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Draft 09.11.2017

CLOUDEOTOKEN

CBN Foundation's CloudEO Token Generating Event

DECENTRALIZING SPACEBASED EARTH OBSERVATION – ENABLING GEOSERVICES FOR THE INTERNET OF THINGS & MOBILITY

"The commercial space industry is enormous and ripe for disruption."
- Steve Jurvetson

Hello and welcome to the CloudEO Blockchain Network!

You are here because space, satellites and the geoservices industry are captivating your imagination. Just like us, you are a crypto enthusiast, who sees the disruptive power and potential of the blockchain technology. The CloudEO Blockchain Network (CBN) brings together companies and individuals who contribute their experience, know-how, geodata, and services to the development of a new, comprehensive ecosystem for geoservices.

Everything we do - relates to the Earth and, because of that, anyone can contribute to the CBN - from an individual driving a car or collecting geodata on a smart phone, to a big satellite company providing high-resolution data. Developers may create new geo-apps. This Whitepaper outlines the opportunities that that can be realized when more people and companies create and use geodata and geoservices. If you want to participate in the CBN and want to learn how, please contact us at token@cbn.foundation and we will find a way for you to participate.

Please note that in order to participate in the CBN, you must acquire a CloudEO token. **We emphasize in the strongest possible terms that a CloudEO token does not represent ownership or a security interest in the Foundation or any other entity. Nor is a CloudEO token related to any other assets or properties. The token does not represent a debt owed by the Foundation or any other entity and shall not be considered a debenture. To acquire CloudEO tokens, you need to be genuinely interested in contributing geodata, skills, time, energy and expertise to the CBN by becoming a member of the CBN community of volunteers. If you determine that CloudEO tokens may constitute a security subject to regulations in any country, we strongly advise you not to acquire them and suggest you immediately notify us of any possible risks.**

The CBN Foundation is registered in the Principality of Liechtenstein. We have been in consultations with representatives of the Liechtenstein government and of their financial market regulator with whom we shared this Whitepaper. On September 7th, 2017 we received a “No Action Letter from the Financial Market Authority of Liechtenstein (FMA), indicating that it would not take legal action should the CBN Foundation engage in the activity outlined within this Whitepaper.

ABSTRACT

Monitoring of our planet Earth is a rapidly growing industry. The data produced about Earth is referred to as "geodata" - information that has or could have a 'geotag', including: satellite and aerial imagery, elevation data, data on moving objects, tracking info, field indexes, etc. More often than not, such geodata is produced and distributed among satellite companies and state agencies. It can be expensive and without specialized software, is rarely accessible to other industry sectors or broader public. However today, not only satellites or drones produce geodata. It is being generated by every owner of a cell phone or other connected device, but this data also then mainly belongs to and is utilized by corporations collecting such data. Up until now, there has been no compensation for the crowdsourced geodata.

The data collected is critical to building and expand the Internet of Things (IoT) which, combined with Big Data and Artificial Intelligence (AI), will be driven by geocontext. As the number of machines and services that demand connectivity and location monitoring increases, the geoservices sector is estimated to generate $150–$270 billion of revenue globally and is projected to expand. To stimulate this expansion, we strive to lower the entry and access barriers to the geoservice sector for the broader public. Our mission is to enable crowdsourcing, machine-to-machine communication, and exchange of geospatial information with automated transactions, providing affordable 'micro geoservices', which include geodata, software and IT infrastructures. In other words, we are building a new ecosystem in which multiple sources and users of geodata - from individuals driving cars to satellite companies - may easily interact with each other. Our core strategy is to capture the market by enabling this interaction through smart contracts which enable broad participation in the decentralized network called the CloudEO Blockchain Network (the "**CBN**").

The CBN will be run by a non-for-profit foundation established in the Principality of Liechtenstein (the "**CBN Foundation**" or the "**Foundation**"). To participate in the CBN, members must acquire CloudEO tokens generated by the Foundation on the Ethereum blockchain ("**CloudEO**", cryptoexchange symbol: CLT).

We invite all interested parties to participate in a token-generating round that will take place in two stages here. The initial distribution is set for September 2017, when the Foundation will raise an equivalent of $2 million in Ether. The funds raised will be used to develop the Foundation and prepare for the general token-generating event to take place later in the Fall 2017. The CloudEO token architecture, possible use, benefits, and requirements of the token holders, as well as the methodology for token distribution are outlined in Section 3 of this Whitepaper.

The project team initiating the establishment of this Foundation has already built a marketplace using data from multiple sources and experimented with tokens, used in a project with the European Space Agency (ESA) which enabled transactions between the ESA and international R&D communities. In that pilot project, academic and industrial researchers procured satellite data-as-a-service or software-as-a-service from data providers and satellite operators by using tokens authorized by ESA. Inspired by the success of that project, we seek to build a broader decentralized network and tokenize the entire geoservices industry.

For answers to frequently asked questions, the description of the token valuation method and the list of the defined terms used in the geoservices industry, please go to our Q&A section. If you have any additional questions or comments, please direct them to us at token@cbn.foundation.

INDEX

1. INTRODUCTION 6

2. THE SATELLITE EARTH OBSERVATION MARKET & APPLICATIONS 8

3. DISRUPTING THE INDUSTRY – LOWERING BARRIERS 9

3.1 Conditions Ripe for Industry Disruption 10
3.2 Harnessing Unused and/or Underutilized Geodata 11
3.3 Decentralized Production and Access to Geoservices Via Smart Contracts..... 11
3.4 Ingredients for the Development of Commercial Geoservices 12

4. BUILDING THE CLOUDEO BLOCKCHAIN NETWORK (CBN) 13

4.1 Easy & Decentralized Access to Geodata & Geoservices as Run by CloudEO Today 13
4.2 Creation of a Blockchain-based CBN 16
4.3 The CBN Architecture..... 17
4.4 CloudEO Token Purpose Statement 17
4.4.1 Why CBN Will Not Use Bitcoin, Ether, or Other Cryptocurrencies? 19
4.5 Technical Description of a Use Case – EXAMPLE: Agriculture 19
4.6 The Token Generation Process..... 21
4.7 Methodology for Token Distribution..... 22
4.8 Use & Distribution of Remaining Tokens..... 23

5. GOVERNANCE STRUCTURE OF THE CBN FOUNDATION..... 25

5.1 Governing Bodies 25
5.2 Auditors or control agency..... 25
5.3 Beneficiaries 25
5.4 Code Review Committee..... 25
5.5 Finance & Human Resource Committee 25
5.6 Dispute Resolution 25

6. THE CBN FOUNDATION PROJECT..... 26

6.1 Project Management Team 26
6.2 Core Development Team 27
6.3 Partners 28

7. RISKS AND DISCLAIMERS 30

7.1 Technological & Organizational Risks 30
7.2 Token Value Risks..... 31
7.3 Regulatory Risks 31

REFERENCES 33

1. INTRODUCTION

Seeing the Earth from above has probably more changed the way humans see the world than many other events in history. Having the means to monitor the earth surface on a regular basis and combining these data with other data of geo context will affect almost every part of human activities.

Geospatial services increasingly affect how humans manage their businesses and private affairs. Companies such as SpaceX, Urthecast and Planet Labs have led the space industry into a new era. Instead of institutionalized investments and money spending, we see innovative business models emerging, driving the commercialization of the so called “new space industry”.

The next immensely important step for the humankind will be to enable machines to communicate with each other and exchanging geospatial information and to allow automated transactions involving micro geoservices. The Internet of Things combined with Big Data and AI will be driven by geocontext, if small transaction of satellite based geoservices can be consumed.

A fertilizing machinery ordering the right data for specific fields generated by satellite data, or cars exchanging and consuming geoservices helping them to predict dangerous situations are just some of the huge number of emerging applications. Enabling crowd-sourcing business models around smart phone users generating local information and cars collecting environmental data will allow broad participation and will create new awareness of human and machine interactions with the world in which we live.

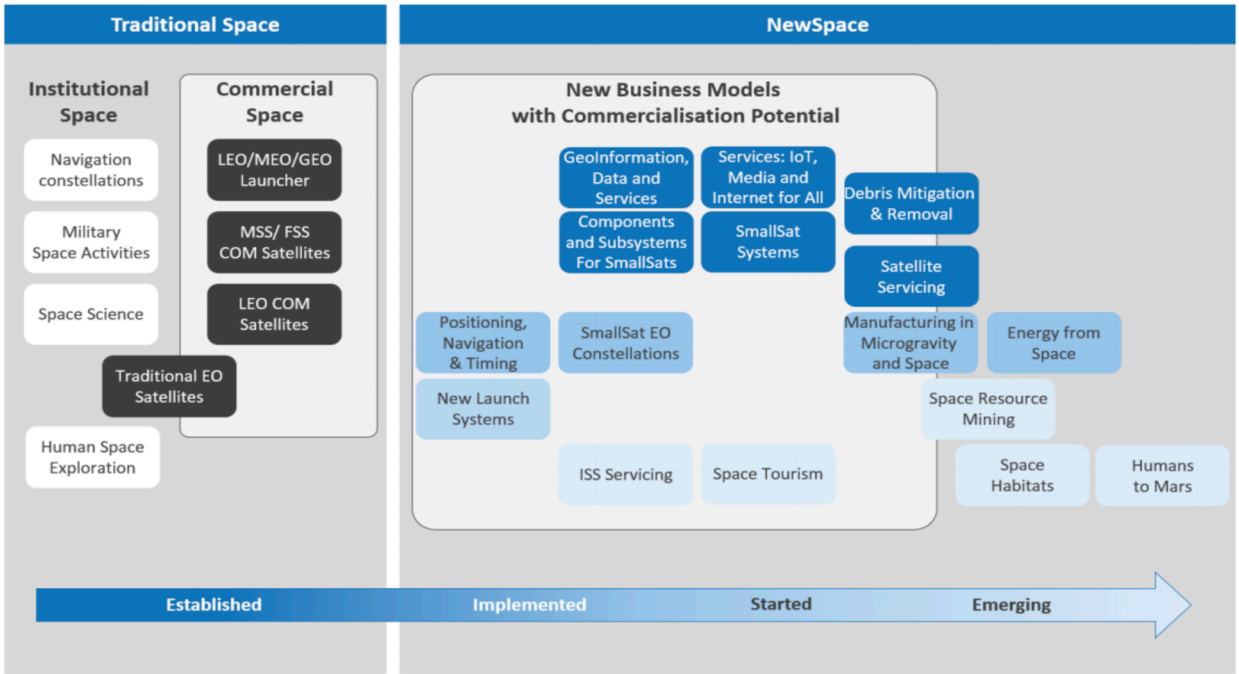


Fig. 1: Current and future space business fields
(“New business fields at the interface of the space industry and digital economy”, Spacetec study for the German Federal Ministry of Energy and Traffic)

Geodata and geoservices will play a dominant role in the swiftly expanding fields of machine-to-machine (M2M) communication, autonomous driving, artificial intelligence (AI), and Internet of Things (IoT), just to name a few of the emerging technologies poised to be enhanced by blockchain technology.

To take advantage of opportunities arising in these two important and fastest growing markets, we initiated the CBN Foundation, a non-for-profit foundation designated to guide the CBN community The Foundation will develop, generate and introduce to the earth observation (EO) industry smart contracts represented by 'CloudEO tokens'. To participate in the CBN, you need to acquire a CloudEO token.

Established in 2017, the CBN Foundation will incentivize geodata, software, and analytics suppliers to make their products and services accessible to the CBN community. On the CBN geodata will be processed in a decentralized manner, involving modules and processing capacities of diverse participants, to be managed, matched with other data, analyzed, and packaged into value added geodata and ready-to-use geoservices. Capabilities of the smart contracts will become more proficient over time and can cover the whole process. However, until such time, the complex data management and orchestration will initially be assigned to a credible steward and to accredited developers from the CBN community, who are already using the existing management platform licensed to the Foundation by one of the early supporters of the Foundation, CloudEO AG. The Foundation will maintain a public ledger that records each token given out to data contributors, users and developers.

The current sales model is already partially token-based, however operationally, it is centralized process and the tokens are not tradable. The newly issued CloudEO tokens are both an incentive and a reward for geodata, analytics and geoservices suppliers to participate in the eco-system. Allowing and enabling technical, legal, and commercial transactions to occur within one automated step will be essential to save operational efforts and generate new micro-geoservices feasibly - a necessity for all IoT applications and enabling crowdsourcing of geodata.

The token fundamentally simplifies all processes in the value adding chain. Providers of geoservices can offer their assets based on tokens to the participants in the community. Participants can consume those services for their own usage (consumer). Alternatively, they can use the resources to produce new geodata and analytics and offer those back to the community through certain APIs. Using tokens again makes this process easy and can lead to a rapid growth of available geoservices. Consumers can be individuals as well as SMEs, large corporations, governmental bodies.

2. THE SATELLITE EARTH OBSERVATION MARKET & APPLICATIONS

Today, the Earth observation industry, and particularly the geoservices utilizing EO data, is the fastest growing market within the satellite economy. Earth observation (EO) refers to the use of remote sensing technologies to monitor land, marine (seas, rivers, lakes), and the Earth's atmosphere. Satellite-based EO relies on the use of satellite-mounted payloads to gather imaging data about the Earth's characteristics. The first essential parameter for satellite Earth observation technologies is the type of information provided:

1. passive remote sensing: the satellite's remote sensing payload - monitoring the energy received from the Earth due to the reflection and re-emission of the Sun's energy by the Earth's surface or atmosphere. Optical or thermal sensors are commonly-used passive sensors; and

2. active remote sensing: the satellite is sending energy to Earth and monitoring the energy received back from the Earth's surface or atmosphere, enabling day and night monitoring during all weather conditions. Radar and lasers are commonly used active sensors.

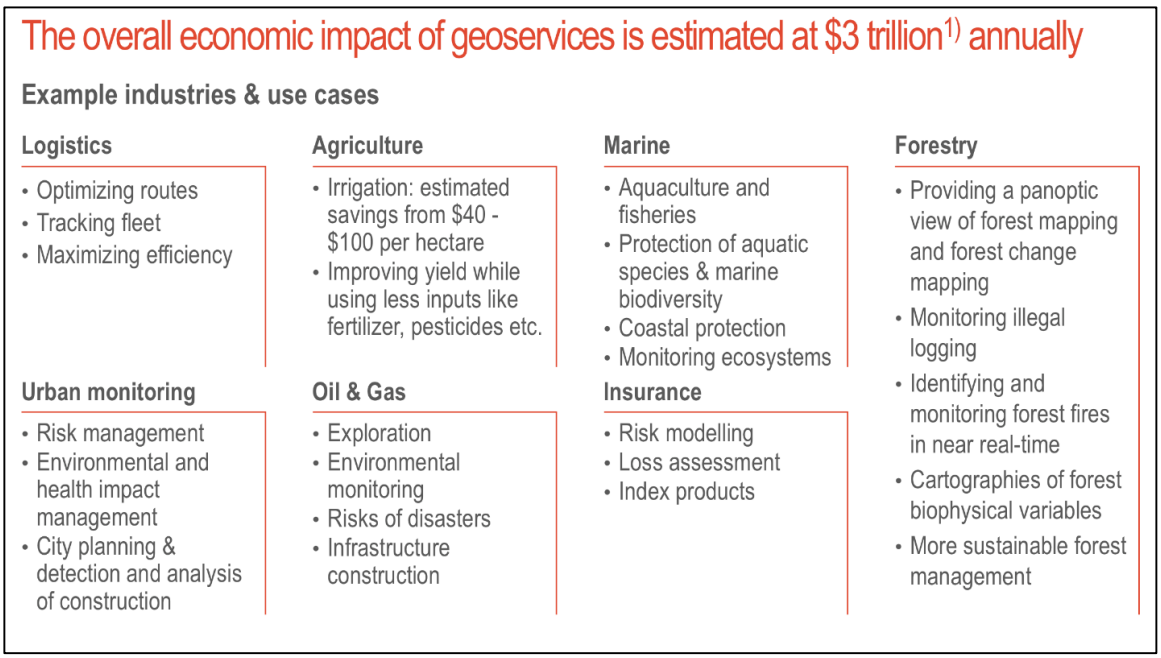


Fig. 2: Example use-cases of Earth Observation
(1) Estimated economic impact of Geoservices on the world from BCG report "The Geospatial Growth Engine"

3. DISRUPTING THE INDUSTRY – LOWERING BARRIERS

Today's Earth Observation market is primarily driven by projects commissioned by governments and large enterprise. High cost barriers and centralized processes prevent individuals, SMEs, and many industry sectors from using geoservices. High costs present substantial entry barriers for new developers and prospective customers, and as a result, the geodata market has been predominantly project-driven, with governments and large organizations and enterprises being the main customers. The main stakeholders of the existing Earth observation industry are providers of remote sensing imagery, provider of geosoftware and value-adding companies. The latter are using the software and images to serve their customers from various industries. In most cases, they currently create for them highly customized one-off solutions.

In recent years however, significant efforts have been made to educate and access prospective industries and market sectors seeking greater efficiencies through standardized and repetitive geoservices. The ESA and NASA alone have invested an estimated €25b over the past 20 years to stimulate market readiness for geoservice adoption.

And now, the access economy and blockchain technology promoting the use of shared resources, enable production and access to geoservices without the prohibitive high-cost of entry.

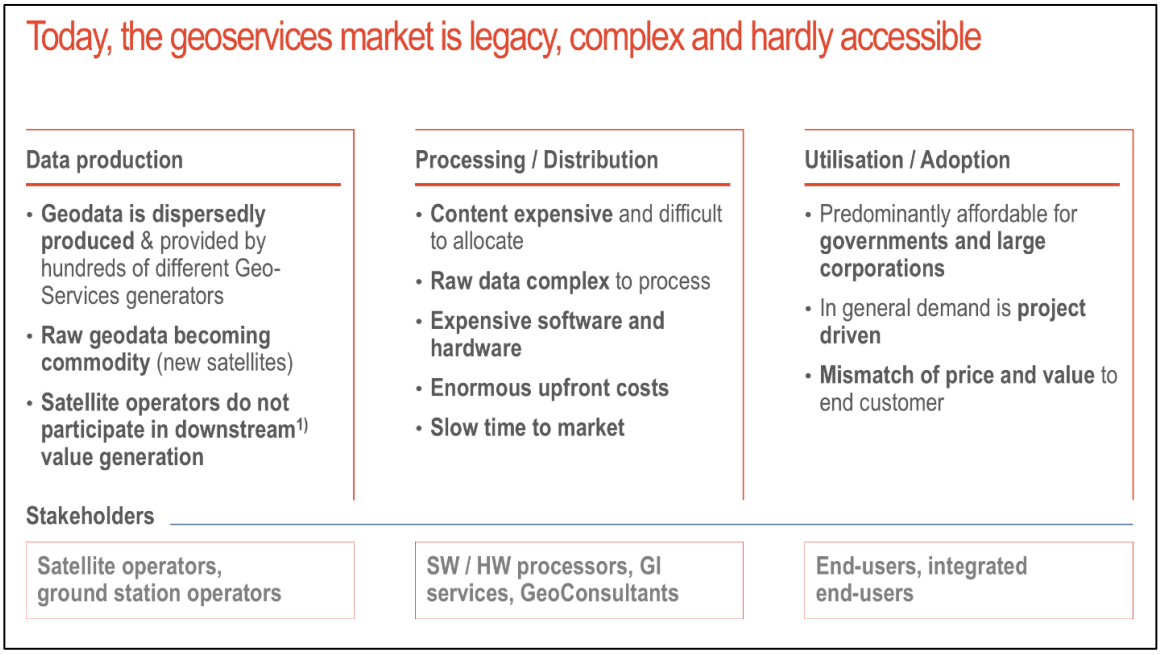


Fig. 3: Shortcomings and Growth Inhibitors of the Traditional Geoservice Market

3.1 Conditions Ripe for Industry Disruption

The current production of value added services is typically monopolized by few big players. Only they can afford to implement the complex workflows for data acquisition and processing, experts are required in the sales process to educate the customers and high upfront investments are necessary, as most data, desktop-software and proprietary IT need to be acquired with perpetual licenses. This significantly limits the number of available geoservices. Effective industry standards are few and far between, and many transactions are complex and not automated.

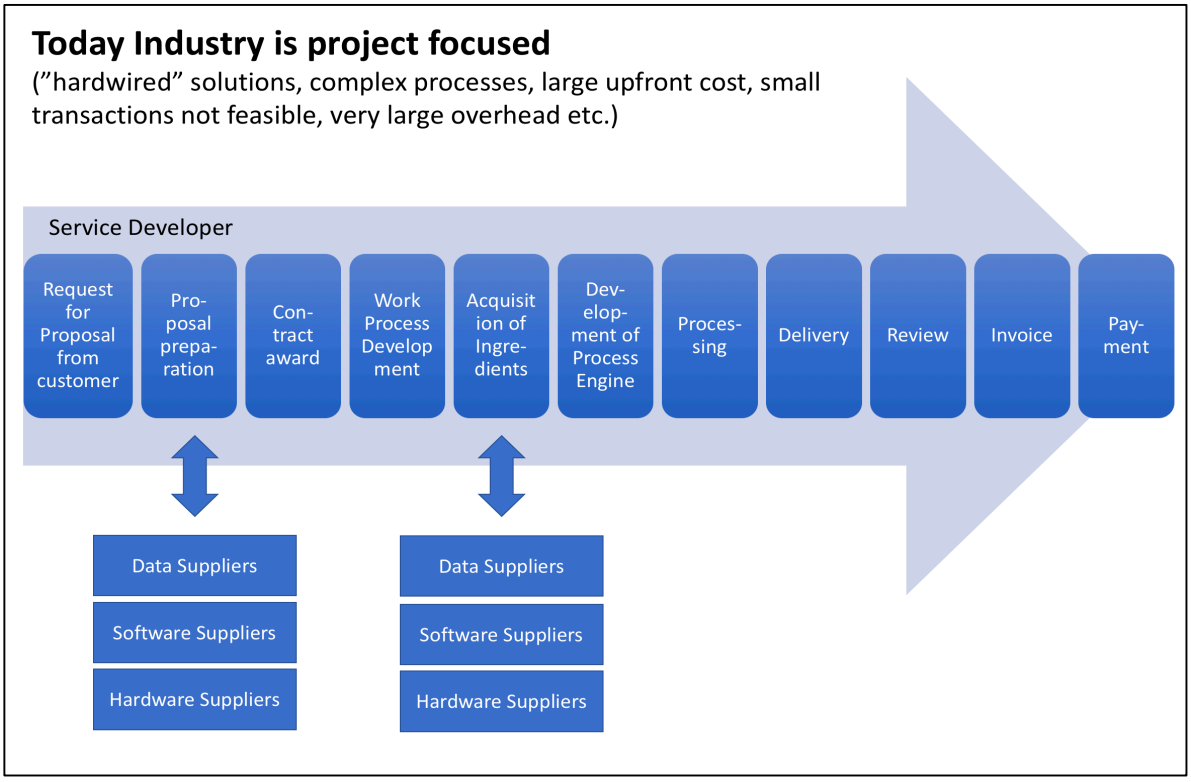


Fig. 4: Example of Typical Project Lifecycle of a Value-Adder in the Earth Observation Industry

Disruptive 'new space industry' companies, such as CloudEO, have already started to unsettle the existing market by applying principles of the access economy to the geoservices by establishing an efficient marketplace, wherein customers can use a standardized API to access services and a sophisticated orchestration system. This allows to break up the current monolithic workflows in single building blocks or micro-geoservices and organize their execution on decentralized systems. As a result, entry barriers are significantly lowered, while creating and offering new commercial geoservices becomes economically feasible. With this architecture, it is immediately possible that many professionals can contribute with their specific knowledge to produce quickly an exponentially number of geoservices. They will be the motor for the rapid growth of the marketplace.

However, processes for setting the contractual frameworks, metering performed tasks, reporting, invoicing, and payment handling requires significant effort, and remains as a barrier precluding potential small-volume or less-savvy customers from leveraging the benefits derived from geoservices. Currently, there is no contractual framework for crowdsourcing of geodata.

In contrast, the CBN will introduce a standardized means of transacting with geodata and geoservice providers using smart contracts. The CBN aspires to be distributed and over time to reduce its centralized management and orchestration systems. It shall run on computers provided by volunteers around the world without a central database, preventing any potential hack or shut down of the CBN. Its participants may access and send any form of digitized value – from geodata and analytics to intellectual property – directly and safely between and amongst participants without the necessity of a bank, credit-card company, government, or other intermediary.

The CBN's systems provide profound opportunities for innovative companies and institutions who desire geodata and analytics, want to streamline processes, introduce smart contracts, increase their customer base, enter new markets, and create additional value for themselves.

3.2 Harnessing Unused and/or Underutilized Geodata

Transferring the success of sharing economy to geo-sharing, vast opportunities exist for harnessing and applying geodata, software and knowledge that are currently unused and/or underutilized:

1. Petabytes of Earth observation imagery are stored away, hidden in archives, rarely having been used – if ever;

2. Geosoftware and the suitable hardware, is expensive to acquire and maintain, and are idle much of the time, waiting for the next project or mission; and

3. In every value adding company, and through each research project, knowledge regarding effective remote-sensing data handling and reliable information extraction is acquired. Until now, there has been no viable means by which to generate business with these building blocks as the knowledge was typically held within the company, and often even within a small project group.

3.3 Decentralized Production and Access to Geoservices Via Smart Contracts

In the context of a blockchain, 'smart contracts' define the rules under which transactions on the blockchain are processed. A transaction, such as the exchange of a token, can be withheld until a certain condition is met. For example, a buyer of the geodata inserts the token into the smart contract-based interface, the availability of the requested data is verified, and concurrent with data delivery and acceptance, the token is deposited into the seller's account.

Blockchain smart contracts work in a fully decentralized manner so that every node of the blockchain system not only has the same consistent database on which transactions take place, but also run the same smart contracts. Thus, each rule of each transaction is verified by the whole network rather than by a single clearing entity.

The Foundation will encourage increased usage of geodata and this will drive revenue into the geo-sharing ecosystem. To this end, the most imminent task of the CBN is to simplify the technical, legal and commercial process to bring geoservices and micro-geoservices to the market. This will drive the number of available geoservices and consequently push the demand and business for all levels of geodata in the value adding chain, including the primary EO imagery. With this setup producers can concentrate on their specific knowledge in creating analytics, apps and geodata, get easy technical and business access to all ingredients they need and are ensured to keep their IP and generate revenue with their assets.

Although hosted environments make it already much simpler to provide these geodata and analytics to third parties as compared with deploying them in heterogeneous, proprietary IT environments of customers, the real push will only come if providers of these geoservices can easily monetize them without incurring too much overhead – yet still rest assured that their intellectual property is secure.

Unlocking the power of archived satellite imagery will be an additional way the CBN can contribute to the development of applications. Here too, the CBN needs to secure the intellectual property and the commercial interests of both data provider and application developer. To incentivize providers who supply developers with low-cost and easy access to data, software, and IT, this early-stage support will be reflected in appropriate business opportunities for the suppliers, upon generation of revenue by the services.

As previously stated, the inclusion of commercial terms and financial transactions within the smart contract is a prerequisite for an efficient geoservice ecosystem. The smart contract CBN token system will enable efficient decentralized transaction handling, securely and transparently. This will be critical element making geo-services an essential part of the future IoT.

3.4 Ingredients for the Development of Commercial Geoservices

The most evident demand for the development of new geoservices is the easy access to geodata and the possibility to build upon the knowledge of other experts. Easy access includes a simple technical access, but much more it requires license and low-cost models. The sharing concept where on a controlled platform underused resources as archive imagery and locked-in expert knowledge can be made available for development purposes at low costs are key.

1. Archived geodata: Beside real-time imagery, archive data are a highly valuable and at the same time underused resource to understanding global changes and incidents, in generating reliable statistics, and of great benefit to research and development being conducted in a variety of sectors.

2. "Locked-in" expert knowledge: Currently, few enterprises are capable of capitalizing on the wealth of remote sensing data, as few possess the necessary geo-IT infrastructure and expertise to execute the full value-adding chain: from sensor data to vertical domain knowledge. Additionally, solutions developed by (or for) these enterprises are often highly specific and applicable to their unique needs. Developing analytics that could be more widely shared by other companies in the field would require additional effort, from generalizing the tools to licensing and marketing, while generating very little revenue to offset the development cost. For that reason, such analytics are typically not available in the marketplace.

4. BUILDING THE CLOUDEO BLOCKCHAIN NETWORK (CBN)

We firmly believe that the satellite Earth observation industry has potential to grow into a huge market, affecting almost every aspect of human life, on the condition that the EO industry can overcome significant inefficiencies and entry barriers.

Introducing smart contracts and the blockchain technology is a natural next step in the industry's development, advancing the ability to unleash a yet unseen market disruption and immense growth.

4.1 Easy & Decentralized Access to Geodata & Geoservices as Run by CloudEO Today

An entirely decentralized network does not currently exist in the industry. The disruptive CloudEO ecosystem has come closest to offering democratized access to geoservices, as it effectively serves as a marketplace platform to control and manage an otherwise decentralized operation of distributed data archives, analytic modules, and processing nodes.

Technically, fully distributed geoprocessing workflows can already run automatically, however contracting, metering, monitoring and management of financial transactions is performed centrally by the platform.

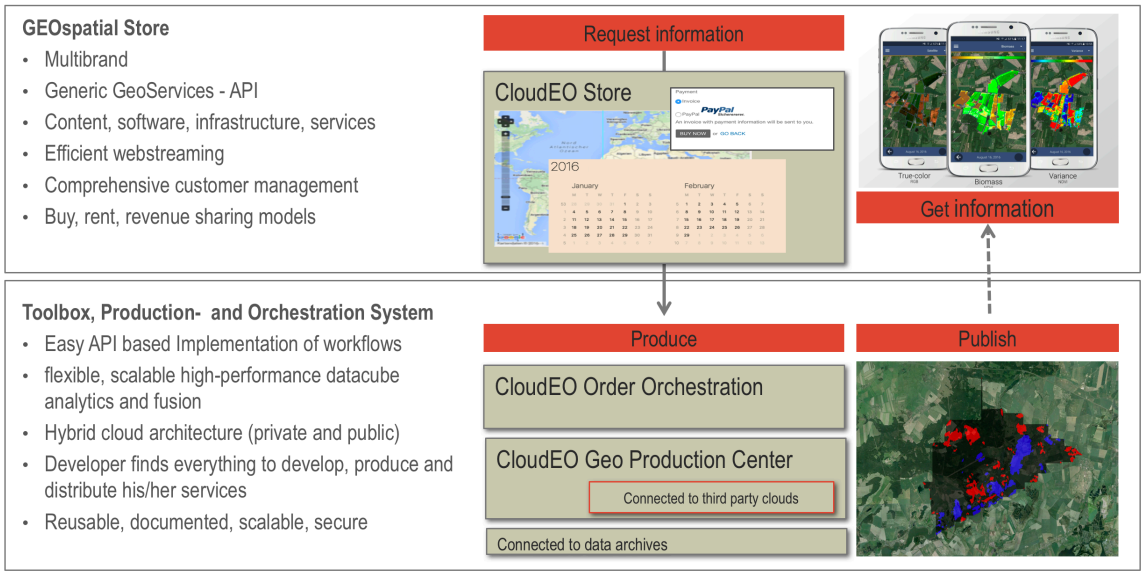


Fig 5: Overview of the On-demand Production of Commercial Geoservice

The following chart describes the processes on the CloudEO platform:

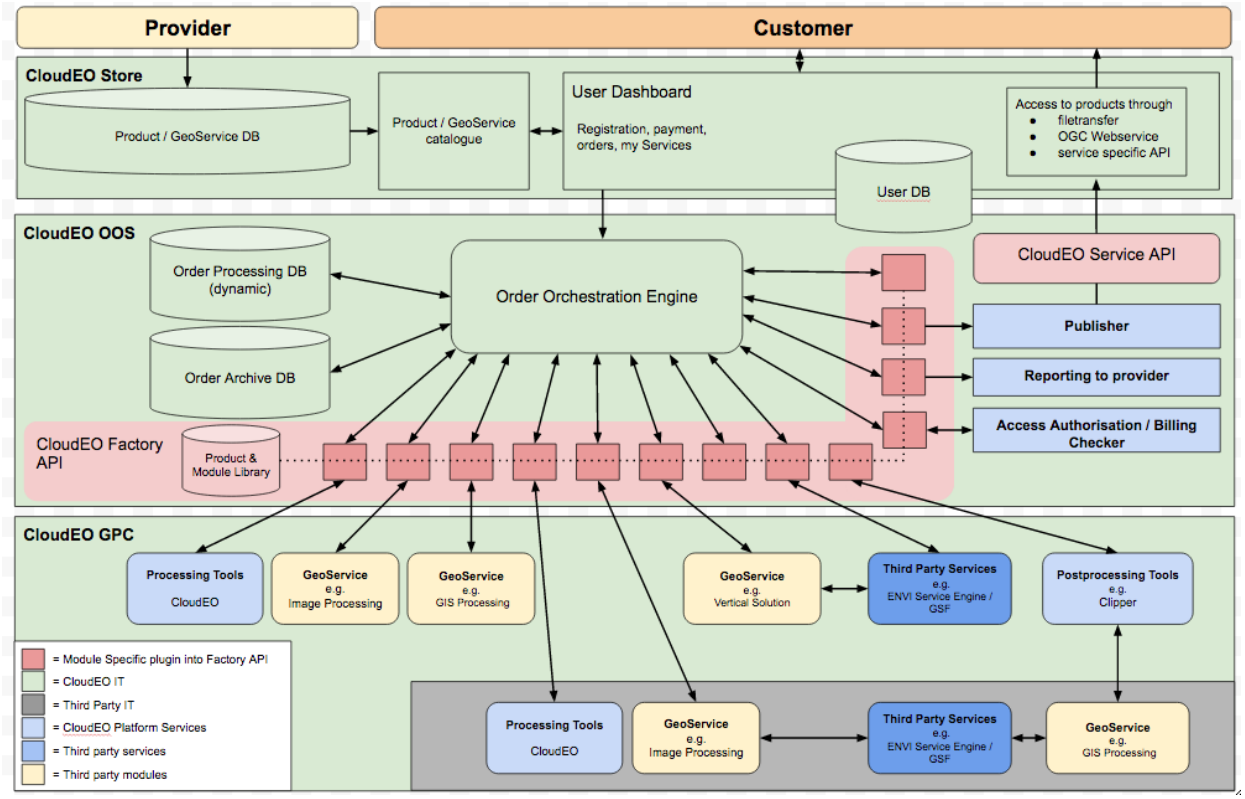


Fig. 6: CloudEO Store, Order Orchestration System and GPC with Distributed Processing Nodes for Decentralized Multi-Step Workflows

The CloudEO Store acts as the central interface to the customer: catalogues of existing products and services; an interface through which parameters may be set and options selected; The geoservice API which gives customer access to selected services. It is also hosts the central registration interface and provides a dashboard where customer manage their account and acquired services.

The Store produces an order file (json) for each service sold, which includes technical and commercial parameters of the service purchased. This file is then provided to the Order Orchestration System where it steers the execution of the workflow to produce and deliver the product/service to the customer. According to the individual workflow of the specific product the Order Orchestration Engine communicates to all the different involved modules. These modules are either executed on CloudEO internal IT or in most cases on third party IT. The Orchestration System uses interpreter modules to adapt to the individual APIs of the suppliers of the modules (data archives, analytics, cloud and server capacities etc.) and to reduce the internal complexity.

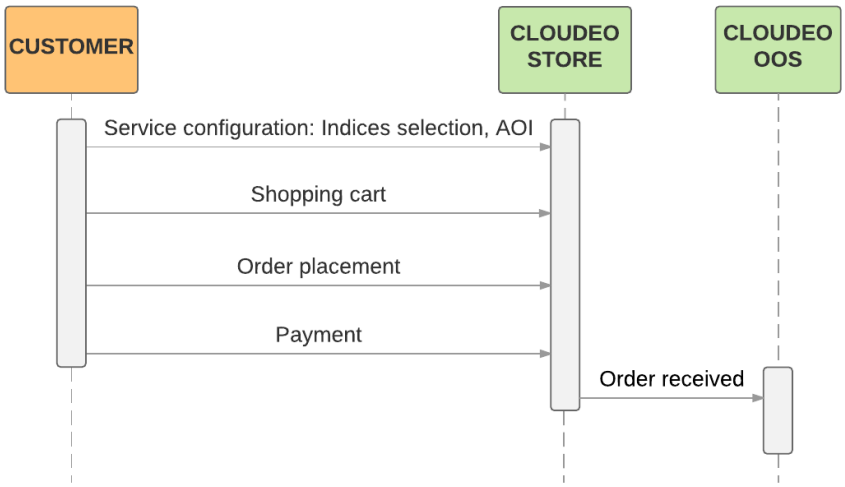


Fig. 7: Customer Created Store Order File Which Steers the Complete Order Production & Delivery

Without tokens, the steps required from the customer are:

1. Select the AOI, indicators, spectral indices, analysis period if required
2. Add product to the shopping cart
3. Review order
4. Choose payment method (bank transfer, credit card, PayPal or invoice). The available payment methods depend on the amount of the invoice.
5. Confirm order

The Order Orchestration System conducts all commercial handling of the production and delivery of products and services. It meters and monitors all transactions, generates reports to suppliers, and provides required input for accounting.

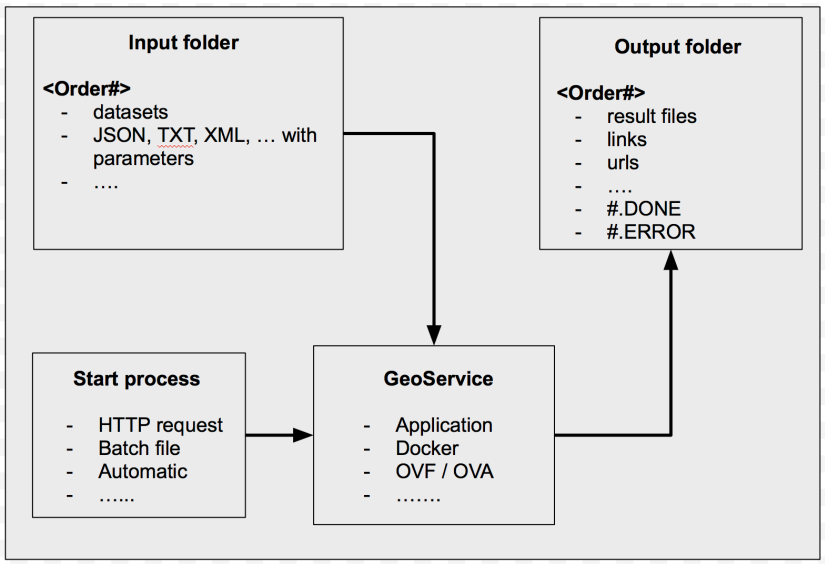


Fig. 8: Integration & Process Workflow for Geoservices

4.2 Creation of a Blockchain-based CBN

In the existing CloudEO ecosystem, there are considerable handling efforts required due to separation of technical, commercial, and contractual handling of an order. The CBN will redefine the ecosystem by integrating the legal and commercial contexts into the technical by introducing smart contracts using blockchain technology. We strongly believe that this, in combination with a community building strategy, will simplify the handling effort and will enable a disruptive growth of the business of geoservices.

The figure below explains how the EO ecosystem transforms from a platform-based economy to the blockchain-based CBN ecosystem.

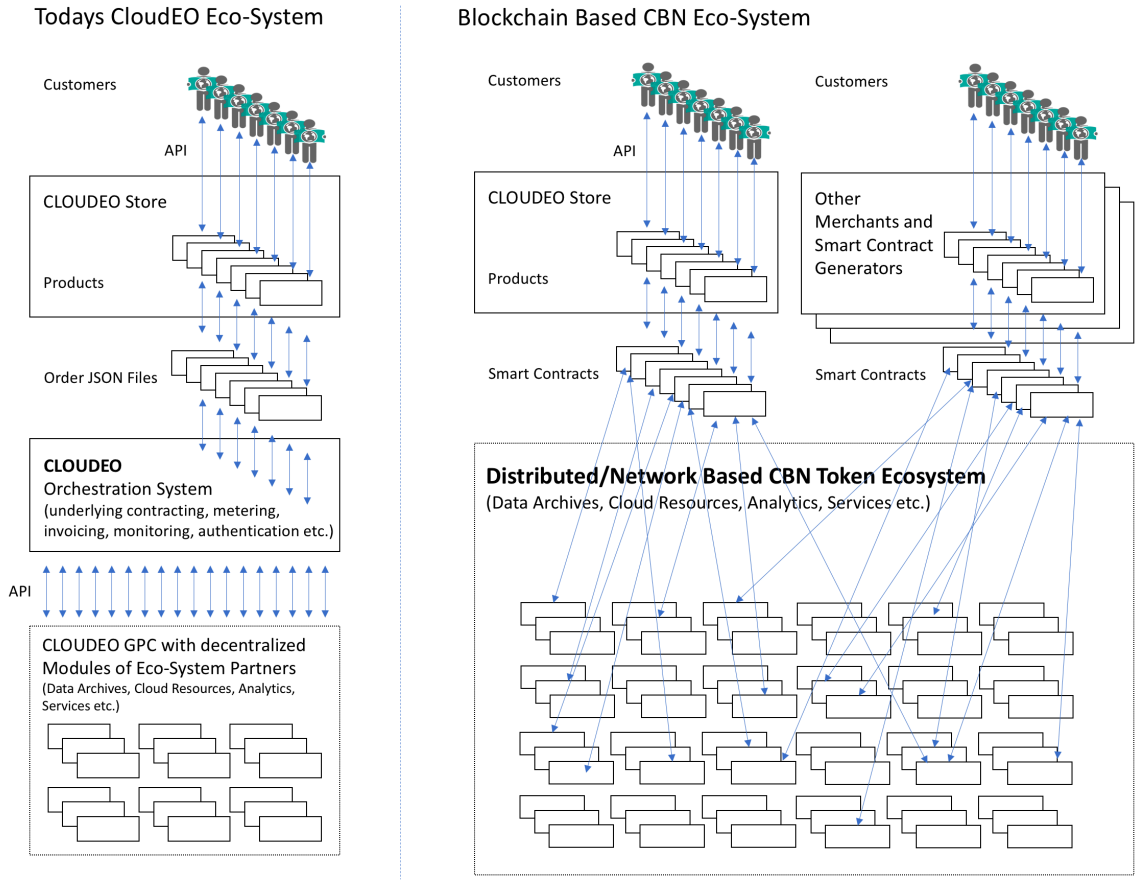


Fig. 9: CloudEO Ecosystem Transformation to CBN's Blockchain-based Ecosystem

As already demonstrated, as the smart contracting language and library of modules grow and develop, smart contracts will replace the need for centralized orchestration systems. This will lead to major savings in metering, monitoring, and handling of the commercial aspects of geoservices. However, for a certain period centralized orchestration will be required for more complex work processes and the ecosystem will operate through merchants representing automated smart contract generators like CloudEO Store or also individual brokers of geoservices. This system will run in cooperation with orchestration systems and decentralized modules using smart contracts in the blockchain. Over time, 'oracles' may manage the more complex operations involving external real-time data and e.g. quality assurance services.

The Foundation's initiative to build the CBN anticipates that CloudEO AG, as one of its early supporters, will act as a responsible and impartial steward, also licensing or transferring certain of its assets, know-how, market access, and personnel to the CBN.

4.3 The CBN Architecture

The construct of the CBN has three main aspects: technical, commercial and legal. If either of these three access modes is not clearly defined, the CBN will not effectively scale. The CBN ecosystem clearly necessitates a decentralized network.

Having been involved in the Earth Observation and geoservices industry for several years, we determined that:

1. A non-for-profit Foundation is the best entity through which to consolidate the satellite Earth observation industry and lead the efforts of building the CBN;
2. For the initial five years, the Foundation shall be served by a commercial steward to care for legal and commercial transparency of the network and to provide limited administrative services to the Foundation;
3. A broad community will be built from representatives of diverse industries; and
4. Developers and volunteers who are dedicated to the course of unlocking the huge potential of the satellite technology, geodata, and EO in particular, will be the initial members and contributors to the CBN.

In the CBN, transactions between all the participants shall be transacted directly and governed by rules and regulations formulated through "smart contracts". Tokens generated by the Foundation through an initial Token Generating Event (TGE) shall represent their holders' rights to participate in creation of the CBN and generate value for all the CBN participants through additional development and promotion of the Network and the solutions provided within.

4.4 CloudEO Token Purpose Statement

The CBN Foundation will introduce tokens to the orchestration engine and earth observation (EO) data-marketplace to secure all transactions, engage the community, and enable new business models.

By linking all transactions taking place within the marketplace to a smart contract on a blockchain, the transfer of ownership of the data at hand is verifiable and ensures that the buyer obtains exactly the data requested. Additionally, the payment for the data is performed using tokens, representing value, which makes certain that the seller is paid. Whenever a transaction is initiated in the marketplace, e.g. purchasing or selling of EO data, the specifics are written into a smart contract.

The smart contract resides on a blockchain, storing the full history of ownership and automating payouts. This brings further benefits to parties in the transactions: the ability to make installed payments, or payments in escrow, or conditional payments based on the quality of the data. In cases that are more complicated or intricate, an 'oracle' service external to the blockchain may be required to provide input to the smart contract, and must be designated prior to initiation of the transaction.

The token-based ownership and payment system engages all users, from content production, through data processing and packaging, to end users in new ways compared to the previous standard-model of

marketplaces. This is achieved through the full ownership of the tokens, without the actual involvement of any third-parties or escrows.

A user in possession of a CloudEO token is free to use, sell or transfer the token as they see fit. Since users control their tokens, and tokens have real value which is closely related to the value generated by everyone on the platform, it is the strict requirement that every token holder participates in and contributes to the CBN ecosystem improving, delivering, advertising or otherwise facilitating the delivery of the services and processing of content provided therein. For example, even though every token holder does not have access to a satellite or provide geodata, users can generate data by photo or video requested by the marketplace using smartphones or drones, may process data sets using computer vision, enable machine learning, or simply by offering their time (see Amazon's Mechanical Turk). Also, users may use pre-processed data in their own apps or other services. Or users may distribute and advertise the services. All these actions, and countless others, will contribute to an increase in the ecosystem's value.

By engaging the community in building and contributing to the platform, the ecosystem will become more valuable for all participants, however. Not only will the indirect value be created, but the usage of tokens enables new business models and allows for freelancing photographers, data scientists, drone pilots, and many more to be rewarded immediately for the work they are doing. For example, when an app developer is using data for an end-product, and that end-product is sold for a monthly payment, a smart contract can be set up to distribute that payment according to an agreed upon structure between the data producer (e.g. a weather satellite), the data processor (e.g. CloudEO orchestration engine) and the app developer. See section 6 on legal and operational risks.

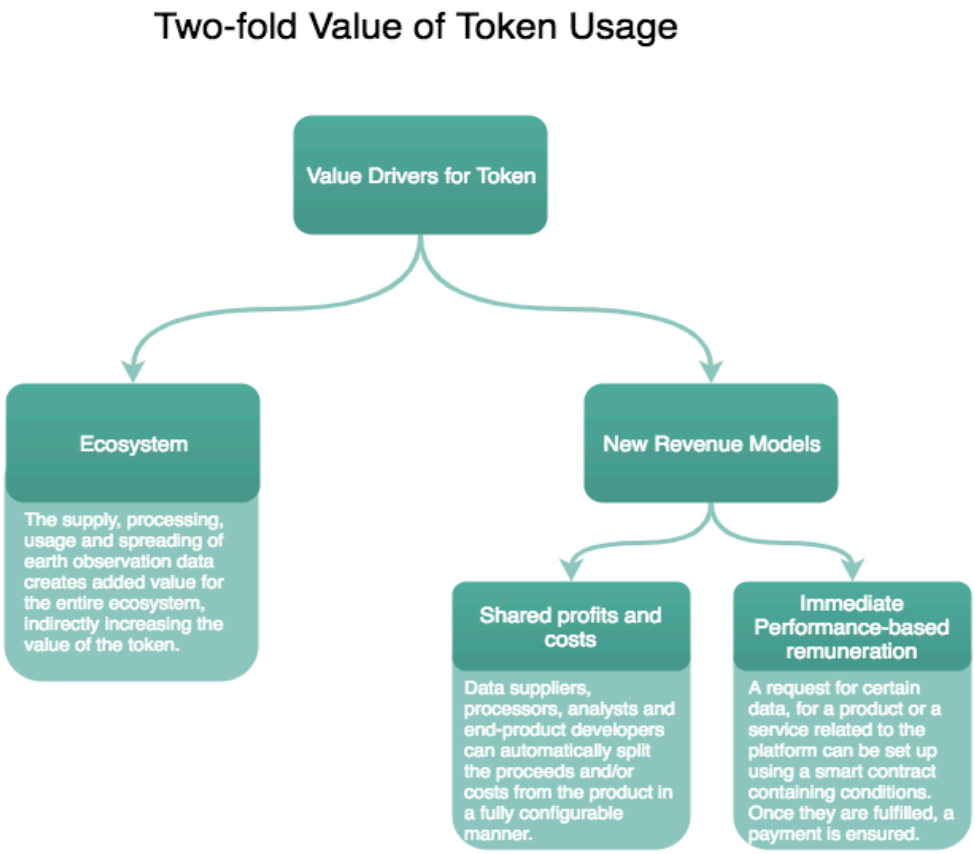


Fig. 10: The CloudEO Token Serves Multiple Purpose

4.4.1 Why CBN Will Not Use Bitcoin, Ether, or Other Cryptocurrencies?

While CloudEO token will be generated on Ether, the CBN will not use Ether, Bitcoin or any other virtual currency. On a technical level, the CBN Foundation is introducing the smart contract-based system because the complexity of the requirements is much higher than what could be achieved using another cryptocurrency. Although it would be possible to decentralize the transaction system and thereby avoid certain fees by using existing cryptocurrencies, there are functions of the ecosystem and the trading of data which are not programmable using the scripting language of, for example, Bitcoin. Thus, specific smart contracts are used to model the data published, processed and traded with on the platform. To keep a record of who owns what and of who has the right to purchase and access data, the smart contracts contain representations of tokens. The tokens are linked to public keys used to identify the members of the community and the tokens can thereafter be used for any type of transactions involving earth observation data. Customized smart contracts can be set up to handle more complex profit- or cost-splitting depending on the revenue model of the trading. All these requirements are not, in a fully transparent and decentralized way, encoded by Bitcoin or Ether themselves.

Another dimension of why a new token is being used is that one of the purposes of the token is to be specific for earth observation data and for the platform at hand. Using a general currency would be counterproductive for incentivizing the community at large to participate and would not lead to the increase in value of the ecosystem. Therefore, the Foundation is integrating the token deeply within the functionality of the platform; making the token a requirement platform usage ensures value for users.

4.5 Technical Description of a Use Case – EXAMPLE: Agriculture

A large corporation within the agricultural industry is involved in the cultivation of millions of hectares of farm lands globally and builds a wide set of technological solutions for optimizing their returns. By having real-time imagery of the crops or livestock, farmers can improve how they sow, reap and otherwise interact with the lands. When the area simply too big is for a farmer or even a team of farmers to control for disease, fires, bad harvest, etc., then the only possible solution would be through satellite (or potentially drone[1]) imagery.

A satellite owner takes footage of the entire earth and thus provides the raw data for the specific region in which the agricultural corporation is acting. The raw data consists a high-resolution image file and some meta-data such as coordinates and a time-stamp. The satellite owner wishes to sell the raw imagery without losing control of the data and making sure that the data is paid for. To achieve this, a smart contract is created on the CBN marketplace, open to other users to sign. The smart contract specifies:

1. What is being sold: Raw data of
2. Location = $\{\boldsymbol{X}, \boldsymbol{Y}\} = \boldsymbol{x_1}, \boldsymbol{x_2}, \ldots \in \boldsymbol{X}, \boldsymbol{y_1}, \boldsymbol{y_2}, \ldots \in \boldsymbol{Y}$
3. Quality attribute = $\boldsymbol{Q_i}$, where $\boldsymbol{i}$ is the index of the image in question, unless homogenous quality
4. Frequency of update = $\boldsymbol{f_i}$
5. What further services or products apply to the item: Analysis, packaging and sales of the data at cost = $\{\boldsymbol{c_{Analysis}}, \boldsymbol{c_{Development}}, \boldsymbol{c_{Sales}}\}$, which can equal a percentage of expected returns from end sales or another form of profit-sharing structure. Each service is governed by inequality constraint $\boldsymbol{g_j(Z) \geq k_j\ with\ j}$ **the number of services required**, specifying if a purpose is fulfilled or not.

[1] Crop surveillance by drone is problematic for very large fields since it is illegal, in many jurisdictions, to take photos or video from a drone, or even to fly a drone, if the pilot doesn't have visual contact with the drone.

6. Time frame of contract: [$\boldsymbol{t_{start}}, \boldsymbol{t_{end}}$]
7. Additional conditions to be specified (e.g. privacy requirements)

Upon signing the contract, the satellite owner commits several tokens to the contract which can be used to access the raw data.

A data scientist sees the smart contract on the CBN marketplace and applies for it as a freelancing data scientist with previously performed projects, her github profile, curriculum vitae, etc. If the profile meets the conditions of the smart contract, she receives a token and can access the data. She analyses the raw image data using computer vision and machine learning algorithms and thus enriches the value of it. At this point she can either comply with the already signed contract, or she can create a new one, selling her intellectual property (IP) rights by way of smart contract which would have the following specifications:

1. Reference to original data = $\boldsymbol{addresses}: \boldsymbol{a_i}$
2. Current cost-/profit-sharing structure $= \boldsymbol{CP_{address}}$
3. Result of algorithm, knowledge or other IP to be sold, hashed = $\boldsymbol{sha256(msg)}$ where $\boldsymbol{msg}$ is the describing document.

For our example, we will assume she complies with the first contract, and other service providers apply to the smart contract.

A programmer that builds apps that enable users to access imagery of their lands and analytics thereof, also fulfills the constraints of the smart contract created by the satellite owner and builds an app, based on the raw imagery and the analytics engine built by the data scientist. The app provides a dashboard and a usable interface for farmers to relevant data. For the performance of this service, the designated number of tokens is delivered to the app developer, or another type of remuneration-structure is offered such as pure profit-sharing based on percentages as described above.

Finally, a sales person with connections to the agricultural industry sees the product, the contract and intends to sell it for a commission to the agricultural corporation. The person signs a transaction to the contract, specifying the details required for fulfilment of the constraints and receives (if fulfilled), access to a prototype or trial version as well as the rights to sell the product.

After the product is sold, based on how the payment structure is built into the smart contracts, the tokens can be returned to the service providers in the chain of enrichment, or payment through another form of cryptocurrency takes place.

At each stage of the process, each participant can ensure the security of their contribution, whilst resting assured that the contract they signed in the beginning is being followed. Should a conflict arise, based on smart contracts, the Blockchain Arbitration Rules described below will be activated:

The Blockchain Arbitration Rules are rules the parties have agreed upon in their legal contract. They shall apply in case of a dispute. Those rules are based on the UNCITRAL Arbitration Rules and have been developed by Codelegit in cooperation with IT lawyer and Blockchain expert, Dr. Markus Kaulartz. The advantages of the rules are, on one hand, speed, because they are tailored to work together with the Arbitration Library and all communication is done via e-mail or any other form of electronic communication and secured via hashes written in the Bitcoin and the public Ethereum Blockchain. On the other hand, the Blockchain Arbitration Rules shall attract arbitrators who are specialists both in legal and technical questions.

In our example, one party which considers the other party to be in a breach of the legal contract pauses the execution of the Smart Contract by triggering a function *pauseAndSendToArbitrator()* in the Arbitration Library. This function automatically notifies a so-called Appointing Authority defined in the Blockchain Arbitration Rules. The Appointing Authority then proposes an Arbitrator who reviews the statements of claim and defense, decides upon the case and finally delivers his arbiter award to the parties. According to the award, the Appointing Authority either resumes the Smart Contract, modifies its execution or ends it permanently, depending on the resolution. The arbitrator is paid with funds available in the Smart Contract in dispute.

The integration of decisions by human beings – the arbitration, known from the offline world – transforms a false performance based on an erroneous piece of software – the Smart Contract – into a legally correct performance. At the same time, this kind of arbitration preserves all the advantages of Smart Contracts, because a dispute does not have to be brought before a state court, but can be solved by an expert arbitrator by modifying the performance, as seen in the figure below:

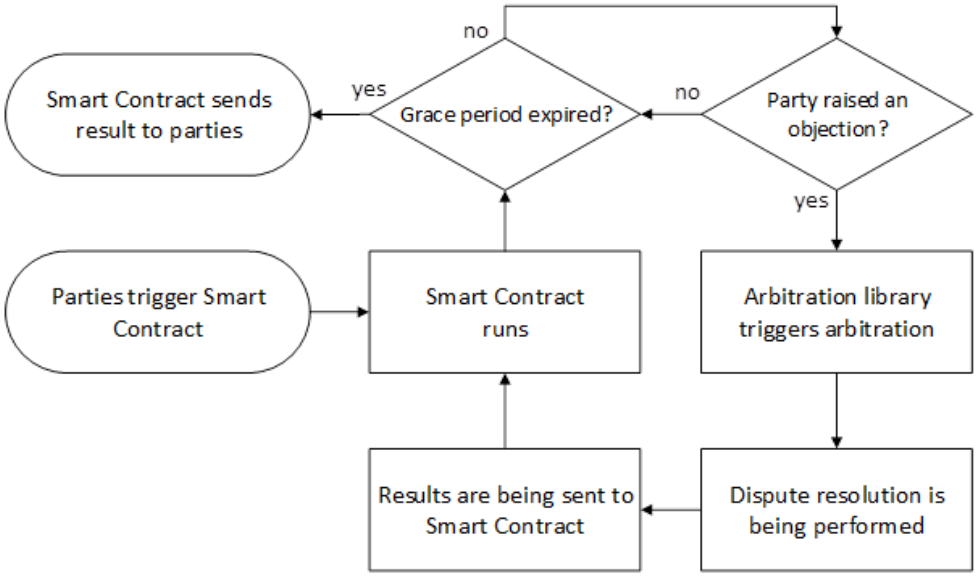


Fig. 11: How Blockchain Arbitration Rules Apply to Smart Contracts

4.6 The Token Generation Process

The token will be generated here at a token generating event following the ERC223 standard and using the token pricing method announced prior to the TGE. For other details please see the TGE page on github. The total supply of tokens generated will be equal to $1{,}1259*10^{9}$. All tokens will be held by the CBN Foundation and issued in batches as described.

- The Foundation and community verifies claims of provision of earth observation data and records issuance in public ledger
- The Foundation sends coins from reserve account to claimant (visible in the blockchain)
- The claimant spends and/or circulates coins using wallets and exchanges

- The $1{,}1259*10^9$ supply of tokens in the token generation process represent earth observation data, contributions to the platform and infrastructure as well as other necessary functions of the ecosystem.

4.7 Methodology for Token Distribution

In September 2017, the CBN Foundation will generate $1{,}1259*10^9$ tokens here on the TGE's page (https://cbn.foundation) which will be sold as CloudEO tokens. The token will have a subunit called Cleo where 1 CloudEO token equals 10^6 Cleos.

Of these $1{,}1259*10^9$ tokens, the Foundation will reserve 28.5% for distribution to stakeholders of the existing ecosystem - individuals and entities, who have contributed to the ecosystem either as geodata or software providers, geoanalytics developers, distribution partners, service providers, or those in other professional capacities. The distribution schedule is available on CBN Foundation webpage. CloudEO currently has approximately one hundred partners in its ecosystem. The allocation of tokens to the ecosystem will start in September 2017. The Foundation will also reserve 7.5% for entities and individuals providing professional services in relation to the TGE.

Additionally in September 2017, in exchange for digital currency, the Foundation will distribute to early supporters up to 5% of all CloudEO tokens allocated for the TGE. To become an early supporter, please register here or send your inquiry to token@cbn.foundation.

Later in the Fall of 2017, the Foundation will distribute 40% through a token generating event (TGE) to the international blockchain community, satellite and geo-enthusiasts, and individuals and enterprises willing to participate in building and developing the CBN, with the goal of enabling and promoting the use of geodata and geoservices on a decentralized blockchain network. The price for the tokens distributed through the TGE will be announced before the TGE using a transparent valuation method. The token distribution will take place here on the TGE's page (https://cbn.foundation).

Upon completion of a successful TGE, the Foundation will use the remaining tokens to compensate members of the CBN community, who may subsequently earn tokens through data contribution, crowdsourcing, development work and professional and other services delivered to the CBN in the period from October 2017 through September 2021.

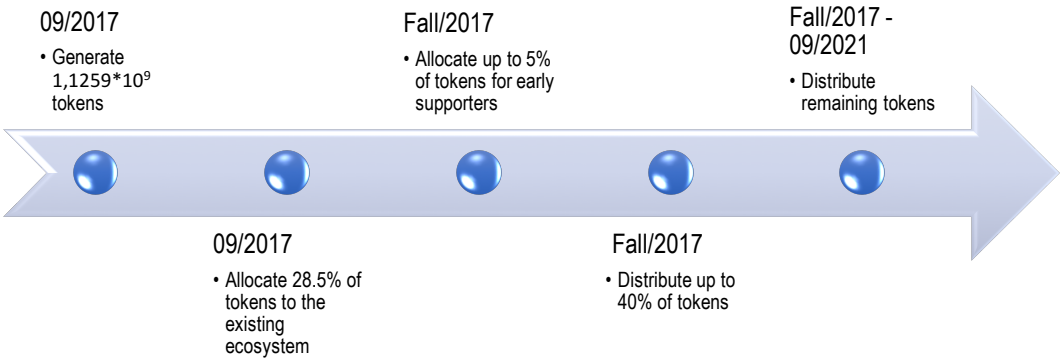


Fig. 12: Intended CBN Token Distribution Timeline

The tokens enable a prosumer to deliver content, analytics, offer processing and storing resources, and other services to the ecosystem and to use the infrastructure – or to create completely new geodata products and services.

The Foundation is a non-for-profit entity. Each token holder undertakes to contribute thru the whole period of holding the tokens by taking actions enhancing the CBN and the CBN ecosystem.

The TGE will occur before any code is deployed on a blockchain, and any profits for the CBN ecosystem may be generated only by efforts of the contributors.

4.8 Use & Distribution of Remaining Tokens

The token has the specific function of enabling access to the CBN and allowing current members of the community to enter into smart contracts, regulated by transactions on the CBN. These functions shall be available only to token holders. Therefore, the acquisition of tokens is made mainly to access this function and not for an expectation of speculative profits or profits from actions of other contributors.

There will be varying returns between token holders, based on their participation in or use of the network. Tokens' holders can earn additional tokens by providing geodata, API, computation effort, editing of data, data storage on the CBN network, or can spend tokens to access geodata, API, data storage, developing geoservices, as well as legal, consulting, marketing services and distributing solutions available on CBN (collectively, the "**CBN Services**"). The rate for each CBN Service will be established by the Foundation.

Provided that the TGE is completed as anticipated in this Whitepaper, for the consideration equal to the Ether amount received for the 20% of all tokens distributed by the Foundation at the TGE, CloudEO AG shall grant to the Foundation a license authorizing the CBN community to use company's know-how and intellectual property associated with its order orchestration system.

Upon receiving such license, but no later than ten (10) days from the TGE, the Foundation shall retain CloudEO AG for the period of four (4) years to act as a steward for the CBN.

There are three main technical stages to establish the CBN:

Stage 1 – ESTIMATED DURATION: 12 months

Developing the Foundation, building the CBN, introducing the tokens as the marketplace internal currency. Developing a smart contract concept, including mining, and defining the development plan for transitioning the existing order orchestration into the decentralized network. Within a month from the TGE, the Foundation shall approve its detailed business plan.

Acquiring a perpetual unlimited license from the steward for the usage of all related IP and technical pre-developments and the commitment to bring its marketplace into the token eco-system.

The Foundation starts to employ staff for administrative, promotional and for technical development work.

Contributing partners (underwriting, consulting, legal, marketing and any other professional services) and the steward will be compensated for their effort by cash according to arm-length principles and by tokens.

Stage 2 – ESTIMATED DURATION: 12 months

Development and launch of the smart contract structure and protocols for interfacing the order orchestration to the decentralized partner modules (data archives, analytic modules, Cloud resources, Service modules etc.).

Performing strengthened marketing and promotion efforts to increase acceptance in the industry and get new members of the community on board.

If sufficient capital can be raised a stimulus fund of €5 million and 1 million tokens will be established to help startups and SME (small and medium enterprises) to establishing useful services in the eco-system to the end users.

The Foundation will continue to build up its own personnel for administrative, promotional work, and for technical development.

Contributing partners (consulting, legal, marketing and any other professional services) and the steward will be compensated for their effort by cash and by tokens.

Stage 3 – ESTIMATED DURATION: 24 months

Development and launch of smart contract end-to-end system, which will eventually replace to a large extend the centralized order orchestration system. Further strengthened marketing and promotion activities to populate eco-system. Increased activities to support startups and SME.
The foundation will further continue to build up its own personnel for administrative and technical development.

Contributing partners (consulting, legal, marketing and any other professional services) and the steward will be compensated for their efforts by cash and by tokens.

All functionalities of the token, including the ones listed in this Section 4.8 above, are inherent in the token and shall occur programmatically.

Each acquirer of tokens understands that there is neither expressed nor implied warranty associated with CloudEO tokens, and all tokens are acquired on an “as is” basis. Acquirers also understand that the Foundation will not provide refunds under any circumstance and that token holder is required to contribute to the development and operations of the CBN Foundation and ecosystem. For further disclaimers please see Section 6.

5. GOVERNANCE STRUCTURE OF THE CBN FOUNDATION

CBN Foundation is a Liechtenstein foundation established for guiding the efforts of participants of the CBN. The foundation's assets are set apart from the private assets of the founders. The foundation has no members, participants or shareholders. It operates pursuant to the foundation documents and the articles of association. We have contributed the minimum capital of the CBN Foundation amounting to CHF 30,000. This amount became the assets of the foundation to which its liabilities are limited.

5.1 Governing Bodies

The supreme authority of the CBN Foundation is the Foundation Council, established and run using best practices for non-profit board formation. It manages the Foundation and represents it in any legal relations.

5.2 Auditors or control agency

The Foundations will appoint auditors from auditing firms and chartered accountants.

5.3 Beneficiaries

All the participants of the CBN shall be beneficiaries and their rights are regulated in the articles of association and by-laws.

5.4 Code Review Committee

The Code Review Committee is made up of core developers in the CBN development team who are responsible for the underlying technology development, API development, product development, etc. Developers shall hold weekly meetings to track project status and communicate progression and requests. Committee members follow the updates and hot topics from the community, maintain communication with the token holders inside the community and organize technical workshops occasionally.

5.5 Finance & Human Resource Committee

The Finance & Human Resource Committee is responsible for the project financial monitoring, developer compensation, operation expenses monitoring, recruitment, talent management, performance review and staff on-boarding and off-boarding. The committee will also make regular disclosures about the use of tokens and Ether, and the development of the Foundation. Digital assets are managed by the Committee or other authorized personnel, including wallet management, transferred digital assets, other digital currencies switches, digital currency withdrawals, etc. All funds in the Foundation's wallet will be used based on the open and transparency principle. A trusted custodian institution monitors the usage of the digital assets and shares with the community periodically.

5.6 Dispute Resolution

All disputes related to the Foundation, CBN and token acquisition and distribution shall be settled based on independent and out-of-court mitigation to reach a mutually acceptable agreement.

6. THE CBN FOUNDATION PROJECT

6.1 Project Management Team

Dr. Manfred Krischke
Co-Founder and CEO of CloudEO. He founded and led, as CEO, RapidEye - the world's first private remote sensing satellite constellation in 1998 (today belonging to Planet Labs). Manfred has held several managing director positions and has been involved in early stage investment and consulting services for established hi-tech companies and governmental agencies. He started his career at the space company Kayser-Threde GmbH in Munich (today OHB). He graduated with a PhD in Aerospace Engineering from the Technical University of Munich. In 1991, he received the Wernher-von-Braun Award of the Deutsche Aerospace (today Airbus) for the best visionary diploma thesis in Germany, which he developed during his studies at the Harvard-Smithsonian Center for Astrophysics, Cambridge.

Joerg Blumtritt
Is a co-founder Datarella GmbH based in Munich, Germany, and Baltic Data Science in Gdansk, Poland. Prior to founding Datarella, Joerg worked for numerous media companies and publishers in Europe and the US. After graduating in statistics and political sciences with a thesis on artificial intelligence, he had worked in behavioral sciences, focused on nonverbal communications research. Joerg teaches blockchain and data science classes at NYU (New York), TUM (Munich), and at other universities.

Joram Voelklein
Joram is an Investment banker with a brokerage and corporate finance background. Based in Munich, he focuses on the new space sector and big data technologies. He is a crypto currency enthusiast and an investor with a broad network.

Sasha Borovik
Since graduating from Harvard Law School in 1999, Sasha has worked as an international attorney, entrepreneur, and team manager for numerous global corporations and law firms in Silicon Valley, Seattle, Washington DC, Munich, Paris, London, and in emerging markets. As a lead attorney, he handled some of the biggest technology deals, far-reaching public-private partnerships, anti-trust, compliance and tax investigations, as well as some of the gravest internet security breaches in history. He has experience opening new markets, introducing cloud-based and life-science products, technology, and services. As a member of several management teams, he led legal and growth strategies around the world. Sasha has also established several international start-ups, speaks seven languages, and is admitted to professional bars in the EU and in the State of New York.

Michael Reuter
Michael is co-founder of Datarella GmbH, based in Munich, Germany, and of Baltic Data Science in Gdansk, Poland. He has been building companies for over 25 years. He founded Germany's first online travel portal in 1996 and sold it in 2002. He then founded the social news aggregator YiGG which he sold in 2010. His next company, AppAdvisors, co-founded with Kira Nezu, was sold to Gruner+Jahr in 2016. Together with Kira, Joerg Blumtritt, and Yuki Nezu, Michael founded Datarella in 2013 and positioned the company as a big data and blockchain solutions provider.

6.2 Core Development Team

Michael Reuter (as above)

Joerg Blumtritt (as above)

Ivo Banovsky
Managing Director of Erteco Technologies GmbH, Munich
As a CloudEO Expert Partner, Ivo Banovsky is responsible for the technical implementation of CloudEO's order orchestration system and works with his outstanding capability to quickly understand complex technical and business concepts closely together with CloudEO's Technical Director and COO in the design of new components making the system more powerful, more easy to use and more scalable.

Dimitris Bellos
Geosystems Engineer at CloudEO
Dimitris Bellos graduated at University of Crete in Heraklion, Greece. At the Technical University of Munich, he did his master in sustainable resource management. In his studies of physics and research work at the university and at DLR he focused on remote sensing. He brings his deep understanding how to exploit bio- and geo-physical parameters from EO data to the team and consults CloudEO partners in their developments. By stringing micro services from CloudEO and third parties together to professional and cost efficient geo-workflows he generates new GeoServices driving business to CloudEO and to all contributing providers.

Thomas Benz
Technical Director and Head of Operations at CloudEO
With many years of experience in various IT systems Thomas Benz acts as system architect for the CloudEO platform. He coordinates all internal and external contributions to the system and ensures their interoperability and the reliable operational process.
He developed the concept of the three-tier architecture of CloudEO Platform, which connects merchants, e.g. the CloudEO Store with distributed processing centres through a modular and scalable order orchestration system. The system is built to simplify and accelerate the geoprocessing and administration workflows at CloudEO and at the same time ensuring high quality services, IP security and transparency for partners and customers. He graduated in Electrical Engineering and Information Technology at Technical University in Munich. During his work as technical journalist he always stayed on top of leading edge IT developments.

Stefan Konz
System Administration and Quality Assurance at CloudEO
Stefan Konz has long year experience as quality engineer for IT based processes. He takes care at CloudEO for professional documentation, setting up and executing test routines and maintaining CloudEO platform to ensure its 24/7 availability, the reliable execution of the integrated GeoServices of CloudEO partners and the connection to third parties processing platforms.

Martin Mayer
Chief Developer of CloudEO Store and working as expert partner since 2012 for CloudEO.
His long year experience as Drupal programmer, involvement in the development of several e-Commerce platforms and his strong believe in communities makes Martin Mayer not only a professional software developer for CloudEO but also a brain behind technical tools and concepts for building communities and ecosystems. He is active in freelancer cooperation and engaged to contribute to technical topics of software development at conventions all over Eastern and Western Europe.

Yukitaka Nezu
Yuki is co-founder of Datarella GmbH based in Munich, Germany, and Baltic Data Science in Gdansk, Poland. As an experienced investment manager in the field of direct private equity and infrastructure investments, Yuki adds value to companies with his investor spirit and his in-depth expertise in corporate finance. He spent more than 10 years at Allianz Capital Partners in Munich and London, the direct private equity and infrastructure entity of the leading German insurance company Allianz. Since 2012, he has supported the Munich-based family office at Goetzpartners as an independent corporate finance consultant.

Kira Nezu
Kira is co-founder of Datarella GmbH based in Munich, Germany, and Baltic Data Science in Gdansk, Poland. She is an experienced product developer who can excellently think through a product form its concept, user experience to the design. Over the past 20 years, she has realized numerous interactive design projects. Her experience in web and mobile applications ensure products are usable. Prior to her role at Datarella, Kira worked at AppAdvisors, which she co-founded with Michael Reuter and sold to Gruner+Jahr in 2016.

Jonatan Bergquist
Jonatan is a technical consultant and blockchain expert at Datarella. He has experience working closely with blockchain from a strategic and technical point of view as a consultant and project lead. For his thesis, he researched smart contracts and developed a blockchain-based medication plan. Previously, he worked in risk modelling in a fintech startup, and then finished his Master's degree in engineering physics and computational science at Uppsala University.

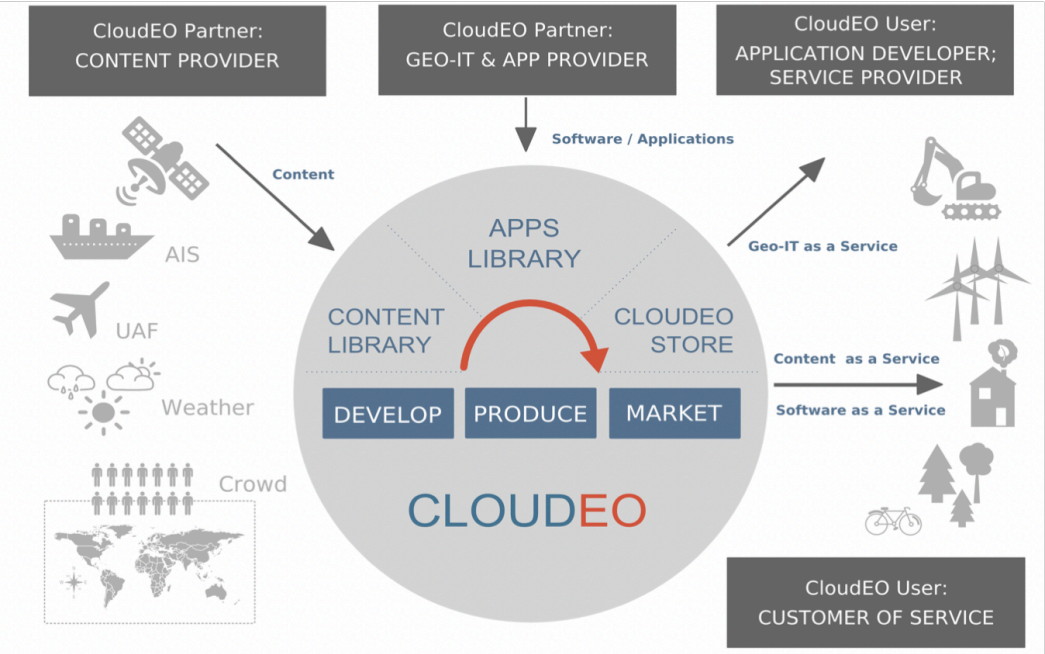
Michał Lukasiewicz
Michal is a strong mobile app and backend developer. Since blockchain has become more and more established, he started to focus on blockchain technologies. One of his main projects is WFP's Building Blocks project, one of the UN's first blockchain projects that transformed the way in which humanitarian agencies deliver aid. He is one of the co-founders of Bright Inventions, an established development agency for mobile applications and of Baltic Data Science, a specialist for data analytics and data warehouse solution.

Daniel Makurat
Daniel is a real full-stack developer. He has probably touched every possible technology in his technology career. At Datarella, Daniel works as a specialist for data warehouse solutions. He is one of the co-founders of Bright Inventions, an established development agency for mobile applications and Baltic Data Science, a specialist for data analytics and data warehouse solutions.

Tianchen Wu
Tianchen Wu is an analytically brilliant data scientist with a strong academic background within data engineering and IT. His passions include data modelling and data mining, which enables him to design and implement complex data structures. He has a Master's degree in Data and Knowledge Engineering from the University of Magdeburg, Germany.

6.3 Partners

Currently there is a robust ecosystem from the satellite earth observation and related industries, with approximately 100 partners interacting upon the existing platform. Through this ecosystem, the CBN Foundation and its founders have access to the majority of established market players. Potential partners, who we expect to join the CBN from start may be found on the CloudEO Store.



Through collaboration with business partners and the integration of resources from companies, businesses, technology communities and governments, the Foundation will make the most efficient use of shared resources to achieve synergetic development with society. It will provide transparency for financial management, code management, and business practices, and will maintain high standards of honesty, ethical business conduct and compliance with applicable laws, rules, and regulations.

7. RISKS AND DISCLAIMERS

This Whitepaper has been prepared by the CBN Foundation for the sole purpose of assisting prospective participants in deciding whether to participate in the CBN. We emphasize that this is an open-source initiative where everyone makes the decision independently.
We further note, that financial information contained in the Whitepaper and accompanying materials is unaudited. The projections contained herein and the accompanying materials are based on certain assumptions. No assurance can be given that these assumptions will prove to be correct, and, accordingly, no assurance can be given that actual results will conform to the projected results.
The CBN Foundation, the management and the development teams of the project, CloudEO and Datarella each expressly disclaim any responsibility for ensuring the accuracy or completeness of the information contained herein and in the accompanying materials. Accordingly, neither of us, nor any other individuals or entity, nor any of our affiliates, representatives or advisors will be subject to any liability for any inaccuracies in or any omissions from materials contained herein or the accompanying materials or any other oral or written information provided with respect to the CloudEO token or the CBN Foundation, and no express or implied representations or warranties will be deemed to have been made with respect to the Whitepaper or any other matters.
Neither the project management and core development teams, nor CloudEO AG, nor Datarella nor any affiliates, representatives or advisors are under any obligation to update, supplement or correct this Whitepaper or accompanying materials in any respect, or otherwise to provide any recipient or reviewer of these materials with access to any additional information. In addition, the project management and core development teams, CloudEO and Datarella and the development teams reserve the right, without prior notice to any reviewer or recipient of this Whitepaper or any accompanying materials, to terminate, at any time, further participation in the CBN Foundation or CBN and, until tokens are generated, we reserve the right to modify any applicable procedures, without giving advance notice thereof and without providing any reason therefor.

We emphasize in the strongest possible terms that a CloudEO token does not represent ownership or a security interest in the CBN Foundation or any other entity. Nor is a CloudEO token related to any other assets or properties. The token does not represent a debt owed by the Foundation or any other entity, and shall not be considered a debenture. To acquire CloudEO tokens, you need to be genuinely interested in contributing geodata, skills, time, energy and expertise to the CBN by becoming a member of the CBN community of volunteers. If you determine that CloudEO tokens may constitute a security subject to regulations in any country, we strongly advise you not to acquire them and suggest you immediately notify us of any possible risks. In addition, we feel compelled to advise you of the following risks, and indicate that these and additional risk need to be factored in your decision.

7.1 Technological & Organizational Risks

The Foundation will build upon the order orchestration technology which CloudEO developed over the last 6 years. The system has been tested and is considered to be reliable and stable. The token system is based on the Ethereum technology which has certain technical risks, some of which are outlined here.

A major technical challenge will be to enable automatic generation of more complex smart contracts, which involve complicated work of several parties.

7.2 Token Value Risks

Due to the very short history of crypto tokens and crypto-economic systems, there are several challenges that token holders face when trying to value these projects and underlying tokens.

First, among the organizational risks, one needs to consider that historically the geoservices industry has been fragmented. Even though CloudEO has attracted a significant number of partners to its marketplace, having them all join the CBN will require renewed negotiations. In addition, crowdsourcing is a relatively new concept in the geoservices sector, and the expectation that the whole community will grow and participate in the CBN using tools of the general geoservice ecosystem is based solely on CloudEO's experience to date.

Second, the short history of crypto tokens has generally shown an even shorter lifespan of many of the projects. This is especially true because projects present a big principal-agent problem. This is different than a startup that usually raises money in a series of different rounds over several years.

Third, there is some level of systemic risk associated with the crypto markets that cannot really be diversified away. The industry is too nascent for that. Therefore token-holders take on both project-specific risk and market risk when they acquire tokens in a specific sector

The systemic risk is very hard to predict, due to the short timespan, and is unique to the industry. Everything from hard forks to new crypto attacks are a source of systemic risk that traditional investments don't suffer from.

Third, many projects are interdependent, which causes dependency risk to projects. For example, a crypto project built on ethereum will be affected by things happening in ethereum, like a bug found in a compiler, or an attack on the ethereum network.

And further, as layers of the ecosystem build up, this dependency risk deepens.

7.3 Regulatory Risks

While significant efforts are being considered and undertaken to make the Earth observation satellite data open for commercial purposes and to establish a more reliable access to it, geodata sector is a regulated industry and access to some data is restricted. **Not all geodata may be available for the CBN at all times**.

Generally, as the development of blockchain tokens continues to enable new business models, new legal issues come into focus. For developers, legal and regulatory uncertainty can be one of the main barriers to building new blockchain protocols and applications, including the CBN. In this video, Sasha Borovik, an international attorney and one of the CBN founders, explains the legal risks associated with TGE. The legal risks be further examined in this Legal Framework for BlockChain Tokens. This Framework has been prepared by in collaboration by Coin Center, Union Square Ventures and Consensys.

This chart is starting point for those, who consider joining the CBN to analyze the likelihood that this particular blockchain token would be subject to securities laws. It also establishes a set of best practices for token crowdsales, which the Foundation has been trying to follow rigorously and diligently. We emphasize in the strongest possible way that **CloudEO tokens do not represent ownership or a security interest over the Foundation or any other entity or any other assets or property. They do not represent a debt owed by the Foundation or any other entity and shall not be considered a debenture under any applicable law.** It is for these reasons that we believe that our tokens are not securities and may be

purchased by anyone, who is genuinely interested in contributing geodata, skills, time, energy and expertise to the CBN by becoming a member of the CBN community of volunteers.

We note that recently, there has been growing interest in whether, and in what circumstances, crypto-tokens may constitute “investment contracts” under the U.S. Supreme Court’s *Howey* test, or similar regulations around the world, rendering them securities subject to regulation in the United States and other countries. The following resources take a deep dive into that issue, exploring the structural, marketing and other key considerations that may make crypto-tokens more- or less-likely to be securities under *Howey*. As these resources demonstrate, the *Howey* test is highly fact-dependent, indicating that certain crypto-tokens may be securities under Howey whereas others – if properly designed – may not.

If you determine that our tokens may constitute securities subject to regulation in any country, we strongly advise you from acquiring them and suggest you immediately notify us of the possible risks.

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