SKYFchain

The New Operating Platform
for Cargo Robotics Industry

WHITE PAPER

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The SKYFchain Operating Platform will provide a disruptive solution for switching global logistics industries to unmanned systems. As an independent blockchain-based Operating Platform open to all industry participants it will contain critical information for each stage of lifecycle of a cargo robot. The operations and access to clients of SKYF drone will be used to develop and test the SKYFchain. We aim to set the standards for the new industry in robotic delivery in areas such as financing, manufacturing, operations, maintenance, insurance, and authorization of drones and robots in the air, on the ground and at the sea

by Alexander Kulichevskiy

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CERTAIN RISK FACTORS RELATED TO PURCHASING, SALE, AND USE OF TOKENS

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EXECUTIVE SUMMARY

Unmanned cargo robots in the air, on the ground and at the sea can dramatically reduce cost of logistics worldwide and increase efficiency for industrial users and end customers.

While PwC have estimated addressable market size for airborne drones alone to be $127 bn.[1], the current industry limitations including lack of stable credit, costly insurance and near-prohibitive regulations in some countries do not allow it to realize its full potential. Currently, this industry exists in form of feasibility studies carried out by large corporations or startups.

Universal operating platform for the cargo robots does not exist.

SKYFchain Operating Platform (hereinafter SKYFchain OP) is **the first B2R (business-to-robots)** blockchain based operating platform applicable globally in all sectors of a developing cargo robotics industry. It will be initially developed and tested by using the first industrial cargo airborne robot – SKYF drone – which will also give SKYFchain instant access to its client base for development of unmanned business processes. Later all other unmanned cargo systems: in the air, on the ground and at the sea will be connected to SKYFchain.

The first feedback from our customers in oil and gas industry confirms that if they switch from helicopters to cargo drones they can supply their on-shore rigs with 5 to 10 times less cost.

SKYFchain as a blockchain with built-in smart contracts will provide trusted source of data and reasonable control over unmanned assets for clients, logistics operators, insurance and leasing companies, banks, and authorities worldwide.

It will unveil new profitable business opportunities for all industry participants, transportation system with lower risk for the society, and increased overall affordability of goods and services due to substantial cost cutting in the global supply chain.

During ICO we will issue 1 200 000 000 SKYFT tokens, which will be used in SKYFchain to facilitate all internal transactions.

We expect that value of SKYFT may increase over time because of two main drivers:

1. More and more companies, clients, financial institutions will be connected to SKYFchain which will drive the growth of transactions in SKYFchain and demand on SKYFT.
2. For every SKYFchain transaction whether it's getting loan to buy unmanned vehicle, client payment or something else SKYFchain will charge some commission. 25% of commissions will go to SKYFT holders.

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[1] https://www.pwc.pl/en/publikacje/2016/clarity-from-above.html

We understand that your backing of SKYFchain may be associated with risk and we have taken several measures to mitigate those risks:

➢ SKYFchain legal entity - Skyfdrones Services OU - is registered in Estonia which has one of most favorable regulations in the world for blockchain related companies.

➢ SKYFT tokens are **compliant** with SEC of USA and available for US investors.

➢ Hundreds of SKYF drones will use SKYFchain as an operating platform. SKYFchain developers will have direct access to all SKYF drone clients to test and polish SKYFchain system before inviting other producers of drones to use the system.

➢ SKYFchain is a spin-off of SKYF drone development project, which in addition to granting SKYFchain access to clients shall use 20% of revenues from sales of SKYF drones to purchase the SKYFT tokens from the market. We estimate that this may amount to $50M during the next 3-5 years after the ICO. And the SKYF drone is designed with full range of IP protection measures including patens and know-how. This shall protect SKYFchain uniqueness for the time of its initial development.

➢ SKYFchain has very experienced and trusted team of engineers and business leaders with proven results – they have attracted $5M of VC money into the SKYF drone project.

YOU CAN BUY SKYFT TOKENS RIGHT NOW

VISIT WWW.SKYFCHAIN.IO

1. SKYFchain OP business model

Logistics business processes today are designed with a human being in mind, either as a customer or a controller etc. Autopilots for cargo robots, AI and the developing field of IOT hints that one day, robots may work without being directly controlled by an individual.

This would bring enormous savings since currently, around 50% of costs in logistics is in labor.

The field in cargo robotics will require investments, and investments need insurance, risk management and control. Thus, unmanned cargo robots may become an asset which would require new types of regulations and business processes. We are planning to develop them in the SKYFchain Operating Platform.
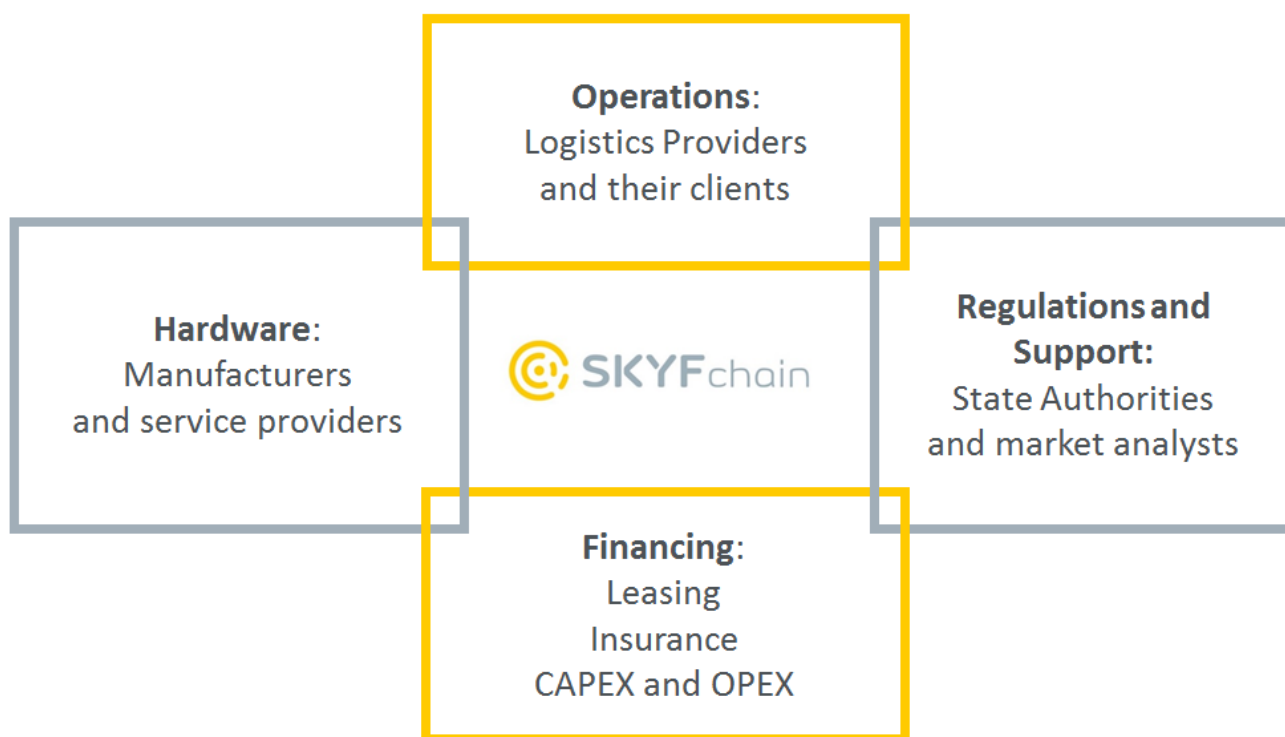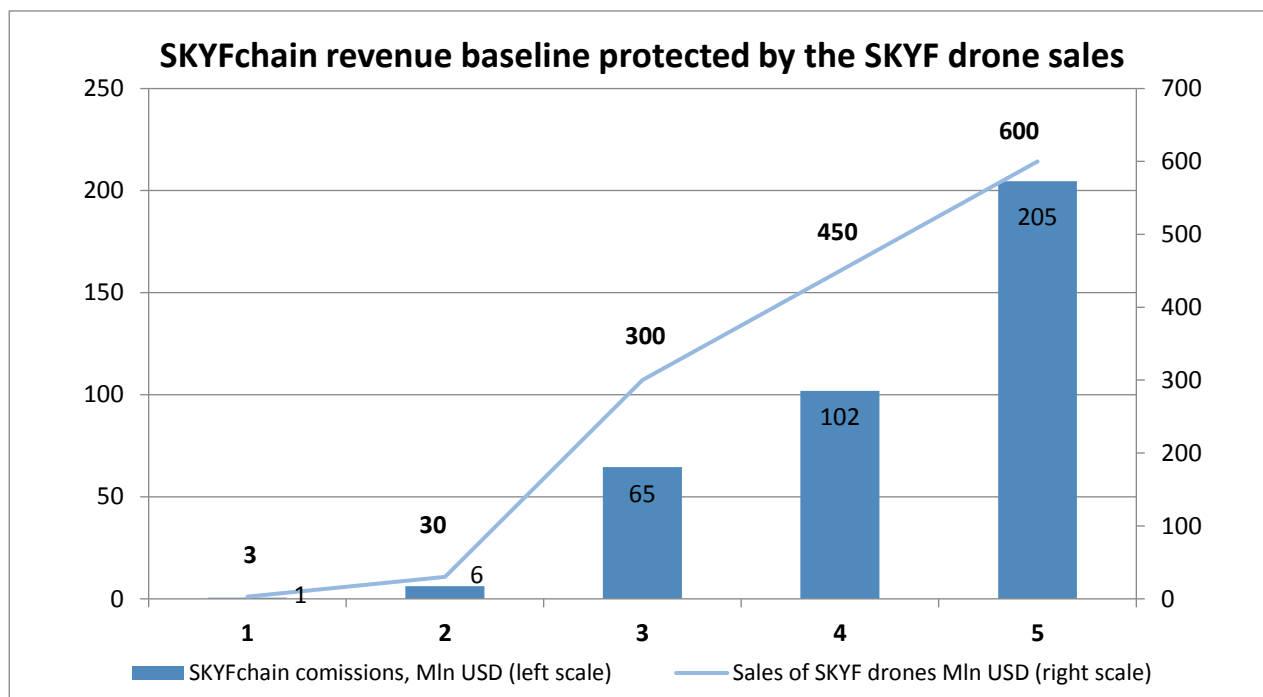

Source: SKYFchain OP

The main purpose of the SKYFchain OP is to integrate information for all market participants and organize the execution of smart-contracts for transactions. Transactions may vary in value and frequency. The platform will collect commissions from each transaction. All transactions will be paid in USD or other fiat currency but executed in system using the SKYFT tokens.

SKYFT token will be the internal currency of the platform. Only 1.2 bn tokens will be issued at ICO in form of Ethereum ERC20 tokens. This is fixed amount for all system.

We are going to test the platform using SKYF drones, then we shall educate drone producers and integrate other drones into the system. When sea-borne and ground-borne cargo robots come into the market, we shall integrate them as well by organizing workshops with respective associations of producers.

As the number of cargo robots connected to system grows, so does the number of transactions. More tokens will be needed to execute the smart-contracts and the SKYFT exchange rate may increase. We expect that the clients would usually pay us in fiat and crypto currencies, and purchase our tokens from the crypto exchanges in case of need. We are planning that **SKYFT tokens will be traded at least at four or five crypto exchanges.** This would create liquidity needed for the platform operations.

SKYFchain revenue baseline protected by the SKYF drone sales

- SKYFchain comissions, Mln USD (left scale)
- Sales of SKYF drones Mln USD (right scale)

Source: SKYFchain OP

For a token buyer at ICO, the **downside protection** is the fact that SKYFchain OP will be created using three unique resources:

1. The exclusivity of servicing operations of **SKYF drone** - the world's first heavy and industrial grade cargo drone. It is a fundamentally new drone vehicle with a hybrid gasoline-fueled engine that outperforms existing drone solutions. It is capable of vertical take-off and landing, and has an ultra-high useful load of up to 400 kg/880lb and an exceptional flying range of up to 350km/220 miles. The SKYF drone suits multiple market segments, including logistics, agriculture and firefighting to name a few. It's already have clients which would allow SKYFchain to develop new business processes of unmanned logistics. Those clients will also bring in transactions to execute on SKYFchain. SKYF drone IP and know-how fully protected.

From the start of SKYFchain

the SKYF drone autopilot will require authorization in the SKYFchain to lift off

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2. **20% of the revenue from sales of the first 1000 SKYF drones will be reserved by a license agreement with the SKYF drone producers to purchase back SKYFT tokens from the market**. We expect this to take place during the first three to five years after ICO (this revenue is equivalent to $50-60mln). Tokens bought under this condition will be put into a Community Development Fund and used to reward partners and developers of the SKYFchain.

3. Mission planning, verification and operations support of SKYF drones (and later other drones) will be run through SKYFchain – a unique private blockchain:

- SKYFchain super node holders will receive 50% of transaction fees.
- SKYF drones will be marketed together with a franchise of a drone logistics operator and a license for the third-party drone producers of drones and spare parts. By 2021, more than 1100 SKYF drones projected to be operating worldwide, and other drone manufacturers and owners will also be able to join the SKYFchain Operating Platform therefore increasing the number of transactions in the system.

The upside for a token buyer is our plan to open the SKYFchain OP after the testing period for all other developers and manufacturers of air-borne, sea-borne and ground-borne cargo robots. The SKYF drone will become just one of the many participants of the platform.

We'll open the SKYFchain to other drone manufacturers after the testing period

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SKYFchain OP will invite experts from the logistics industry from all over the world to become part of the development community. Special funds for tokens will be allocated to ICO to reward them. The Community Development Fund (CDF) will hold 10% of tokens issued at ICO.

SKYFchain OP project team includes leading aviation industry experts, blockchain specialists and international business professionals.

The SKYF drone initial testing market will be the developing countries agricultural and logistics sectors – a multi-billion-dollar market on its own. From year 2021 onwards it'll start expansion to the US and European markets.

Test flights of the SKYF drone are already under way and have been successful. Please take a look at a flight test video on our website: http://skyfchain.io/

Several big clients have signed up for test flights or pilot implementations of SKYF drones in their business operations. Our most prominent partners are:

- **Syngenta AG** (annual revenue – $12.8bn), a global Swiss agribusiness that produces agrochemicals and seeds
- **Avgust Crop Protection** (annual revenue - $263.3mln), the largest crop protection chemicals producer and service provider in CIS;
- **Pony Express** (annual revenue - $86.7mln), the number one multi-modal logistics operator and delivery company in the CIS territories.

The second step in developing sales of SKYF drone will be to create a franchise model in AsiaPac in associate with a local partner. Hence, we are not looking at the US market as a priority because of its intense regulations. Nonetheless, we have noted that the demand in other markets is huge for the next 5 – 10 years.

Increasing sales of SKYF drones will benefit the SKYFchain

The demand for SKYFT tokens is expected to multiply with each new connected drone, an autonomous truck or ship. Increasing global reach of SKYFchain will lead to an exponential increase in the number of cargo robots and other stakeholders in the system.

SKYFchain OP key metrics (conservative scenario)

Years	2018	2019	2020	2021	2022
Number of SKYF drones in operation	10	110	1 110	2 610	4 610
Total number of cargo robots using SKYFchain	10	110	3 330	7 830	59 930
SKYFchain market share	0,003%	0,03%	0,26%	0,37%	0,47%
Average number of transactions (operational*)	36 500	438 000	12 556 000	40 734 000	247 324 000
Average number of transactions (financial**)	5	55	1 665	3 915	29 965
Total number of transactions	36 505	438 055	12 557 665	40 737 915	247 353 965
SKYFchain comissions, Mln USD	0,6	6,2	65	102	205

* Operational transactions are drone data I/O and expected to cost ~0,1 USD each
** Financial transactions are related to leasing and insurance and expected to cost ~1000 USD each

Source: SKYFchain OP

2. Project roadmap

2014 – 2017
- ✓ securing $5 mln of VC funding;
- ✓ design and manufacturing of SKYF cargo drones;
- ✓ successful aerodynamic tests;
- ✓ fully autonomous flights Q4 2017.

2018
- ✓ SKYFchain project spin-off from the SKYF project;
- research into the most suitable technology and **development of a private block chain** network;
- Development of logic and data of the SKYFchain OP in tight cooperation with all cargo robotics market stakeholders (hardware producers, operators/clients, authorities, banks/leasing companies);
- creation of the international legal structure;
- sale of the first assembled SKYF drones and **expansion of the partner network** in the regions without strict regulations on drone flights (**CIS, Asia, and Africa**).

2019
- dissemination of the **private block chain** network nodes among market participants;
- launch of the with a franchise of a drone logistics operator and a license for third-party drone producers.

2020
- rapid growth in SKYF drone sales, as a consequence of expansion of the franchise of a drone logistics operator and growth of number of licensed drone producers around the world;
- start of educational campaign and workshops for producers of other types of drones.

2021 - 2022
- **inclusion of third-party airborne drones** into the SKYFchain;
- lobbying for new regulations in developed markets through industry associations and round-tables.

2023 – 2025
- **inclusion of ground and sea-borne cargo robots into the system.**

3. The Market

3.1 The market for air-borne cargo robots (drones)

$127bn – that's how much PWC estimated the total addressable value of drone powered solutions to be in all applicable industries. Exponential investments growth into the sector has already began.

$100bn – is the service market size for SKYF drone in agriculture, logistics, and infrastructure (see Annex 4 for details). During the first three years it is expected that SKYFchain would service clients of SKYF drones in these industries.

The value in $bn of drone-powered solutions in addressable industries globally

	2015
Infrastructure	45.2
Transport	13.0
Insurance	6.8
Media & Ent.	8.8
Telecommunication	6.3
Agriculture	32.4
Security	10.5
Mining	4.3
Total	**127.3**

Source: PwC – Clarity from above[1]

Despite high demand, none of the commercially available drone solutions fully satisfy the market needs.

Market expansion of SKYF drones would allow for development and testing of the SKYFchain platform before inviting other industry participants.

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[1] https://www.pwc.pl/en/publikacje/2016/clarity-from-above.html
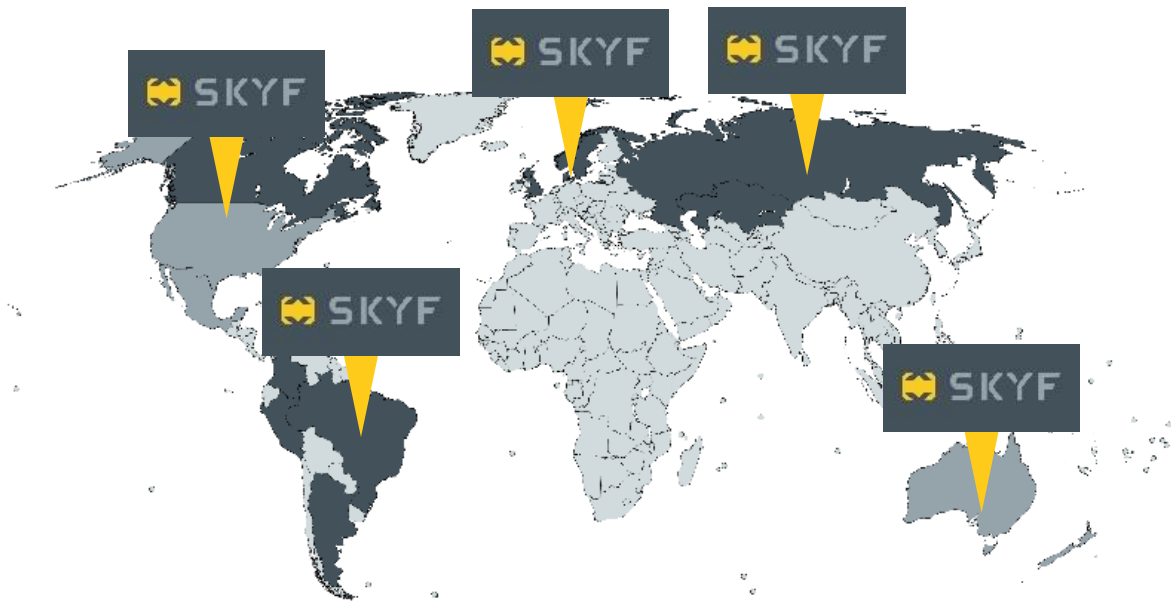
SKYF launch geography

(dark grey areas on the map)

- Russia
- Kazakhstan
- Canada
- South America
- Northern Europe

SKYF expansion geography

(medium grey areas on the map)

- Australia
- New Zealand
- USA

Source: SKYFchain OP

SKYF have received Letters of Intent from several potential clients to use SKYF drones

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SKYF received letters of intent from several big oil & gas companies (NGK Slavneft, PAO SIBUR Holding) and agricultural industry (Syngenta AG, Avgust Crop Protection, Rusagro Group, Prodimex), willing to use the SKYF drone services.

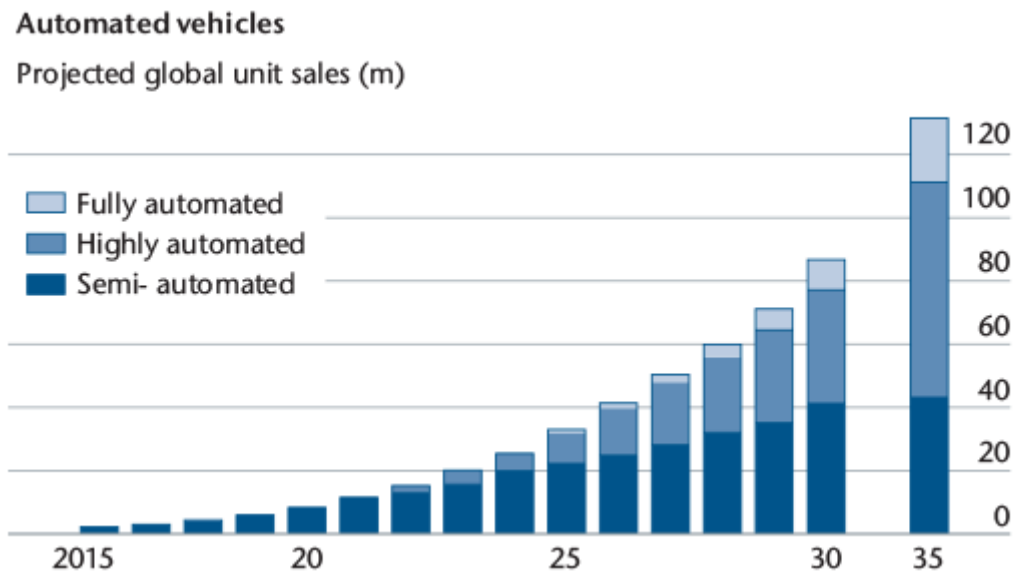**See Annex 2 for details about the first prospective clients**

3.2   Unmanned trucks, ships and cars

After the launch of air-borne drones, SKYFchain will invite other cargo robots, unmanned trucks, unmanned ships, and later unmanned passenger vehicles.

We are planning to invite air-borne drones from 2020 onwards, and sea-borne and ground-borne robots starting from 2022 onwards.

According to Abhimanyu Raheja, an analyst at BIS Research, "the overall number of automated vehicles is expected to reach more than 110 million by the end of 2026."[1]

Exane BNP Paribas is giving lower, but also promising projections of 40 millions automated vehicles of all types in 2026. [2]
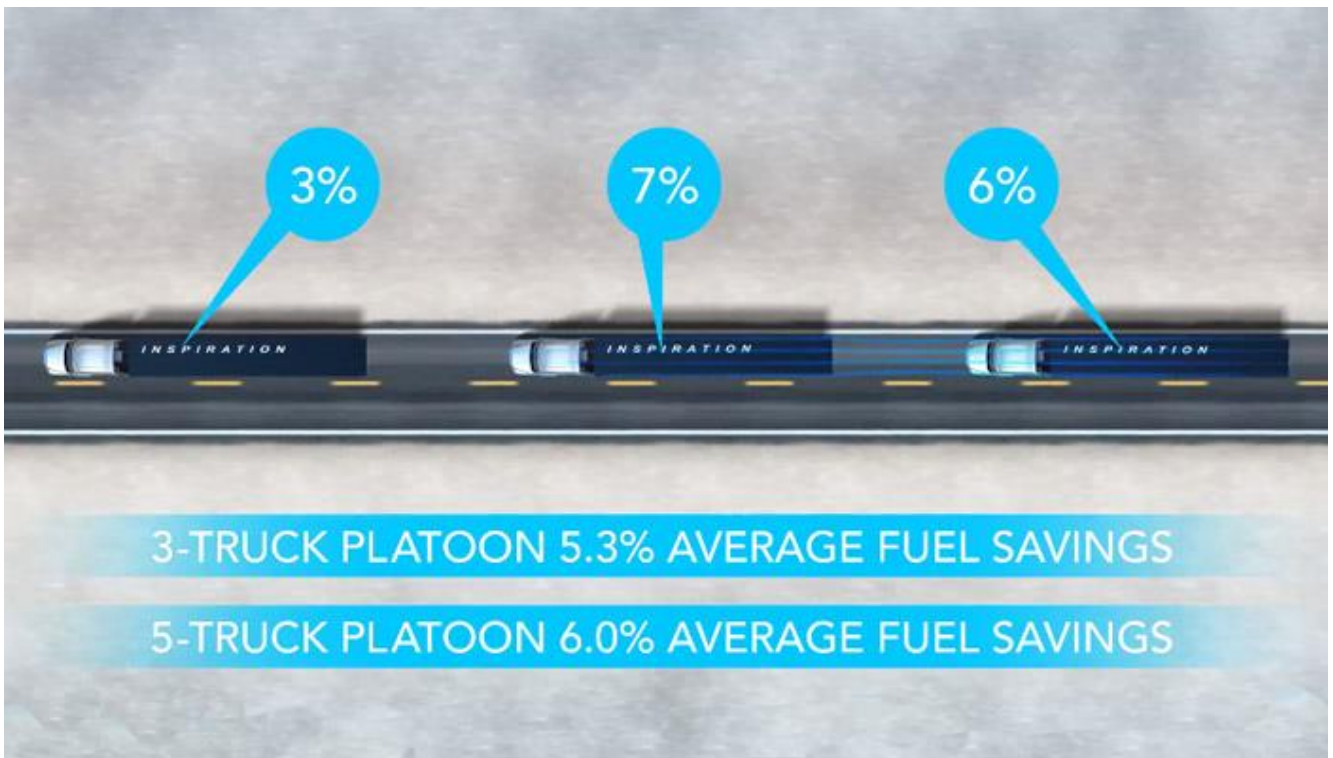
Automated vehicles

Projected global unit sales (m)

Source: Exane BNP Parbas estimates

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[1] http://www.prnewswire.co.uk/news-releases/global-adas-and-autonomous-driving-components-market-to-reach-6106-billion-by-2026-reports-bis-research-650745173.html

[2] http://www.genre.com/knowledge/blog/autonomous-cars-from-drivers-seat-to-riding-shotgun-en.html

Benefits of the unmanned trucks

Proponents of automated trucks are talking about several useful features. They say that such trucks will be more efficient because they would not waste fuel by accelerating and braking as frequently as trucks driven manually by a human driver. Similarly, developers have plans to use truck platooning to save on fuel. Other benefits may include: increased safety and less stress for drivers during long-haul monotonous drives.
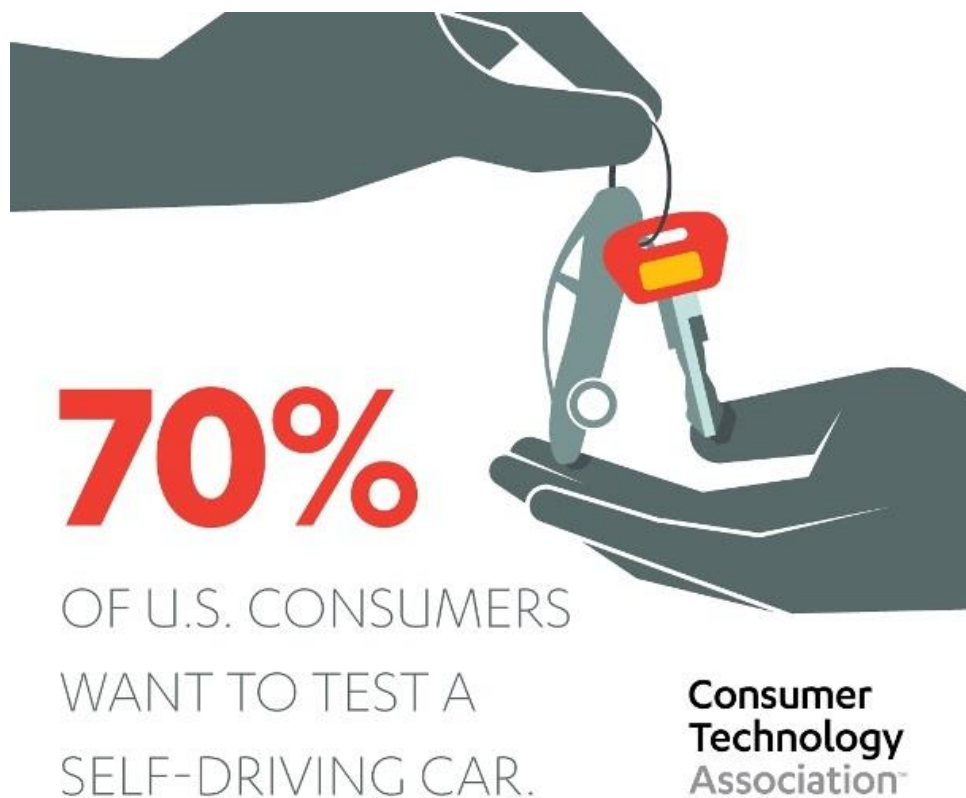

Source: Freightliner Inspiration Truck[1]

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[1] https://www.overdriveonline.com/nacfe-truck-platooning-viable-boosts-fuel-economy/

Passenger car drivers are ready to test automated cars

According to the press release of a Consumer Technology Association (CTA),™ most drivers (93 percent) use existing driver-assist features such as adaptive cruise control, parking assist, and collision avoidance. They then appreciate the usefulness of these driving technology innovations.[1]

"Clearly, drivers are getting more and more excited about everything that driver-less cars will offer us – 90 percent fewer U.S. traffic accidents, 40 percent lower insurance costs, the end of drunk driving accidents and new-found freedom for seniors and people with disabilities," said Gary Shapiro, president and CEO of CTA. "The broad adoption of self-driving vehicles will save tens of thousands of lives each year in the U.S. alone, and deliver a level of independence and mobility that seniors and people with disabilities couldn't otherwise dream of enjoying."

Source: Consumer Technology Association (CTA)™

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[1] https://www.cta.tech/News/Press-Releases/2016/October/Revved-Up-and-Ready-Most-Consumers-are-Excited-A.aspx

Rolls-Royce expects a remotely operated local vessel being in operation by 2020[1]

Autonomous shipping is being proactively explored by the maritime industry. Discussions within the industry have identified both direct cost-reducing benefits and other indirect benefits. Direct benefits are often listed at the vessel level:

- Better use of space in ship design
- Better use of the crew and their skills
- Better use of fuel.

Indirect benefits occur at company and network levels along the shipping sector. Remote and autonomous shipping allows for improved optimization of operations and processes. For example, optimizing processes or operations based on real-time data enables economies of scale at fleet and company levels as well as reduces the likelihood of human errors, contributing to both safety and service quality. In the shipping sector, autonomous shipping will recast the roles and reorganize the division of work.

The operation of remote and autonomous ships will need to be at least as safe as existing vessels if they are to secure regulatory approval, the support of ship owners, operators, sea-farers and wider public acceptance.

Source: Rolls Royce Marine

[1] http://www.rolls-royce.com/~/media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/rr-ship-intel-aawa-8pg.pdf

The region in which an autonomous vessel should operate and whether it should be remote-controlled or autonomous will have a significant impact on the rules applied to it. We plan to operate along the same logic at SKYFchain during mission planning, approval and verification.
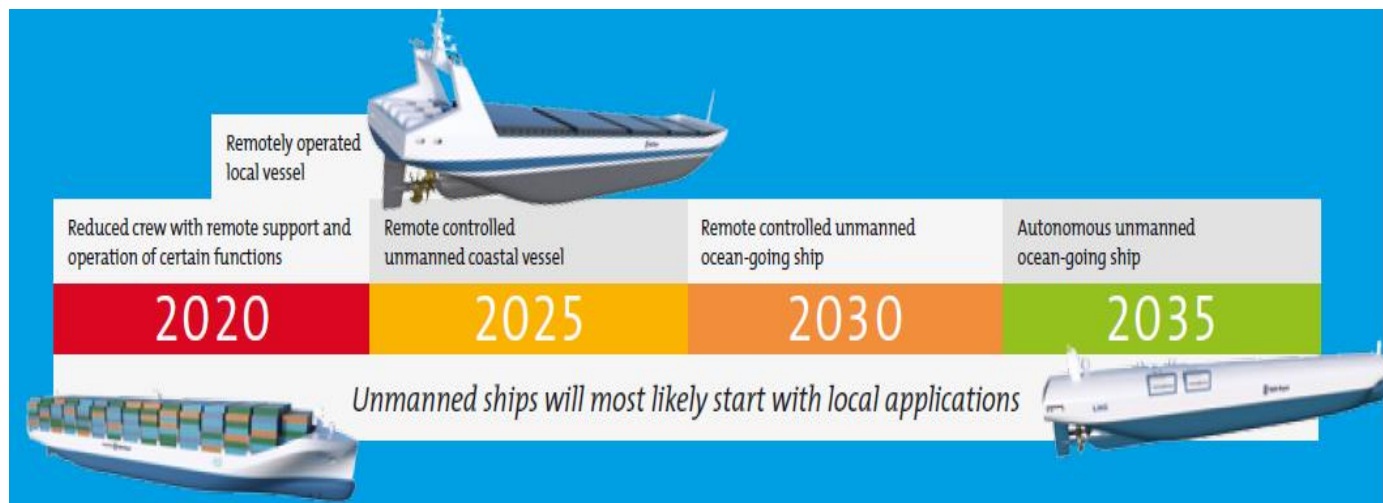
Source: Rolls Royce Marine[1]

Embedding smart ship equipment into an existing vessel is the first step on the Rolls-Royce roadmap to a fully autonomous and intelligent ship. The company envisages a remotely operated local vessel being in operation by 2020. By 2025, the company hopes to have a remotely operated autonomous vessel on international waters.

Five years later, the company hopes that autonomous ocean-going vessels will be a common sight on the ocean. As time goes on, such ships will be made even more intelligent and capable of autonomous operations.

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[1] http://www.rolls-royce.com/~/media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/rr-ship-intel-aawa-8pg.pdf

AAWA (Advanced Autonomous Waterborne Applications) partners may all be invited to test and join SKYFchain in the next 3 to 5 years.

AAWA — REDEFINING SHIPPING

Advanced Autonomous Waterborne Applications (AAWA) partners

Company	Input
Rolls-Royce	System Integration and Automation Control
Deltamarin	Ship Design
Inmarsat	Satellite Communications Technology
DNV GL	Classification and regulatory guidelines
NAPA	Software house providing solutions for ship design and operation

Rolls-Royce   DELTAMARIN   inmarsat — The mobile satellite company   DNV·GL   NAPA

Universities	Input
Aalto / VTT (Technical Research Centre of Finland)	Safety and Security
Tampere University of Technology / University of Turku	Technology Research
University of Turku	Business Aspects
Åbo Akademi / University of Turku	Legal Aspects

A? Aalto University   VTT   TAMPERE UNIVERSITY OF TECHNOLOGY   Turun yliopisto University of Turku   Åbo Akademi

Source: Rolls Royce Marine[1]

[1] http://www.rolls-royce.com/~/media/Files/R/Rolls-Royce/documents/customers/marine/ship-intel/rr-ship-intel-aawa-8pg.pdf

3.3   Drone-related VC deals

According to the CBInsights report "The State of Drone Technology"[1] VC funds have recognized an opportunity in UC; the total disclosed VC capital raised for unmanned systems (drones) in the year 2016 increased by 123% to over $1,3bn.

Drone investment activity Q1'12 – Q2'15
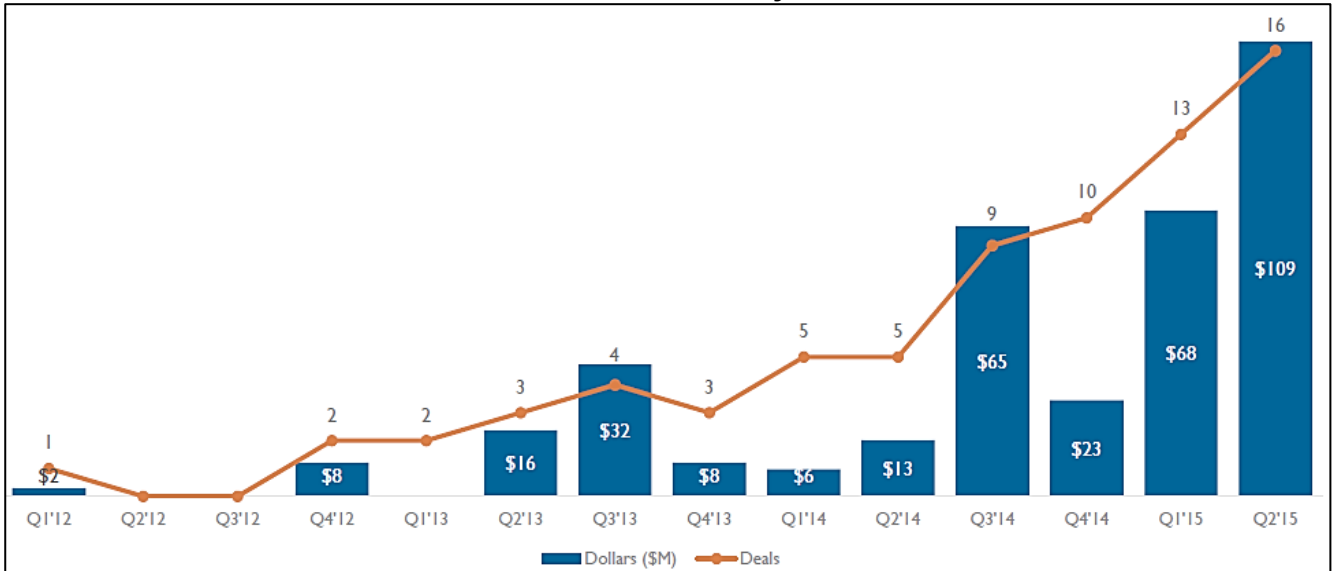
Source: CBInsights - The State of Drone Technology

Drones quarterly global financing Q1'12 – Q3'16
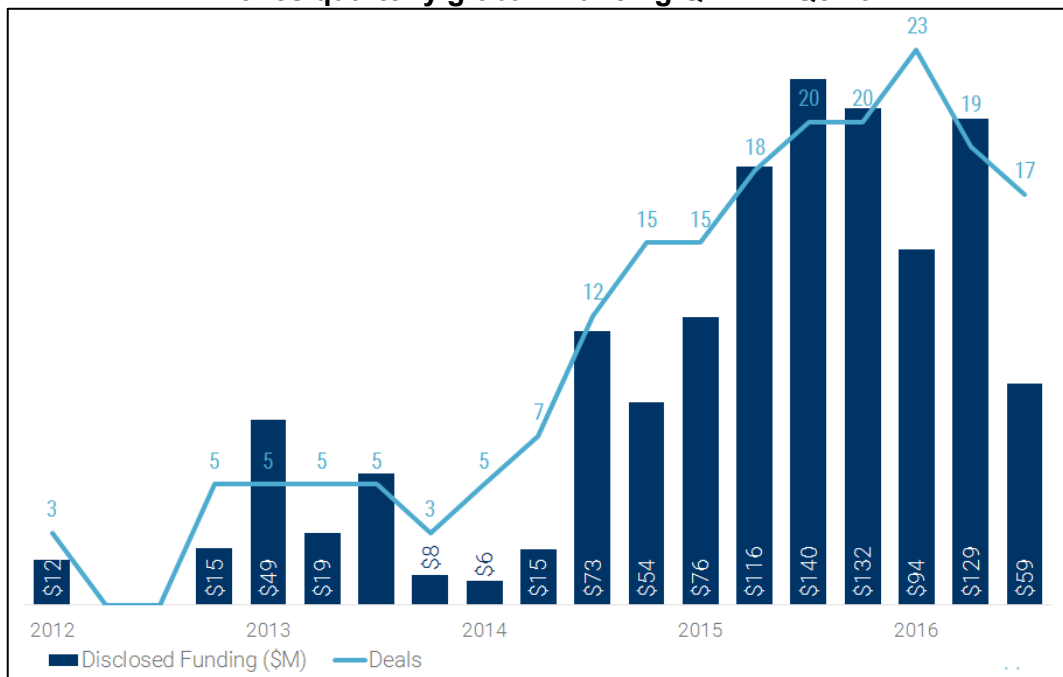
Source: CBInsights - The State of Drone Technology

[1] https://s3.amazonaws.com/postachio-files/596e5227-47d3-4770-b7d8-2754051d6a19/03f6377a-029b-4950-a6bc-7d35b809e6c1/e8b6e0fa-c2aa-4f96-9edb-73cb071b0351_orig.pdf

The broad adoption of drones has become a mainstream in this decade. Q1'2016 investments include: Airware ($30mln), Skydio ($25mln), and Delair-Tech ($14.5mln). DJI was one of the first drone companies with confirmed a Mcap of $10bn. The investors' spectrum is diverse and includes leading global business companies.

The most active investors in drone VC from 2012-2017

Investor	Rank	Investments					
Lux Capital	1	Airmap	CyPhy Works	Drone Racing League	Echodyne	Hangar Technologies	Saildrone
Qualcomm Ventures	1	3D Robotics	Airmap	Flirtey	RedZone Robotics	Skycatch	Swift Navigation
Andreessen Horowitz	3	Airware	Matternet	Skydio	Skysafe	Zipline International	
Felicis Ventures	3	Airware	CyPhy Works	Dedrone	Swift Navigation	Zipline International	
Commercial Drone Fund	5	Cape Productions	Raptor Maps	Red Bird	SkyFutures		
Google Ventures	5	Airware	Hivemapper	Skycatch	Zipline International		
New Enterprise Associates	5	Cape Productions	Echodyne	Pilot AI Labs	Swift Navigation		
Social Capital	5	Airmap	Iris Automation	Saildrone	Verifly		
SV Angel	5	DroneBase	LilyRobotics	Skysafe	Zipline International		

Source: CB Insights

Now you have the opportunity to invest in SKYFchain ICO!

4. Problems in the drone market and unmanned logistics

4.1 Lack of transparency

Universal operating systems for the drone market still do not exist. There is no system where customers can check the technical condition of drones and their safety itineraries. This is one of the reasons why public authorities limit drone flight range.

This problem is not only present in the aviation industry. All the cargo robotics markets do not have reliable certified operational platforms.

The organizational problems of the unmanned drone industry include costly insurance and near-prohibitive regulations in some countries.

The insurance problem stems from the fact that there are many stakeholders in the process of the drone operations: the drone manufacturer, the drone operator company, the drone pilot, the drone service company, the customer etc. Additionally, it is not always clear who is liable in different cases of a disaster. If we can store all the relevant data on a block chain and provide it to an insurance company, they can then assess the risks quicker based on facts. Hence the insurance policy cost could decrease and the insurance payment would be provided quicker because the liable party will be known.

The table below represents how the regulatory framework looks today in 15 countries, on five continents. Many countries have yet to develop regulations to guarantee a business-friendly legal environment. The solutions of SKYFchain OP may provide the standard for the development of future regulations.

Regulations by country

Territory	Possibility of commercial flights	License required to fly	Possibility to perform BVLOS flights	License required for BVLOS flights	Insurance required for commercial flights	Training required for pilots in order to obtain licenses
Poland	✓	✓	✓	✓	✓	✓
UK	✓	✓	✓	✓	✓	✓
China	✓	✓	✓	✗	✓	✓
Canada	✓	✓	✓	✗	✓	✗
Germany	✓	✓	✗	✗	✓	✓
France	✓	✓	✓	✗	✗	✓
South Africa	✓	✓	✓	✗	✗	✓
Indonesia	✓	✓	✗	✗	✓	✓
Australia	✓	✓	✗	✗	✓	✓
Brasil	✓	✓	✓	✗	✗	✗
Mexico	✓	✓	✗	✗	✗	✓
USA	✓	✓	✗	✗	✗	✗
Japan	✓	✗	✗	✗	✗	✗
Russia	✗	✗	✗	✗	✗	✓
Argentina	✗	✗	✗	✗	✗	✗

Source: PwC – "Clarity from above" report - 2015[1]

Flights by drones, called 'drone operations', are governed by manned and unmanned aviation laws that determine the ground rules for operating drones in airspace. Most countries' regulations distinguish between recreational and commercial flights; however, a fully developed regulatory framework takes into account the drone's weight, flight area, time of day and altitude. Mostly, the areas where flying drones is prohibited are very similar worldwide. Permission is always required to fly near and over airports, military infrastructure, key public infrastructure (e.g. government offices), densely-populated areas or other restricted areas. Some countries require drone registration prior to use.

Generally, recreational flights performed by the smallest drones do not need permission from aviation authorities or a license. However, in the US for example, recreational drones weighing more than 250 grams but less than 25 kilograms have to be registered before their first flight.

Commercial flights in most countries have to be performed by certified pilots. There are more specific restrictions regarding their use, especially in populated areas. In majority countries, drone operators

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[1] https://www.pwc.pl/en/publikacje/2016/clarity-from-above.html

have to obtain licenses, as well as special permission to perform commercial flights. They may also be required to appoint a pilot, a commander responsible for flight safety and an observer, especially during BVLOS (Beyond-visual-line-of-sight) flights.

Solution is the SKYFchain OP

SKYFchain OP is a transparent and trusted operating platform that offers financing and gives insurance companies direct control over their assets, which has sparked the growth of this industry.

4.2 Technical problems of air-borne unmanned logistics – short flight range of existing drones

Have you ever wondered why there are dozens of toy-drones in the market, yet the airports still have large manned helicopters? Unfortunately, the multi-copter's size scalability problem does not have a solution yet at the moment. The higher the take-off mass, the larger the propeller has to be, which, in turn, increases the momentum. This is how the aircraft rapidly reaches the controlable threshold.

Good rotor dynamics require an electric engine. However, the increase in scale of the drone comes with a second problem **–** accumulator batteries become ineffective. The internal combustion engine can solve this issue. However, its implementation in drones remains problematic because of its high weight. On the other hand, the hybrid engine's cost is usually too high.

Solution – SKYF drone with a gasoline engine

The SKYF drone new aerodynamic design solves the problem of multi-copter scalability. The SKYF drone is the world's first unmanned air cargo platform (unmanned aerial carrier, the drone) with vertical take-off and landing (VTOL) based on patented aerodynamics, which allow for the development of unmanned aerial vehicles with different modifications that can carry out a wide variety of challenging tasks.

The SKYF drone is easy to operate and less expensive when compared to other existing solutions, and it allows for scaling in order to increase payload and flight range, as well as to configure other characteristics.

Moreover, we provide licensed operational documentation, software and key electronic components. We believe that the emergence of universal high-performance VTOL drones can lead to unpredictable expansion in application areas, especially in the market segment of 100-150 kg payload.

See Annex 3 for the blueprints of the SKYF drone

The real photo of a SKYF drone

Source: SKYFchain OP

Model: SKYF P2-1

The SKYF Unmanned Aerial Carrier was designed and built at ARDN Technology Limited (UK), whose R&D HQ is now located in Kazan, Russia. Areas of the system's applications include: crop spraying and long distance delivery of goods. The SKYF device is a vertical take-off and landing device drone with two 2.8 m main rotors that synchronously rotate towards each other. The main rotors, which generate lift to ensure the drone is air-borne, are driven by a gasoline engine. The engine transmits torque through the gearbox and the belt drive to the main rotors.

The vehicle's housing has a truss structure assembled from a square aluminum profile through riveting. The vehicle's horizontal movement is achieved through tilting using eight controlling electric motors on different modes located on the spark shafts, on four outrigger rods. The yaw rotation of the SKYF is achieved by turning the control plates under the main rotors in opposite directions. An electric generator connected to a gasoline engine and buffer batteries are mounted on a vehicle to ensure the operation of the electrical equipment.

The movement of the vehicle, including take-off, mission and landing, do not require human participation. The movement occurs according to a trajectory and altitude predetermined by a flight mission with the use of satellite navigation systems and an on-board system to determine the altitude above the ground. The auto-pilot control system has algorithms that ensure the vehicle's safe operation and action in case of malfunction or in various abnormal situations.

A parachute system is installed on the vehicle for flights above 40 meters (for SKYF transport versions).

SKYF drone technical characteristics

The SKYF drone's maximum useful load is 400 kg. The drone flight range can reach up to 350 km, while the flight time is 8 hours (with 50 kg of cargo onboard).

SKYF drone mobility

The SKYF drone transportation container can hold two vehicles. A container allows for customization for various purposes and SKYF drone modifications.

Source: SKYFchain OP

SKYF drone modifications

SKYF CARGO

The average payload is 150 kg with a maximum flight range of 350 km. This SKYF drone version is the best solution for oil & gas logistics and for delivery in hard-to-reach areas. These services are in great demand in Russia, Africa, Canada, Asia, Australia, South America, CIS countries and the mountainous regions in Europe. SKYF drones can deliver goods (food, spare parts, measuring equipment, emergency supply) from the logistics centers to designated residential areas.

SKYF MARINE

This modification has reinforced construction by adding corrosion protection. This SKYF drone can work during emergencies in most regions of the world due to its increased reliability. It will be able to deliver food, rescue equipment and medicine to natural disaster locations as well as evacuate the injured and distressed at sea. Furthermore, this vehicle could serve in marine logistics centers and intensive shipping regions to deliver medium-sized cargo (spare parts, mail, etc.) to ships at sea or on the move, which will significantly reduce their service time and fuel consumption.

5. SKYFchain Operating Platform technical details and economics

5.1 Blockchain concept for the SKYFchain OP

SKYFchain architecture is based on two building blocks:

1. SKYFchain blockchain itself - private permissioned blockchain customized for the most effective usage in the industry;
2. Ethereum ERC-20 SKYFT tokens-based perimeter of public blockchain for processing and settling SKYFT tokens transactions and communicating them back and forth with SKYFchain.

Private (permissioned) blockchain is required to simplify the development and support and give an opportunity to choose solution most appropriate for each particular task. Moreover we want to be independent of the performance of public networks (e.g. scalability issues with Ethereum) and not wait for transactions to be committed in public network. At the moment we are considering three different approaches for the SKYFchain: creating our own Ethereum fork, SKYF-specific custom platform, built on top of either Exonum libraries or instance of R3 Corda blockchain.
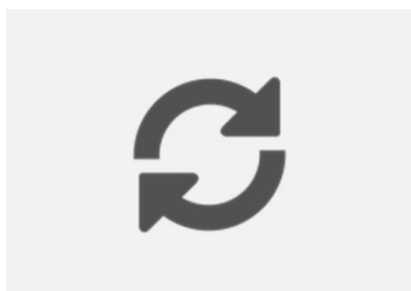
All tokens issued at public Ethereum network at the ICO stage are ERC-20 compatible and can be bought and sold on stock exchange. So we keep them in the public Ethereum network. At the same time these same tokens are going to be utilized as a cryptonomic fuel for the permissioned SKYFchain, so it is essential to synchronize balances between public Ethereum network and the SKYFchain.

SKYFT tokens synchronization

SKYFT tokens are the currency for all operations in the SKYFchain. All contracts are processed in SKYFT tokens. Although tokens are issued at public Ethereum network they are also fully used at SKYFchain. There are several options for synchronization. Using public Ethereum network transactions is the obvious way, but it locks SKYFchain performance due to different speed of transactions. Moreover additional public Ethereum network operations costs can ruin main advantages. Creating additional "internal tokens" as an alternative approach is going to dramatically increase complexity of the system because it depends on resource-consuming synchronization process between internal and external balances.

The problem of storage and token balances reconciliation between SKYFchain and public Ethereum networks is solved by using payment channels and keeping balances in Ethereum public network. There are already several implementations of payment channels. And with Plasma project evolution sharding, parallel transaction execution and most of all the scalability problem are going to be addressed.

Payment channels are part of a special middleware over blockchain database. They form a payment network and allow two or more parties to make funds transfers from one to another. In our case we create payment channel from public Ethereum network to the SKYFchain.
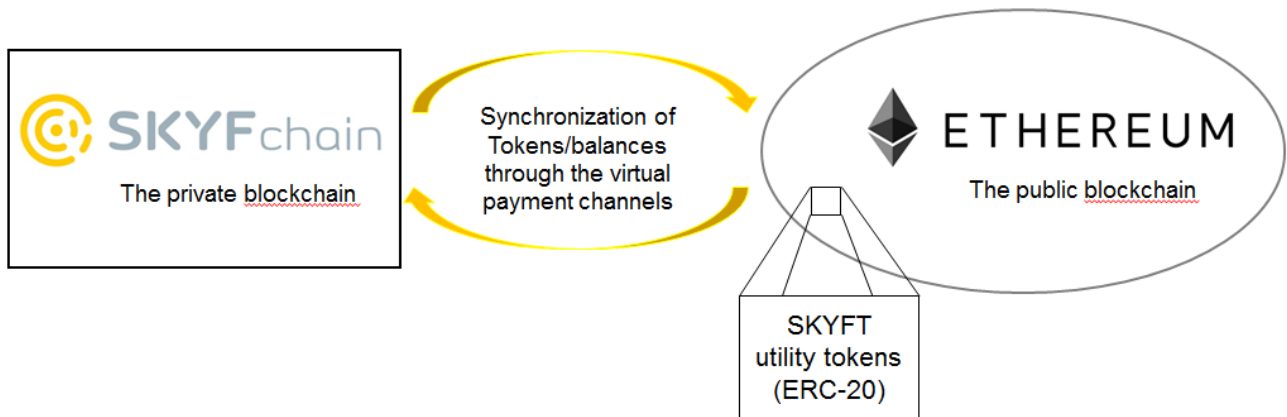
Source: SKYFchain OP

Payment channels work in the following way. First a connection between the SKYFchain and public Ethereum network is established by execution of a special transaction in public Ethereum network. This transaction reserves certain amount of SKYFT tokens for this connection - payment channel. When SKYFT tokens are required for any operation at SKYFchain then they are used from the payment channel funds.

Operations on payment channels are extremely fast since there is no need waiting for a commit of transaction on blockchain. A receipt signed by two parties is used for confirmation and payment validation. At any time either party can close the payment channel and spread reserved tokens based on received receipts.

So we get an architecture where the SKYFchain is separated from public Ethereum network and all transactions could be processed at their own speed without any additional delays. And at the same time there is only one source of truth about balances - public Ethereum network.

SKYFchain architecture

Building private (permissioned) blockchain is required in order to fully support all industry operations at reasonable fee and speed. Selection of an appropriate consensus protocol is one of the key points for this. The most popular (and proven to be more or less effective) are: Proof-of-Work (POW) like in Ethereum public network, Proof-of-Authority (POA) like in system of authorized nodes in the Ripple network, Proof-of-Stake (POS) like in Decred public network, and different variations. We will start with Proof-of-Authority consensus.

In the beginning of our private blockchain there will be an administrator which will set the rules (governance), which may be written in the form of legal contract. Such administrator will invite other participants. In case of rules violation their node may be suspended and certificates annulled.
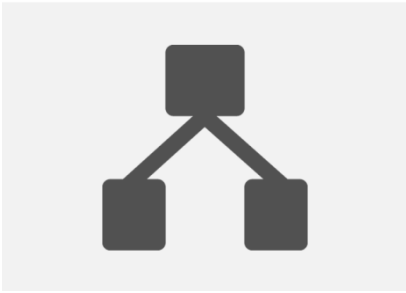
It is essential to clearly state private network governance policy. So we are planning to offer governance roles in our blockchain to professional industry participants: Leasing and Insurance companies, Logistics Providers and their clients, State Authorities and market analysts, manufacturers and service providers. Thus in the beginning the network will be centralized, but as new participants join the system it will become more and more decentralized.

We plan to extend the blockchain to 300 nodes during first three years of operations. While reserving 20-30 nodes as to ensure stability of the system. Other nodes would belong to ICO investors and to other market participants. Thus **our platform will be ~90% decentralized till the third year** and even more so after the third year.

Although the SKYFchain will be based on the universal platform we are going to use it for a particular industry. So blockchain transactions would be optimized for operations of different roles. This will simplify admission of new participants and their initial adaptation.

In blockchain database each block holds batches of valid transactions that are encoded into a Merkle tree. Each block has a hash to the previous one, so no one could alter the chain in any way later. Merkle tree is a tree of hashes, and it is optimized for size and speed to check if a particular data was included in a set of objects.

SKYFchain is a permissioned blockchain, because only members have access to it. Transactions log in SKYFchain is public and accessible for all participants. It is required for validation of the blockchain. On the other hand **any participant can decide to hide commercially sensitive data and post only hash of that data** in transaction while still maintaining its accuracy and completeness. Merkle tree structure allows seamless integration of such transactions into blockchain. This is a so-called "anchoring". Later such partner (network participant) could provide data and confirm validity with hash in blockchain. Anchoring also allows to optimize the size of stored data.

Anchoring and local decentralized transactions could be used to provide confidentiality when it is required for a certain contract. In case of disagreement administrator and legal parties can be brought in to validate contract and operations, check governance and make a ruling.
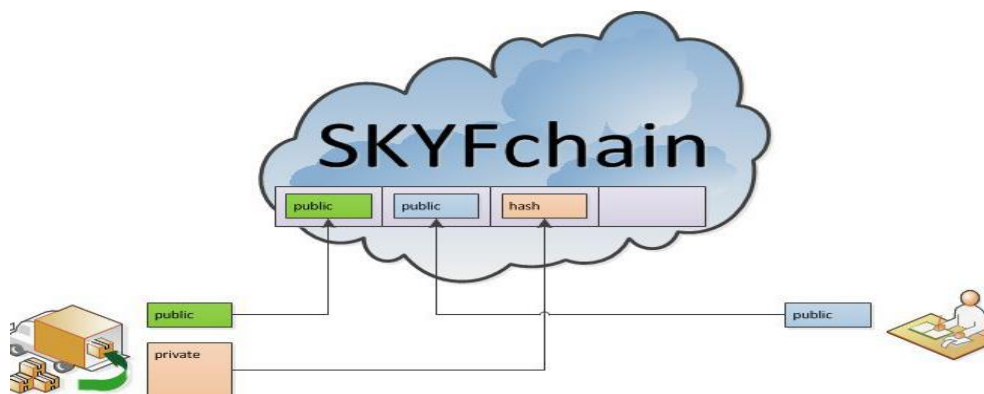
Source: SKYFchain OP

5.2   Proposed data structure of SKYFchain OP

SKYFchain gets together all the participants of unmanned vehicle market. Each participant will store and request data from SKYFchain.

Developers and Producers

- Can get financing, insurance and customers through SKYFchain
- Store data on SKYFchain:
    - device ID data
    - digital specification of each device
    - flight tests and tests of acceptance reports
    - certificates and documentation for each country/authority

Licensees

- Can get customers from SKYFchain and unique drone blueprints from developers and producers
- Store data on SKYFchain:
    - licenses for assembly
    - licenses for software
    - licenses for operations
    - device ID data
    - digital specification of each device
    - flight tests and tests of acceptance reports

Technical services

- Can provide services to participants of SKYFchain
- Store data on SKYFchain:
    - device's technical maintenance data
    - device's incidents data
    - repair and units' replacement reports
    - software versions and software update data

Operators and End-users

- Conclude and execute smart contracts to use unmanned drones
- Store data on SKYFchain:
    - development and approval of missions / itineraries
    - development and approval of logistic smart-contracts
    - missions / smart-contracts reports
    - charter contracts (temporarily)
    - orders data
    - payments data
    - incident reports
    - ratings (for devices, for operators, for end-users)

Authorities

- Authorize and control the available itineraries for drones on their territory
- Store data on SKYFchain:
    – device certification
    – safety control
    – missions approval
    – mission reports control
    – fast routes blocking, if required
    – no-flight areas regulation

Analysts

- Analyze performance of different drone models and of market participants, provide scoring and recommendations
- Store data on SKYFchain:
    – robo-assets analysis
    – ratings / scoring for fintech
    – recommendations for market players

Financial markets

- Provide financing to international market participants on SKYFchain network, based on scoring from analysts and using remote block function in case of disruption of payment for a drone or related service
- Store data on SKYFchain:
    – asset information for each device
    – records of transactions and encumbrances
    – device booking for a financial deal
    – blocking of a specific device (or a group) in case of convenience (for authorized users)

All these transactions will be supported by SKYFchain OP and will technically be executed using smart-contracts and SKYFT tokens.

5.3 SKYFT-token – the internal currency of SKYFchain

SKYFchain OP will use the SKYFT - a utility token issued through ICO.

SKYFT properties include:

- Internal currency of the SKYFchain OP required for any transaction,
- Fixed amount of 1 200 000 000 tokens,
- The ICO-end price will be ~0,065 USD per 1 SKYFT,
- SKYFT are compliant with USA's SEC and **available for US accredited investors**
- The blockchain super-node holders harvests 50% of transaction fees,
- **25% of transaction fees goes to all token holders**,
- 25% of transaction fees goes to the Community Development Fund to sustain constant system development and expansion.

5.4 The economics of the SKYFchain OP

Users may pay in fiat or crypto currency accepted by the system. Thus, inside the system, the transactions must be paid in SKYFT tokens, which may be bought automatically and invisibly for the user to execute transactions.

We expect SKYFchain to have two main types of transactions:

- Operational transactions of around 0.1 USD per transaction (e.g. one data fixation by a drone done several times per day).

- Fintech transactions – This would be of a much bigger value up as a fraction of cost of one drone financed through the system (SKYF price ca 250 000 USD), but more rare.

Economics of the SKYFchain OP
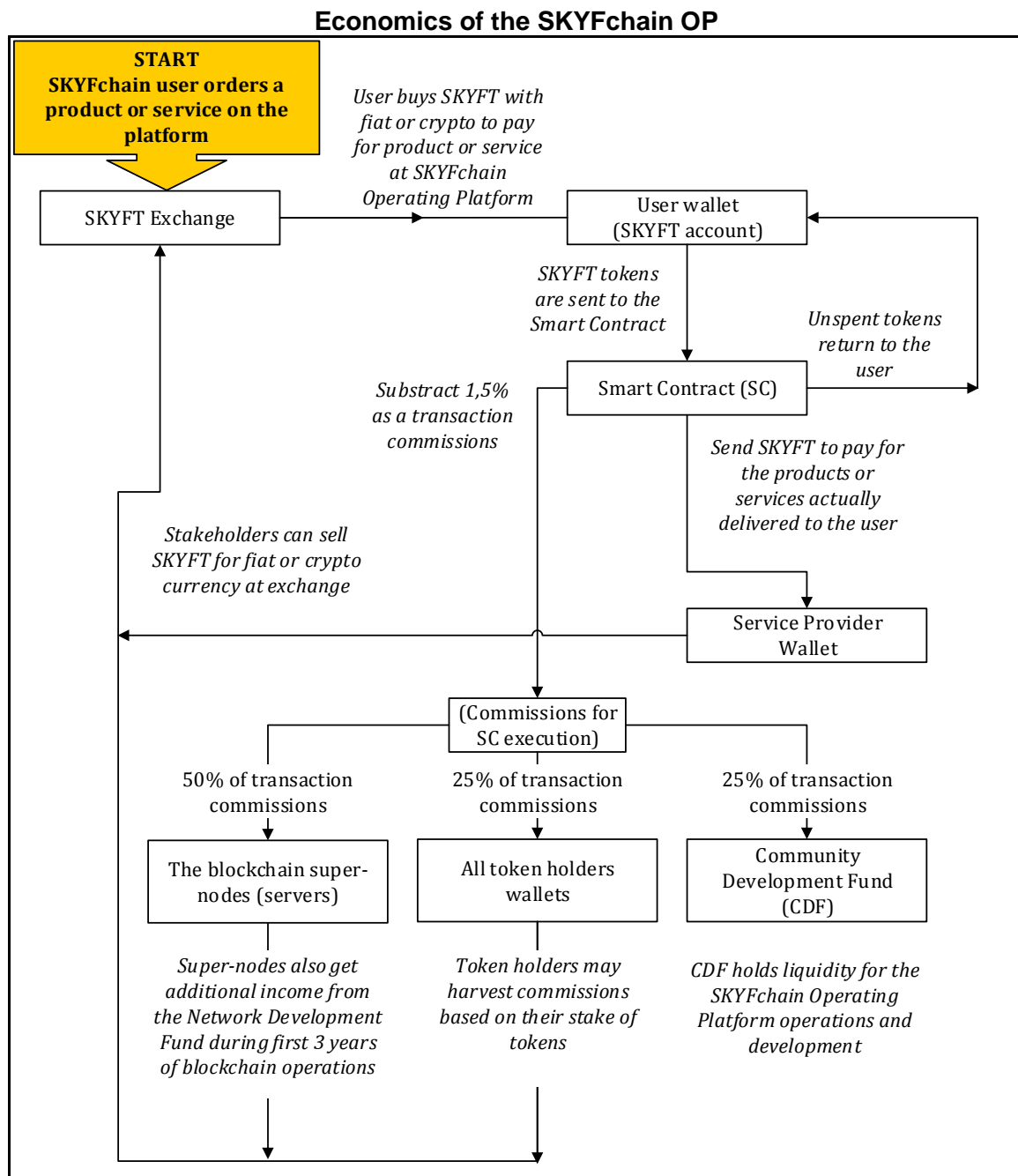
Source: SKYFchain OP

5.5 SKYFchain key figures (projections)

Years	2018	2019	2020	2021	2022
Number of SKYF robots in operation	10	110	1 110	2 610	4 610
Number of other airborne robots in SKYFchain			2 220	5 220	9 220
Number of ground- and seaborne robots in SKYFchain					46 100
Total number of robots using SKYFchain	10	110	3 330	7 830	59 930
Expected number of transactions, Mln.	0,037	0,438	12,6	40,7	247,4
SKYFchain comissions, Mln USD	0,6	6,2	65	102	205
Sales of SKYF drones Mln USD	3	30	300	450	600

Source: SKYFchain OP
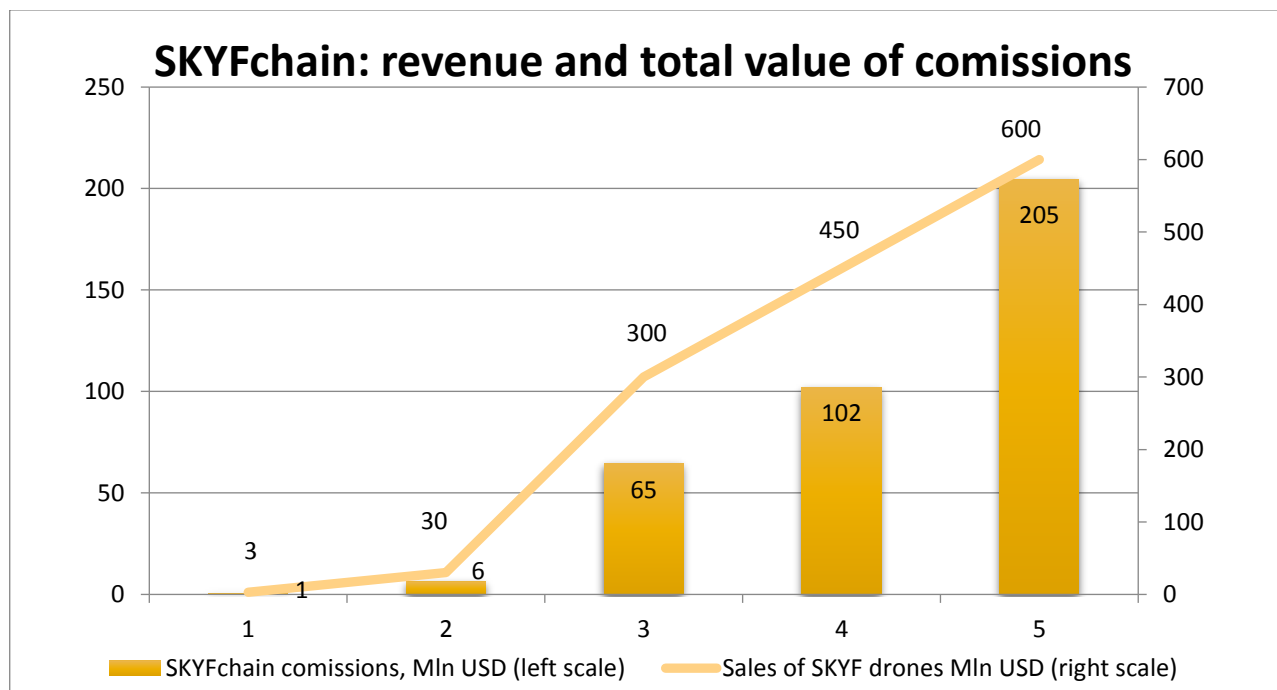
Source: SKYFchain OP

Commissions will be split among SKYFchain participants as described below:

- The blockchain super-node holders would harvest 50% of transaction fees (by Proof-of-Authority concept)

- 25% of transaction fees would go to all token holders (by Proof-of-Stake concept),

- 25% of transaction fees would go to the Community Development Fund to sustain constant system expansion.

5.6 Projected Super Node holder's income

SKYFchain: Projected income of one Super Node, USD/a

Source: SKYFchain OP
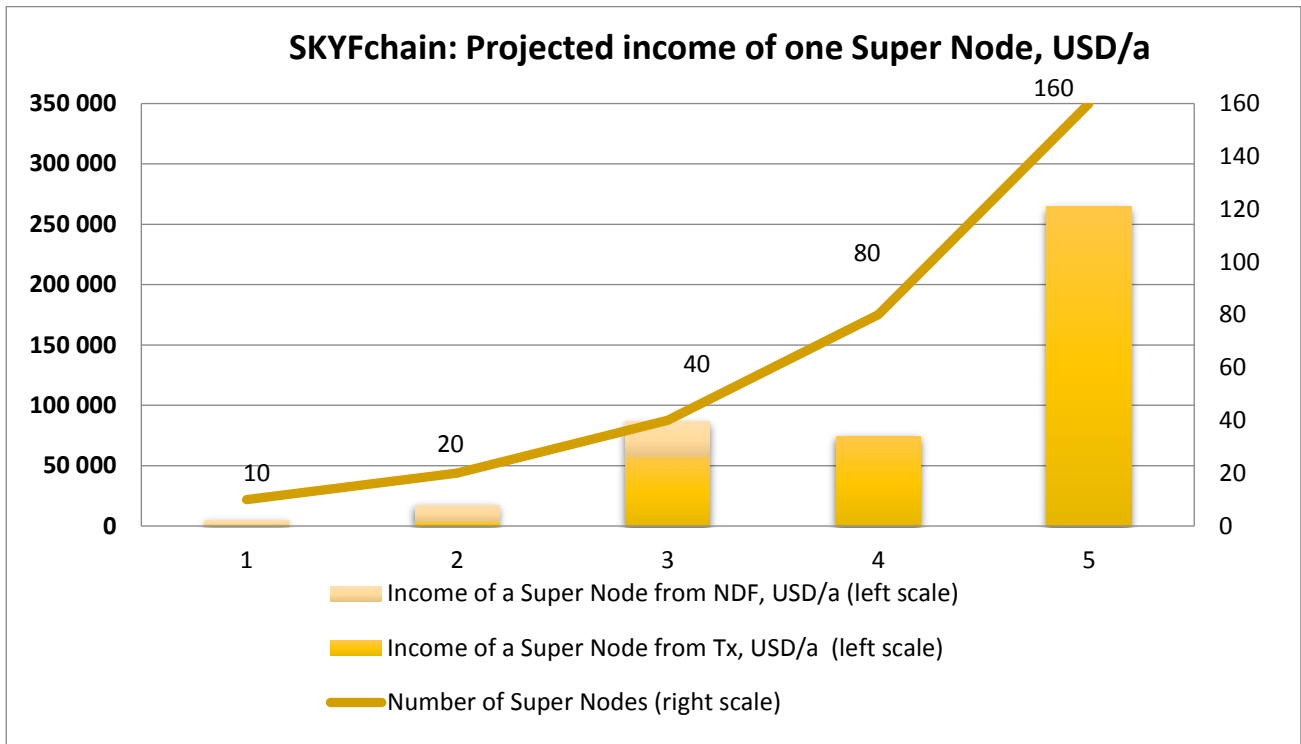
Super Nodes holders will have an income:

- from transaction commissions (approximately 1,5% of transactions volume),
- during the first three years of blockchain operation - from the Network Development Fund created at ICO, which would contain 180 000 000 of SKYFT tokens (15% of total tokens).

Number of super-nodes is limited to 300 during first 3 years of operations
Contact us if you want to own a super-node in SKYFchain

Hardware server costs are expected to be around 5 000 USD during the first year and 1 000 USD yearly spend from the second year on. The node server would require a stable internet connection and ongoing technical support.

Year	2018	2019	2020	2021	2022
Projected number of Super Nodes	10	20	40	80	160
Income of a Super Node from Tx, USD/a	683	3 845	57 320	74 396	264 570
Income of a Super Node from NDF, USD/a	3 963	13 334	29 148	0	0
Total income of a Node, USD/a	4 645	17 179	86 468	74 396	264 570

Source: SKYFchain OP

6. Pre-ICO and Terms crowdsale

Pre-ICO will be launched on 1st of March 2018

Join the white-list to receive a 40% discount on your SKYFT tokens!

The pre-ICO target is $1 000 000.

The pre-ICO hard cap is $2 000 000.

Only 51 300 000 SKYFT tokens is reserved for Pre-ICO.

Minimum tokens purchase volume is 3000 SKYFT.

Collected funds will be stored on several accounts to limit potential impact of an attack by hackers.

We accept contributions in ETH and BTC. If you want to contribute BTC, you still need the ETH address in order to receive tokens.

ICO is planned to be launched in May 2018

Exact ICO dates are to be announced.

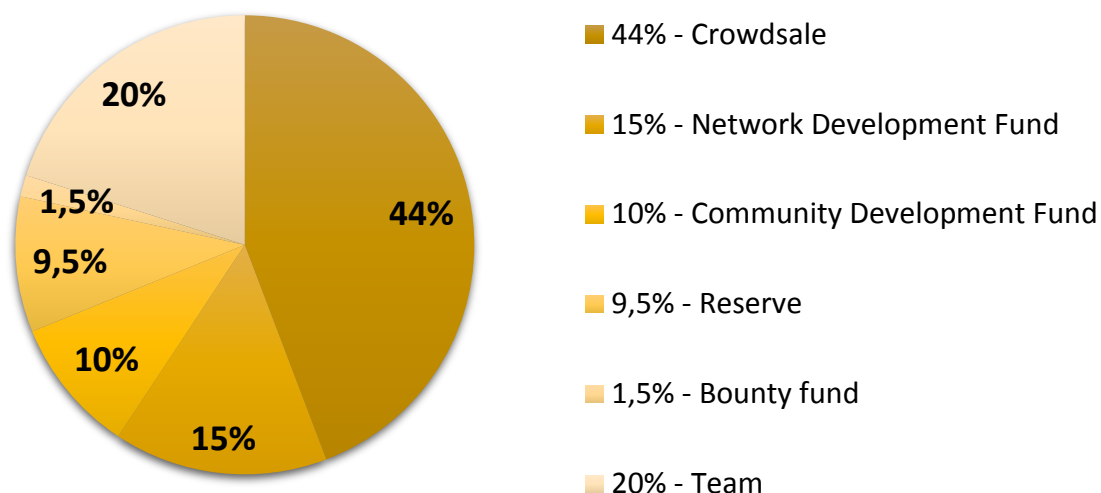| ICO Stage	Discount	SKYFT Price, USD	Number of tokens for the stage
1	30%	0,046	25 000 000
2	20%	0,052	20 000 000
3	10%	0,059	20 000 000
4	5%	0,062	20 000 000
5	0%	0,065	391 700 000

ICO hard-cap is $30 000 000.

The final SKYFT token price at ICO will be $0,065.

528 000 000 of SKYFT will be available for purchase at ICO. Unsold tokens will be burned.

For each SKYFT token sold at the crowdsale 1,27 tokens will be created and will be split between special token funds (see pie chart below).

Thus **the maximum number of tokens is 1 200 000 000 SKYFT.**

SKYFchain - tokens allocation

- ■ 44% - Crowdsale
- ■ 15% - Network Development Fund
- ■ 10% - Community Development Fund
- ■ 9,5% - Reserve
- ■ 1,5% - Bounty fund
- ■ 20% - Team

| #	SKYFT tokens allocation	%	Total tokens issued SKYFT
1.	Crowdsale (Pre-ICO and ICO)	44%	528 000 000
2.	Network Development Fund (NDF) - to support super nodes during the first three years of blockchain operations. (50% of NDF will be spent in the first year, 35% during the 2nd year and 15% during the 3rd year)	15%	180 000 000
3.	Community Development Fund (CDF) - to stimulate the growth of the partners' network and developer's community	10%	120 000 000
4.	Reserve (frozen for 1 year)	9,5%	114 000 000
5.	Bounty fund	1,5%	18 000 000
6.	Team (vested for 1 year)	20%	240 000 000
	Total:	**100%**	**1 200 000 000**

Source: SKYFchain OP

7. Use of funds

If we manage to collect the required $30 mln, they will be used for:

45% - Research & Development – including full-time salaries, contractors, research

25% - Marketing & Platform Development – to build a robust marketing campaign in several languages, user acquisition, etc.

24% - Operations, Business and Corporate Development – to grow business via strategic partnerships, integration with various stakeholders, and acquiring or partnering with other relevant projects.

6% - Legal & Administrative - Legal, IP protection, accounting and other third party services needed to run our organization.
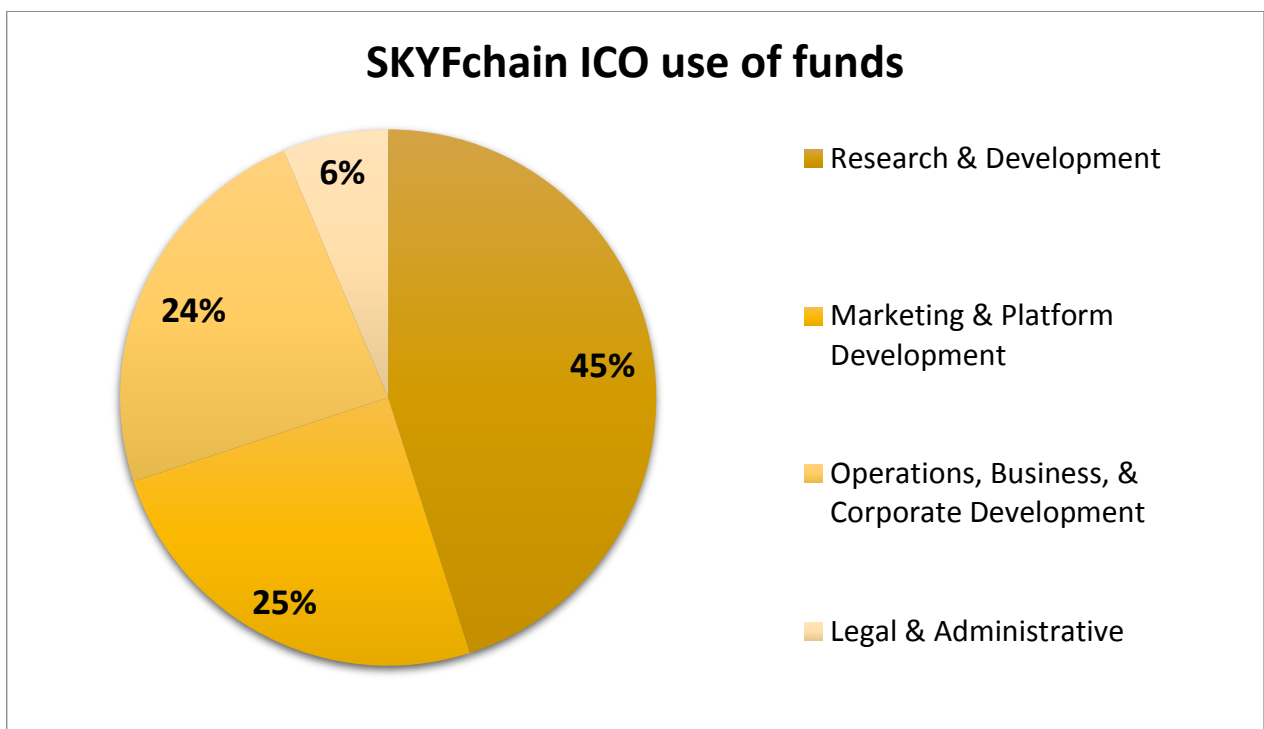
Source: SKYFchain OP

In a softcap success scenario - if we manage to collect only the softcap of $5 mln, then the development of the project will be delayed but the goals will remain. Furthermore, we shall focus on developing an MVP of the blockchain to present it to the market participants to attract additional funding. Meanwhile the 20% of the revenues from sale of SKYF drones would sustain the price of SKYFT token.

In **medium case scenario - if we manage to collect $15 mln** - then after developing an MVP of the blockchain we are going to extend the network of partners among the market participants. We shall organize workshops and educational events about using functionality of the SKYFchain. New participants should bring in new transactions which should generate demand for SKYFT tokens.

8. Team and advisors

Our Team today has more than 30 engineers and developers.

THE MAIN TEAM

Alexander Timofeev – CEO

Moscow Institute of Physics and Technology Latvian State University in Physics

Founder and CEO, Microbor-Nanotech

Founder and CEO, InvestKinoProject

Founder and Managing Partner, FPI. Founder and managing partner of the FPI innovation fund. He has extensive experience in attracting investment, both in Russia and globally, including for a number of international high-tech projects

Valery Krivenko – IR

Managing Partner Bright Capital, Head for High Tech Investments ONEXIM Group; McKinsey & Company, Roland Berger Strategy Consultants; London Business School, University of California Los Angeles, MGIMO University

Nickolay Kovshov – Lead IT Developer

Lead developer and head of R&D groups in a number of software start-ups involved in big data analytics. Holds PhD in computer science from MIPT

Ilya Rodin – GR

Partner at FPI innovation fund. He is a graduate of the Skolkovo Moscow School of Management. He has extensive experience in structuring technology projects, attracting investments and bringing young companies to the international market

Christian Lorentzen – BDO in USA

View Dynamic Glass, Sales Executive

Capital Markets, Cushman & Wakefield

Strategic Consultant, CB Richard Ellis

Sales & Marketing Manager, Alinga Consulting Group
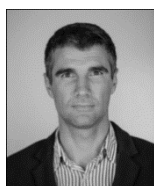
Maxim Khabur – CMO

Marketing Director, FPI Partners

Managing Director, Young & Rubican Group Managing Director, Added Value Senior Marketing Manager, TNK BP

Marat Sabirov - Autopilot design

Tupolev KNITU-KAI

Director of Design Bureau for production preparation with Kazan Aviation Enterprise

Dmitry Arsentyev - Drone development

Since early childhood, Dmitry was fascinated with aviation and dreamed of conquering the sky. He managed to put together a high-profile team of colleagues, who, for the sake of the project, left the Kazan aviation Bureau.

Olga Budnik - PR

Olga has more than ten years of experience in PR and communications. Focused on media relations for tech companies, universities and research institutions

Nail Zinnurov - Drone design

Tupolev KNITU-KAI

Chief Engineer for CAD systems at the Design Bureau named after Tupolev Designs Aviation Equipment for Civil and Military Purposes

Sergey Shilin - Software engineer

Education: Tupolev KGTU-KAI

Software developer for PC (.NET C#) and microcontrollers (C++).

Alexander Malikov - Software engineer

Education: The Pskov State Polytechnic Institute

Designed and developed control system for fully autonomous unmanned aircraft. Proficient in C++ and Java.

Katya Bublik - Head of digital marketing

Digital Marketing at Experian & Enter Capital; Product management at FuturTech Hult International Business School, Plekhanov Russian University of Economics

ADVISORS

Michael Terpin – CEO, Transform Group

Transform Group - the world leader in blockchain and ICO PR and advisory services (50 ICOs and counting)

Alexey Arkhipov – Managing partner at Qiwi Blockchain technologies

Alexey Arkhipov is one of the thought leaders and tech visionary of Russian IT and payment market. He is a pioneering technologist with 8+ years of executive level experience in leading innovation in various distributed systems in the financial industry.

Igor Karavaev – serial blockchain projects investor and advisor

Ex-executive Director at the Skolkovo Foundation, the leading Russian business incubator of start-ups; director of strategy and business development of the largest international corporations; ICObench Expert

Alexander Ivanov – Expert in global business development

Business Director at General Electric, Dupont, Caterpillar

Annex 1: Details on existing drone intelligence platforms

AirMap - The platform that powers drone flights with APIs and SDKs

AirMap's integrated airspace services empower responsible and intelligent decision-making for commercial operations worldwide.

AirMap is an approved U.A.S. Service Supplier of L.A.A.N.C. in the U.S. controlled airspace for:

- Automated authorization for pre-approved flight plans
- Manual authorization for flights outside pre-approved zones
- 45 ATC facilities

AirMap real-time weather for active or planned drone flights for optimal aircraft performance in dynamic airspace conditions. They include:

- Wind speed
- Low-altitude visibility
- Temperature

AirMap alerts operators of nearby air traffic that could create a potential hazard for a drone's flight path. Pilots get traffic alerts for:

- Commercial aircraft
- General aviation aircraft
- Helicopters

AirMap provides mission-Critical APIs for Every Phase of a Flight:

- Maps: Provides a TileJSON spec map for use with MapBox GL.
- Advisory API: Provides airspace information, including advisories and regulatory requirements.
- Airspace API: Interacts with obstacles and rules in the airspace.
- Flight Planning API: Creates flight plans and receives flight briefings to ensure compliance.
- Pilot API: Manages the pilot profile, preferences, and identity verification.
- Aircraft API: Gives information on the drones' manufacturers, their models, and metadata.
- Flight API: Creates and queries flights, verifies requirements, and gives digital notice.
- Telemetry API: Broadcasts position and health information to an endpoint for live feedback.
- Traffic Alerts API: Alerts operators of nearby manned traffic in low-altitude airspace.

Flock – Pay-as-you-fly drone insurance

Flock collects real-time, location-based data, like weather, nearby buildings, ground hazards, NOTAMS and more, to identify the important risks before the flight, and to help get the safest flight path possible. All of Flock's policies are EC785/2004 compliant and are underwritten by Allianz, the world's leading aviation insurer. With Flock's smartphone app, clients pay for drone insurance only when they need it, and receive a customized policy for their flights.

Botlink - drone mapping software that captures data, analyzes it, and reacts quickly

Botlink provides flight planning and aerial mapping services. Botlink mobile app allows for capturing of high-definition images from the flying drone automatically in order to create detailed surface maps. App users can add location-specific comments, discover valuable metrics and take precise measurements.

Annex 2. Prospective clients of SKYFchain

Clients of the SKYF drone will provide key data for the SKYFchain to develop unmanned business processes.

SKYF drone clients in the agricultural sector

Syngenta AG (annual revenue – $12.8bn) is a global Swiss agri-business that produces agrochemicals and seeds. As a biotechnology company, it conducts genomic research. It was formed in 2000 when Novartis Agribusiness and Zeneca Agrochemicals merged. As of 2014, Syngenta was the world's largest crop chemical producer, and the strongest in Europe. As of 2009, it ranked third in seeds and biotechnology sales. Sales in 2015 were approximately $13.4bln, over half of in the sales from emerging markets. International regulators have approved the firm's acquisition by ChemChina, a Chinese state-owned enterprise.

Status: First round of negotiations have been completed; the company is interested in promoting SKYFchain OP. Syngenta is working towards testing SKYF drones; the test flights are planned for spring 2018.

Avgust Crop Protection (annual revenue - $263.3mln) is the largest chemicals supplier among all agricultural companies and farmers in Russia. Currently, it is in almost 30 countries via local distributors, and has its own operations in Russia, Ukraine, Belarus, Kazakhstan, China, and Brazil. The company AVGUST has its own production capacities, and provides a full range of services from the selection of chemicals to chemical cultivation services (for major customers in certain geographies).

The company is ready to provide its promotion space for PR activities pertinent to the SKYFchain OP, which will enable pilot implementation in most of the advanced farms, including those operating in the international markets.
.
Status: AVGUST Crop Protection has signed the Letter of Intent to use SKYF drones for spraying up to 500 thousand hectares of their lands.

Rusagro Group (annual revenue - $1.4bn) is the largest vertically integrated agricultural industry in Russia. At the moment, it occupies the leading positions in sugar, pork, crop, oil and fats production. The land bank of the Group consists of more than 600 thousand ha. In 2015, the investment bank named Rusagro Group became one of the most profitable and fastest growing consumer segment companies in CIS. The company is listed on the London Stock Exchange and on the Moscow Stock Exchange.

Prodimex Group (annual revenue - $1.06bn) is the largest sugar manufacturer in the Russian Federation. The Group has more than 15,000 employees. Prodimex owns one of the largest land banks in the country amounting to over 600,000 ha located in eight major agricultural regions: Voronezh, Belgorod, Kursk, Tambov, Penza, Krasnodar and Stavropol regions, as well as the Republic of Bashkortostan. As a result, agricultural units of the company cultivate over 3.5 million tons of sugar beet and over 500,000 tons of grain.

SKYF drone prospective clients in the logistics sector

NGK Slavneft (annual revenue – $221.7mln) is an oil-drilling company that requires new transportation solutions to cater to their wells.

Status: Ten SKYF drones have been accredited according to the terms of the initial contract. The company is preparing for test flights.

PAO SIBUR Holding (annual revenue – $6.9bn) is an integrated gas processing and petrochemicals company. The company is processing petroleum gas in Western Siberia with a capacity of 25.4 billion cubic meters per year. Drones are necessary for remote production sites supply.

Technical specifications and statement of work is still in progress.

Russian Post (annual revenue – $2.8bn) is Russia's largest post operator with over 40 thousand offices around the country.
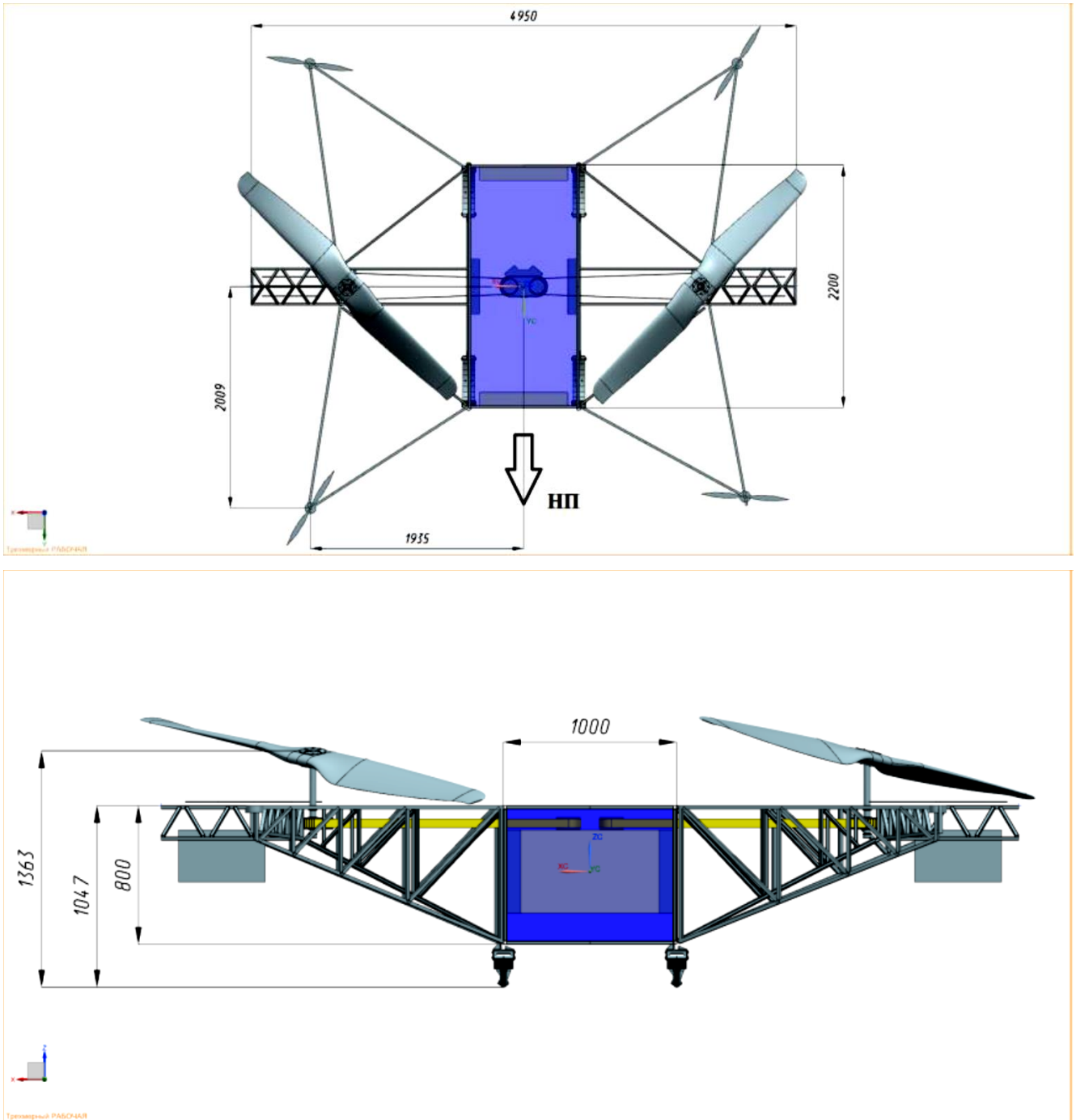
Negotiations are in progress.

Pony Express (annual revenue - $86.7mln) is the largest integrated logistics company in CIS serving over 15 thousand settlements.

Negotiations have successfully been completed. Test flights are planned for the spring of 2018.

Annex 3: Blueprint of the SKYF drone

Source: SKYFchain OP

Annex 4: Details on drone market segments and SKYF drone applications

Infrastructure segment - $45bn

In report "Clarity from above" PwC estimates the addressable market of drone powered solutions in infrastructure at $45.2bn. Drones are able to provide the data required at each phase of the construction process. During the pre-construction phase, drones can significantly improve the speed and quality of the design process by providing better field data. Data collected by drones can also be used to create Digital Terrain Models (DTMs), which ensure better contract valuation. During the construction phase, drones are perfect for quick surveys of sites and for the precise gathering of data for progress reports. In the last phase of the construction process, drones can be used to assess environmental impacts of the final work and for reporting purposes.

Drones can be used in infrastructure companies for stock-taking and inventory management. Performing inventory assessments with drones allows companies to cut costs and accelerate the entire process, while providing more detailed information about the assets. It also increases workplace safety, as rotary-wing drones can fly into places that are difficult to reach without risking human lives.

We can expect to see drones not only diagnosing problems in crumbling infrastructure such as cracks on tarmac roads, bridges and building facades, but also repairing them. In the future, 3D printing technology will be combined with drone technologies to maintain and repair infrastructure.

Monitoring and repair are not the only drone applications being developed within the infrastructure industry. Start-ups are testing drone technology in performing hazardous tasks at certain heights, such as painting and window cleaning. Ultimately, they will be able to perform most of the jobs at certain heights, replacing humans and reducing the risk of death and injury, as well as increasing efficiency.

3D-renders for potential SKYF drone use cases

Sources: SKYFchain OP

3D-renders for potential SKYF drone use cases

Sources: SKYFchain OP

Agriculture segment - $32bn

Agricultural production has drastically increased in recent years, and studies predict that aggregate agricultural consumption will increase by 69% from 2010 to 2050. This increase will be mostly stimulated by population growth from 7 billion to 9 billion by 2050. PwC estimates that the addressable market of drone powered solutions in the agricultural industry at $32.4bn.

Today, drone technology offers a large variety of crop monitoring possibilities at lower costs when compared to traditional satellite imagery. Furthermore, drones can be integrated in every stage of the crop lifecycle, from soil analysis to seed planting to choosing the right moment for harvesting.

Drones are able to produce precise 3D maps for early soil analysis, which can be used to plan for seed planting patterns. Various start-ups have been able to create drone planting systems that not only achieve an uptake rate of 75%, but also decrease planting costs by 85%. Additionally, once the crop is growing, they allow for the calculation of the vegetation index, which showcases the heat signature and allows for crop planting.

Once the later stage of a crop life cycle is reached, the farmer's main objective turns to keeping the plants alive and healthy, which requires constant field monitoring. Drone monitoring possibilities are constantly being enhanced, providing the opportunity to reduce risk in the industry. Crop spraying is another area where drone can be applied in the agricultural. Drones can scan the ground while maintaining the right distance from the crops and spraying the correct amount of liquid, modulating spraying in real time for even coverage.

SKYF drones can conduct high-resolution imagery for crop disease detection, and spraying of pesticides and desiccants for soya, corn, sunflower, sugar beet, rice, etc. We also have a high demand to deploy SKYF drones in orchards and vineyards so as to protect against frost and cherry drying.

SKYF drones can provide aerial application of chemicals, pesticides and fertilizers, for pest control. Moreover, our vehicles are suitable for fast planting of seedlings in biodegradable capsules for the restoration of large forest areas after deforestation, fires, etc. Finally, SKYF drones equipped with meteorological radars can be used in precipitation management during summer and winter (accumulation of snow in fields, decrease of snow in cities), and fire prevention and extinguishing.

Russian agricultural market breakdown

> ➢ $1.1bn – Russian pesticide market size
>
> ➢ 35.8mln ha – the area of land treated with crop protection agents
>
> ➢ $330.5mln – $545.8mln – annual costs of spraying for crop protection
>
> ➢ $280mln – $460mln – market size for SKYF drones

Average cost of aerial chemical spraying services:

- •   Russia – $4 – $5 per hectare
- •   USA and Europe – $30–$40 per hectare

For reference - In the US, up to 20% of pesticides are sprayed through aerial vehicles.

Farmers and their contractors use various means to deploy crop protection chemicals

15%	65%	20%
• Feasible only by means of ground-based means due to high application rates • For instance, fungicides for grain crops	• Ground-based equipment normally used • Air vehicles are more effective due to higher capacity. However, the existing air vehicles do not meet the requirements of precision and low costs • For instance, herbicides, pesticides, certain fungicides	• Even the currently existing low-efficiency aviation equipment is more effective than the ground-based instruments • For instance, the application of pesticides, desiccants

Source: SKYFchain OP

High-performance aerial dusting means can be applied in 75% of cases. They not only increase the air spraying accuracy, but also allow farmers to work at night as well as to reduce the cost of aviation spraying.

SKYF drone solution has fundamental advantages in target service areas in the agricultural market.

Key advantages of application of SKYF drones in the agricultural market

- Safety - unmanned means no human error and no pilot on board
- Productivity - 24/7 operation (pilots can't fly at night)
- Price – they are cheaper than helicopters
- Precision - GPS/GLONASS state-of-the-art flight control programming allows for hovering, low speed movement and route precision down to 4 inches
- Effectiveness - precise amount of dusting liquid or irrigation, which keep the soil and underground waters intact

Transport segment - $13bn

Drones are certain to become an integral part of the transport industry very soon, offering a method of delivery of both services and transport. The industry will turn to drones because of speed, accessibility and low operating costs, which are much better when compared to other forms of transport that require human labour. The addressable market for drone powered solutions in the transport industry is $13bn, according to PwC estimates.

Within e-commerce, time of delivery is paramount when choosing a carrier. Drones enable fast delivery to a specific predefined point, without much human action required. Established corporations, garage-based start-ups and all kinds of companies in between, are looking into optimal ways of using drones for transport. In the goods delivery sector, another concept is gaining popularity; delivery of spare parts. Maersk, which operates a large fleet of tankers, currently uses barges to deliver spare parts to its workers. As this process is expensive, the company has been looking into other options, and has also conducted drone delivery tests. The positive results revealed that Maersk will be able to save $3k to $9k per ship annually when using drone technology.

Another application for drones is in medical logistics. Delivering medical supplies to remote rural areas is the most likely application of drones in the transport sector, because the need is high and the risk is low. Another potential medical application of drones is as flying defibrillators. A drone can be summoned by a patient with heart attack symptoms; the device can fly to the location of the patient, travelling at speeds of 100 km/h, locate and identify him or her and then perform automatic defibrillation.

One of the most promising uses of drones in transport may be in food delivery. Providing products such as frozen food, ready-to-eat dishes or even daily groceries from large chains may be the next big thing in the food and restaurant industries. At first, drones will be used to deliver such products to remote, difficult-to-access places that depend on external food supplies, such as oil rigs, research

stations and isolated islands. Once proper regulations have been established, drones may perform the same tasks in residential areas, decreasing delivery times and increasing the efficiency of the entire transport chain.

The Oil & Gas companies alone spend hundreds of millions of dollars per year on helicopter logistics.

Helicopter logistics expenses in Oil & Gas companies

Company	Helicopter logistics expenses ($ mln/year)
Rosneft	350
STATOIL	284
BR PETROBRAS	235
Shell	210
Транснефть	79

Source: SKYFchain OP

Global helicopter logistics market breakdown
- ➤ $8.2bln – commercial helicopter market size globally in 2017 (data by ReportBuyer)
- ➤ the global helicopter market is expected to grow at a CAGR of 3.5% between 2018 and 2023

Key advantages of SKYF drone applications in the transportation market
- ➤ SKYF drone will save on up to 50% in delivery costs for 500 offshore rigs suppliers worldwide
- ➤ The average delivery payload is around 50 kg

- SKYF drones are faster, cheaper and are less risky when compared to deliveries by ship or helicopter
- SKYF drone saves up to 50% of the total annual budget for helicopter logistics (depending on a particular cargo mix)
- **The average price of helicopter services per hour is $1-1.5 thousand. The price of a SKYF drone per one hour of flying is approximately $150.**

Mining - $4bn

The mining industry has untapped potential in drone usage. The commercial applications of drones in the mining industry are not so obvious at first glance; however, they can replace humans in dangerous and monotonous jobs. Moreover, they are more cost-effective and versatile when compared to helicopters; they are also faster, easier to navigate and cause less pollution when compared to other mining vehicles. In open-cast mining, PwC identifies four main areas of drone-applications: planning, extraction support, environmental protection and reporting. To assess the addressable market of drone powered solutions in this industry, PwC looked at particular cost categories and estimated the value at $4.3bn.

Open-cast mines usually cover several square kilometres, on varying surface levels, which translates into long routes for land vehicles and crew. Drones can be used to quickly map the area, optimize hauling routes and provide control information. Drone applications during mining exploration range from providing data that enables resource calculation through mapping a mining area, to management. Drones can be equipped with special features to supply spare parts or take soil samples for deposit analysis. Drones are able to detect soil erosion, track changes in vegetation and search for defects in mining infrastructure that may endanger the environment, more easily, and definitely faster than people on foot or manned aircraft can. Drones can also be used to monitor the production process in open pit mines and for early detection of deviations and threats. By creating a digital model of an open-pit mine, and the current state of work progress and detecting changes in the structure of the mine (landslides, damages to infrastructure), mine owners can increase safety and decrease costs of controlling processes.

Security segment - $10bn

Areas need to be monitored constantly for security purposes. Drones can quickly cover large and difficult-to-reach areas, reducing staff numbers and costs. They also do not require much space for their operators. As drones are controlled from small pilot stations, operators can gather in one place, as with traditional video monitoring. PwC estimates the addressable market of drone powered solutions in security industry at $10.5bn.

Drones have a competitive edge over stationary cameras as intruders cannot easily step out of sight, and they can cover areas that are normally out of reach. Drones have expanded their function beyond basic monitoring and can also ensure the safety of key sites or infrastructure, such as ports and airports. In addition to monitoring and rapid reaction, drones can provide detailed pictures and documentation of premises, enabling effective data analysis, identification of risks and security planning.

In the future, we envision that the data gathered by drones will be instantly processed in the cloud, providing complete scene recognition and supplementing human supervision. Thanks to machine learning software, motion sensing and biometrics-based behavior analysis, as well as facial recognition, drones will not only recognize unauthorized entry into a site, but also identify precisely who the intruder is.