, however, will foster competition among participants. This device-as-a-service supply chain will appear free of charge for city managers.

In 2018 the huge industry and the new market emerge. Automakers already entrench in it. Market channels are being built.

McFly.aero is a global decentralized business and technology incubator for the emerging urban air taxi market. It aims at facilitating businesses that sell urban passenger transportation, as well as related products, technologies and services along the end-to-end supply chain: starting with R&D for aerial vehicles components and ending at “retail outlets” — landing pads and mobile apps.

The entrepreneurship incentive scheme for the McFly.aero Incubator participants, accelerates the future and enables more affordable urban passenger flight to appear in more cities sooner than was possible in a traditional “centralized” world.

Think how the marvel of the global decentralized datacenter behind the Bitcoin blockchain was incentivised by a token rewarding contribution of mental and computational power.

McFly Token serves as an incentive unit for participants of the Incubator’s community. Participants are committed to implement McFly Token as a unit of measurement (how devices are used) and settlements (how their services are paid for). Therefore McFly Token is a “ticket to ride” business-wise, “ignition key” technologically, and a “record of using the function” economically and legally.

We incubate the technology bundle and a business system for the urban air taxi. This requires joint effort from many companies and an incentive to work together towards that common goal.

# Appendices

## Consortium Manifesto

### BLOCKCHAIN.AERO TECHNOLOGY CONSORTIUM

#### Manifesto

This Manifesto is made to outline the areas and conditions of the participation in Blockchain.aero Technology Consortium with the McFly.aero Technology and Business Incubator and its active development with the relevant joint efforts of the participants to the Consortium.

#### Background

*McFly Token will enable device owners (aerial vehicles, chargers, landing pads) to grant temporary right of use to authorised passengers in exchange for income; McFly.aero shall make every technological resource a potential service to be traded on an open market in real time.*

*Upon development and deployment of McFly.aero it will become possible to connect 1) eVTOLs 2) landing pads and 3) chargers to the market of direct sale of services, such as a) passenger transport, b) charge, maintenance and repair and c) dispatching flights in every city.*

#### 1. Definitions

*Blockchain.aero Technology Consortium* is a Consortium for developers and manufacturers of products and software used to deploy the decentralised infrastructure of IoT (Internet of Things) for the Urban Air Taxi Management System and a Marketplace meant to:

- Safely connect devices (eVTOLs, landing pads, chargers) into one network;
- Convert technological resource of such devices into service, tradable realtime;
- Provide for the standard interaction “man-machine” and “machine-machine” on the basis of smart contract.

*Manufacturers* are companies which take part in the Consortium and planning to become suppliers of devices, components and software for the network of city aero taxi.

*Entrepreneurs* are individuals (as well as companies) owners of devices and components to rent them further to the network for a fee.

*McFly Community* is a Community of (future) users and entrepreneurs concerned in having air taxi services in their cities at the earliest and ready to put some effort within their competence, including showcasing initiative and not limited by just obtaining McFly tokens; they are the persons who would take the products and devices and earn by selling their services to the grid, that will use smart-contracts to orchestrate flight and reward each device owner.

eVTOL is an aerial vehicle powered by electricity and capable of vertical take off and landing.

#### 2. Business Agenda

- 2.1. The goals achievable by participants to the Consortium and opportunities they acquire from participation include plans for organizing mass production of devices and/or software to be used in the system of smart city flights, or of eVTOLs for sale and/or maintenance.
- 2.2. Within the framework of the Consortium Manufacturers and/or Entrepreneurs can:
  - 2.2.1. Access the firsthand news and information relating to the industry: engineering, legal, organisational, event-relating, etc.;
  - 2.2.2. Establish business contacts and expand connections in the industry through the networking in the Consortium;
  - 2.2.3. Lobby certification and standardization issues using the authority of the Consortium;
  - 2.2.4. Access targeted human resource for employment and contracting through the McFly.aero Community;
  - 2.2.5. Set up the direct sales of such service to users (people and machines) in the open market;
  - 2.2.6. Access funding, or orders for manufacture, from the Consortium participants or from the McFly Community of city flight supporters;
- 2.3. Within the framework of the Consortium Manufacturers and/or Entrepreneurs will:
  - 2.3.1. Network with enthusiasts and industry experts, including lawyers, designers, regulators, engineers, evangelists, product ambassadors in different cities of the world; together with the Consortium participate in presentations of their products, technologies and software.
  - 2.3.2. Inform market participants of maintenance & repair requirements to all infrastructural components, prepare them for the supply of these services to different cities and regions, form small and medium-sized entrepreneurial circles interested in providing maintenance & repair to the IoT devices and components;
  - 2.3.3. Make the technical descriptions and agendas related to certification and standardization issues for the lobbying purposes;
  - 2.3.4. Make a catalogue of vacancies to be filled in by the members of McFly.Community;
  - 2.3.5. Make a catalogue of investment and pre-order possibilities within their line of activity for the access by the other participants to the Consortium;
  - 2.3.6. Make a service required by the the network of devices interconnected within IoT system provisioning city air taxi functions based on the properties of their device/component;
  - 2.3.7. "Tokenize" the prospective life cycle of his device (component) and distribute the tokens;
  - 2.3.8. Use blockchain technology to register service load and device resource consumption;
  - 2.3.9. Use smart contract technology to set up fair price and effect transactions for sales of device resource to users.

### **3. Technological agenda**

- 3.1. The participants to the Consortium are committed to delivering unified user experience for passengers within city aero taxi network, which implies the following:
  - 3.1.1. Working out applicable standards for devices, services, and software, including:
    - Unified user experience scenario for both piloted and auto-piloted air taxi service;
    - Technical requirements to the devices and components to provide for the unified user experience;

- Designing the unified process connector, diagnostic connector, charger connector usable by all the devices in the grid;
  - Developing the unified takeoff-and-landing marking;
  - Developing the unified standard for data exchange between the eVTOLs in the grid;
  - Integration with the systems of air traffic control.
- 3.1.2. Manufacturing devices and components in conformity with the technical requirements of the system/network, including the standards indicated in p. 3.1.1. above.
- 3.1.3. Developing and delivering unified interfaces for additional services within the network, including services as provided by various suppliers to passengers during the flight.
- 3.1.4. Participating in discussions related to certification requirements in different cities and circumstances.
- 3.1.5. Refining terms of use of blockchain and relevant apps to register access to, and measure the consumption of technical resource of the devices.
- 3.2. The participants to the Consortium are willing to create the unified technology pack to deploy air taxi service as a decentralised marketplacet, which will include:
- Technological solutions for retail;
  - Technological and design solutions for city architecture;
  - Pack of technologies and standard solutions as described in p. 3.1.1. above;
  - Roadmap and implementation manual;
  - Cooperation with companies-integrators;
  - APIs to simplify technological interactions and serve customers.
- 3.3. The participants to the Consortium aim to proliferate their knowledge and expertise by designing and participating (including as experts and jury) in:
- 3.3.1. Hakatons and other workshops and competitions dedicated to:
- Engineering;
  - Industrial Arts;
  - Blockchain solutions;
  - Architecture and city environment design;
  - Safety (technological and informational);
  - Legal solutions, including legal structuring, licensing and certification rules;
  - Maintenance, repair and support issues.
- 3.3.2. Research-and-development activities including grant programs.
- 3.4. The participants to the Consortium are interested in developing navigation data and software and other by-products and services related to the decentralised infrastructure of IoT (Internet of Things) for city aero taxi, including:
- Database of landing pads for .maps services (google, yandex, etc)
  - Recording, keeping and delivering video records from live cams on eVTOLs;
  - Data and core functionality for navigation systems;
  - Photos and video for public.

#### **4. Public Relations agenda**

- 4.1. The participants to the Consortium agree to be maximally open for mass media, to regularly publish photo- and video-materials related to their activities and achievements, and engage journalists and media from their business circles.

- 4.2. The participants to the Consortium agree that Consortium (McFly.aero Community) is entitled to use any non-confidential materials of any participant of the Consortium without any limitation for any purposes related to informing general public about activities of the Consortium and its participants, as well as to attracting new participants, and to input of the knowledge base of the Consortium to developing the ecosystem and industry.
- 4.3. While setting up a PR-campaign to promote device / technology/ concept, to prepare the market and conform to the technical requirements of use, the participants to the Consortium will mention their participation in the Consortium in their promo-materials and public speech.
- 4.4. The participants to the Consortium agree to publish and spread the word on McFly.aero, including news relating to activities of other participants to the Consortium.
- 4.5. The participants to the Consortium intend to mention their participation to the Consortium while conducting their trainings, workshops, seminars, conferences and other events.
- 4.6. The participants to the Consortium intend to attract and involve new participants from their business circles (e.g. suppliers, customers).

## **5. Conditions for structuring**

- 5.1. The Manifesto is concluded for possibilities of cooperation in marketing and PR and placing priority orders with Manufacturers for products/services with a view of their use within Air Taxi Management System by other participants to the Consortium, as well as by general users of the system, on the basis of the following technical requirements to devices/components specifications:
  - Total technical resource (lifecycle) must be calculated;
  - Provision of devices/components to the network of IoT and their resource consumption must be registered and measured within Blockchain.aero technology;
  - eVTOL provided to the network must be functional only upon the transfer of such amount of McFly tokens to the internal wallet of the eVTOL, which corresponds to the amount of work the eVTOL performs, and, respectfully, to its technical resource consumption;
  - Conditions under which devices/components are provided to the network of IoT, and conditions according to which such devices are coordinated in the network are set up by Blockchain.aero smart contracts;
  - Technical specifications of devices must conform to the system connection requirements.

**THE PARTICIPANTS TO THE CONSORTIUM CONFIRM THEIR AGREEMENT with BLOCKCHAIN.AERO TECHNOLOGY CONSORTIUM MANIFESTO, as well as their understanding of what is to be undertaken by them as by the participants to the Consortium to benefit from participation in Blockchain.aero Consortium and actively partake in its development.**

## Terms and Conditions

The following Terms and Conditions (“Terms”) describe and govern the McFly.aero cryptographic tokens (“McFlyToken”, “McFly”, or “MFL”) and the Token Launch.

This document is not a solicitation for investment and does not pertain in any way to an offering of securities in any jurisdiction. Individuals, businesses, and other organizations should carefully weigh the risks, costs, and benefits of obtaining or otherwise acquiring MFL early in Token Launch versus waiting for MFL to become available on open, third-party exchanges.

### IMPORTANT

Obtaining, acquisition or ownership of MFL carries no rights express or implied. Any form of acquisition of MFL is non-refundable. By participating in the token launch, distribution, sale, acquisition of MFL, you expressly acknowledge and represent that you have carefully reviewed the Terms and fully understand the risks, costs, and benefits of acquiring or in any other way obtaining MFL and agree to be bound by these Terms. As set forth below, you further represent and warrant that, to the extent permitted by your law, that you are authorized to acquire or in any other way obtain MFL in your relevant jurisdiction, are of a legal age to be bound by these Terms, and will not hold liable for any losses or any special, incidental, or consequential damages arising out of, or in any way connected to the distribution, sale, ownership, transfer, acquisition or in any other way obtaining MFL, now or in the future, McFly.aero and/or Blockchain.aero and its affiliates, the community members, officers, directors, agents, joint ventures, employees, suppliers of McFly.aero and/or Blockchain.aero or its affiliates.

**WARNING: DO NOT ACQUIRE OR IN ANY OTHER WAY OBTAIN MFL IF YOU ARE NOT AN EXPERT IN DEALING WITH CRYPTOGRAPHIC TOKENS AND BLOCKCHAIN-BASED SOFTWARE SYSTEMS.**

Ownership, acquisition or in any other way obtaining MFL should be undertaken only by individuals, entities, or companies that have significant experience with, and understanding of, the usage and intricacies of cryptographic tokens, like Bitcoin (“BTC”), Ethereum (“ETH”) and Waves (“WAVES”), and blockchain- based software systems. You must have functional understanding of storage and transmission mechanisms associated with other cryptographic tokens. If you do not have such experience or expertise, then you should not attempt to acquire or in any other way obtain MFL or participate in the MFL token launch.

**WARNING: CRYPTOGRAPHIC TOKENS MAY EXPERIENCE EXTREME PRICE VOLATILITY**

MFL do not represent any formal or legally binding investment. The value of MFL which may be denominated in BTC or in any other denominator of value in various jurisdictions, may be subject to extreme fluctuations in price over short periods of time on a regular basis. McFly.aero cannot and does not guarantee market liquidity for MFL. Additionally, due to different regulatory dictates in different jurisdictions and the inability of citizens of certain countries to use service providers located anywhere in the world, the liquidity of MFL may be markedly different in different countries. By acquiring MFL, you expressly acknowledge and represent that you fully understand that MFL may experience volatility in value and will not seek to hold any of the McFly.aero and/or Blockchain.Aero parties liable for any losses or any special, incidental, or

consequential damages arising from, or in any way connected to, the Token Launch and any subsequent sale, acquisition or ownership of MFL.

**WARNING: THE ACQUISITION AND OWNERSHIP OF MFL ENTAILS A NUMBER OF RISKS.**

The acquisition or in any other way obtaining MFL carries with it a number of risks. Prior to acquiring or in any other way obtaining MFL, you should carefully consider the risks listed below and, to the extent necessary, consult an appropriate lawyer, accountant, or tax professional. By owning MFL you are agreeing not to hold any of the McFly.aero and/or Blockchain.aero participants liable for any losses or any special, incidental, or consequential damages arising from, or in any way connected, to the acquisition or ownership of MFL.

The ownership, acquisition, purchase or obtaining in any other way of MFL carries with it significant risk. Prior to making any actions or considerations regarding the MFL, you should carefully consider the below risks and, to the extent necessary, consult a lawyer, accountant, and/or tax professionals.

- a. It is possible that the value of crypto will drop significantly in future, depriving McFly.aero and/or Blockchain.aero of sufficient resources to continue to operate.
- b. MFL will be stored in a wallet, which can only be accessed with a password selected by you. If you do not maintain an accurate record of your password, this may lead to the loss of MFL. You must safely store your password in one or more backup locations that are well separated from the primary location. In order to access your MFL the password that you had entered is required; loss of this may lead to the loss of your MFL.
- c. Any third party that gains access to your Email may be able to gain access to your MFL. You must take care not to respond to any inquiry regarding your ownership of MFL.
- d. Cryptocurrencies have been the subject of regulatory scrutiny by various regulatory bodies around the globe. McFly.aero and/or Blockchain.aero could be impacted by one or more regulatory enquiries or regulatory action, which could impede or limit the ability of McFly.aero and/or Blockchain.aero to continue to develop.
- e. It is possible that the Blockchain.aero Consortium products will not be used by a large number of external businesses, individuals, and other organizations and that there will be limited public interest in the use of McFly Tokens for aerial vehicles operation. Such a lack of interest could impact the development of the McFly.aero and/or the Blockchain.aero. McFly.aero and/or Blockchain.aero cannot predict the success of its own marketing efforts or the efforts of other third parties. There is no guarantee of revenues or profits resulting from the marketing activities of McFly.aero and/or Blockchain.aero.
- f. You recognise that McFly.aero, Blockchain.aero, the Consortium and its projects are currently under development and may undergo significant changes. You acknowledge that any expectations regarding the form and functionality of McFly.aero and/or Blockchain.aero projects may not be met upon release of any one of the McFly.aero and/or Blockchain.aero projects, for any number of reasons including a change in the design and implementation plans and execution of the implementation of McFly.aero and/or Blockchain.aero projects.
- g. You understand that while McFly.aero, Blockchain.Aero, the Consortium and its projects will make reasonable efforts to complete the related products, it is possible that

completed versions of the products may not be released and projects may never be accomplished.

- h. Hackers or other groups or organizations may attempt to steal the tokens from Token Launch, thus potentially impacting the ability of McFly.aero, Blockchain.aero and the Consortium to promote the projects.
- i. Advances in code cracking, or technical advances such as the development of quantum computers, could present risks to blockchain technology, cryptocurrencies and McFly.aero and/or Blockchain.aero projects, which could result in theft or loss obsolescence of MFL.
- j. The loss or destruction of a private keys used to access the blockchain by McFly.aero and/or Blockchain.aero may be irreversible. Loss of access to private keys or a data loss could adversely affect the value of McFly.aero and/or Blockchain.aero projects.
- k. Decentralized mass passenger urban aviation is a new product, thus contributing to price volatility that could adversely affect the usability of MFL. The factors affecting the further development of the digital tokens industry, as well as the McFly.aero and/or Blockchain.aero projects, include:
  - i. continued worldwide growth in the adoption and use of MFL and other digital tokens;
  - ii. government and quasi-government regulation of MFL and other digital tokens and their use, or restrictions on or regulation of access to and operation of the projects or similar digital token systems;
  - iii. the maintenance and development of the software of McFly.aero and Blockchain.aero projects;
  - iv. changes in consumer demographics and public tastes and preferences;
  - v. the availability and popularity of other similar products; and general economic conditions and the regulatory environment relating to decentralized mass passenger urban aviation.
- l. Intellectual property rights claims may adversely affect the operation of McFly.aero and/or Blockchain.aero, the Consortium, its participants, projects and respective products.
- m. Third parties may assert intellectual property claims relating to the holding and transfer of digital tokens, technologies and their source code. Regardless of the merit of any intellectual property or other legal action, any threatened action that reduces confidence in the McFly.aero and/or Blockchain.aero long-term viability or the ability of end-users to hold and transfer MFL may adversely affect the usability of MFL.
- n. Cryptocurrency exchanges on which MFL may be listed in future are relatively new and largely unregulated and may therefore be more exposed to fraud and failure than established, regulated exchanges for other products. Such cryptocurrency exchange failures may result in a reduction in the usability and can adversely affect the MFL. A lack of stability in the cryptocurrency exchanges and the closure or temporary shutdown of cryptocurrency exchanges due to fraud, business failure, hackers or malware, or government-mandated regulation may reduce confidence in McFly.aero and/or Blockchain.aero, related products and result in greater volatility in perceived value of the MFL and its usability.

- o. Political or economic crises may motivate large-scale sales of MFL, which could result in a reduction in the perceived value and adversely affect the value and usability of MFL. Digital tokens such as MFL, which are relatively new, are subject to supply and demand forces based upon the desirability of an alternative, decentralized means of transacting, and it is unclear how such supply and demand will be impacted by geopolitical events.
- p. Larger and larger scale usage of MFL, growth of McFly.aero and/or Blockchain.aero and adoption of related products shall result in a reduction in its price making flight more and more affordable, reducing its price.
- q. It is possible that a digital token other than MFL could have features that make it more desirable to a material portion of the digital token user base, resulting in a reduction in demand for MFL, which could have a negative impact on the usage, value, price of MFL. It is possible that a comparable product could become materially popular due to either a perceived or exposed shortcoming of the relevant McFly.aero and/or Blockchain.Aero product that is not immediately addressed by the McFly.aero and/or Blockchain.Aero, or its participant, or a perceived advantage of a comparable product that includes features not incorporated into the relevant McFly.aero and/or Blockchain.Aero product. If this product obtains significant market share, it could have a negative impact on the demand for, and price of, and the usability of the MFL.
- r. MFL transactions are irrevocable and stolen MFL or incorrectly transferred MFL shall most likely be irretrievable. As a result, any incorrectly executed MFL transactions could adversely affect the value of MFL. Blockchain-based transactions are not, from an administrative perspective, reversible without the consent and active participation of the recipient of the transaction or, in theory, control or consent of a majority of the processing power on the host blockchain platform. Once a transaction has been verified and recorded in a block that is added to the blockchain, an incorrect transfer of MFL or a theft of MFL generally will not be reversible and there shall be no compensation for any such transfer or theft. Such loss could adversely affect the value and usability of MFL.
- s. MFL tokens may be issued on various blockchain platforms. As such, any malfunction or unexpected functioning of the relevant blockchain platform or any such other protocol may impact your ability to transfer or securely hold MFL. Such impact could adversely affect the value and usability of MFL.
- t. It is possible that, due to any number of reasons, including without limitation the failure of business relationships or marketing strategies, that the McFly.aero and/or Blockchain.aero projects and all subsequent marketing any and all activities in relation to the MFL may fail to achieve success.