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Summary

**Color** is a next generation blockchain platform for hosting high performance decentralized dApps. What separates Color from other platforms? We believe the future of blockchain will require speed, sophisticated governance and applications that help the user-base grow, and to be an attractive platform for developers. As many people in the blockchain community know, without talented developers contributing to your project, the project cannot sustain itself.

**Technology - Concurrent Processing and Productive Development Environment**

Color relies on several key technological and innovative mechanisms to push the platform forward. Firstly, **Color Spectrum**, which separates data streams from code and effectively manages concurrent execution of dApp code. Color Spectrum allows developers to utilize the computing resources of the whole network for their dApps on our platform with concurrent execution.

Next is the **Color Development Kit**, which will help developers debug, organize and create sophisticated dApps that may otherwise never be created. Blockchains are still reliant on prototype-level dApps, which are plagued by scalability issues. Color aims to revolutionize the dApp ecosystem by equipping developers with a powerful Color Development Kit (CDK). Languages like Solidity are cumbersome to use and the environments in which they are developed in make debugging an arduous process. The CDK hopes to address this.

Another revolutionary Color Pay solution offered by Color Platform involves hardware, namely **Physical Unclonable Function** (PUF) chip. Powered by PUF-based P2P transactions, Color Pay improves transaction speed by enabling consensus between only the two engaged nodes. This Color Pay consensus bypasses the need for third-party confirmation and minimizes the delay between transactions. Users can send and receive any type of transaction with minimum confirmation delay. We call this a semiconductor-powered blockchain.

**Garnering Users - Preparing for Mass Adoption**

To accelerate spreading of Color Coins with an explosive network effect, the Color Platform uses a unique **Pixel Program** where participants get incentives for their active participation in spreading Color Coin throughout network. The Color Platform is focused on the fair distribution and active usage of tokens to promote a vibrant token community. Pixels will in time, convert to Color Coin, which unlike other networks, will be usable as a unit of exchange in all dApps that exist on the platform.
The Color Team has already been developing the **ecosystem** with five apps: Dailytto, Reward Inc, Color Design, Color Blog, and Color Guide and is in talks with various partners to rapidly expand their dApp product base. We believe these applications will give us a boost with existing and new partnerships to acquire users to the platform who may never have thought to incorporate the blockchain as part of their lives, and we hope to make it so without them even realizing it! Once the ecosystem grows to include community created dApps, ensuring that the fees leveraged are fair and go straight back to supporting the network is key. The Platform hopes to leverage a sophisticated governance structure that redistributes the small fees leveraged not to a company or organization, but back into the network itself.

**Wondering where to go to create your next decentralized Application? Think Color.**
1. Challenges and Motivation

1.1. Social challenges

Centralized services

Centralized platforms lead to centralized profits. The Apple App Store and Google Play Store collectively take 30% of the profits made from downloaded apps\(^1\) — not just commissions from paid downloads but in-app purchases as well. With centralized services, high commissions are simply the price you pay for (inefficient) middlemen. Further, this reliance on centralized financial institutions to execute platform transactions isolates a massive unbanked population.

Unbalanced rewarding models

The centralized exploitation model is simply a retread of existing models. Facebook, Twitter, and Instagram, for instance, are building billion-dollar companies off community labor, a relationship akin to the disproportional profit of equity holders and base employees. Product profits accrue to administrators, and the actual content creators receive “achievements”, “badges”, and “honorary titles” only, thus disincentivizing the collective to improve the product.

1.2. Blockchain Challenges

The very first blockchain, Bitcoin, was designed for a specific task of a specific group of people - to do secure transfers of non-government coins among two anonymous parties over the net. Since 2009 the number of usage scenarios of blockchains exploded. Smart contracts, decentralized applications, decentralized autonomous organizations, - activists from all over the world tried hard to push those concepts into very specific framework of blockchain. No wonder that such attempts face significant challenges. Vitalik Buterin, a co-founder of Ethereum, summarized them in his recent post\(^2\), which basically boil down to a few main points: Governance, Speed, Waste, and dApp usability and adoption. The question is how can we architect a Blockchain that addresses these four main points in a decentralized and secure way?

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\(^1\) “Transaction fees – Play Console Help – Google Support”

\(^2\) Vitalik Buterin. Hard questions to crypto people.
1.2.1. Network Challenges

Efficiency

Vitalik Buterin: “PoW is burning billions of dollars per year, even more than all scams and thefts combined. Isn’t this a big tragedy?”

Modern blockchains, even the most advanced ones are plagued by the same original sin: all transactions are being executed one by one. It is true not only for Proof-of-Work blockchains, but for Proof-of-Stake as well: transactions are saved into blocks one by one, and only one node at a time can construct blocks. All this results in sequential execution of transactions and smart contracts. This turns the network behind a blockchain into a mega supercomputer, that just throws away 99.99% of its computing power.

1.2.2. Governance Challenges

Centralization of infrastructure

As Vitalik Buterin stated recently “Bitmain and affiliated pools now have ~53% of all bitcoin hashpower. Isn’t this a really big problem?” Centralization of network resources imposes risks of attacks on the network, and making rich get richer.

Governance

Vitalik Buterin: “Given how EOS governance has turned into an epic fail, doesn’t this mean that all on-chain governance including DAOs is fundamentally flawed? How can any DAO deal with bribe attacks, plutocrats and other risks?”

On governance we have a lot to learn from existing methods, frameworks and attempts. There are some things in governance in which we need to get right from the start, and some things we have to assess the reality of being able to change those later on. Computer Scientists are looking for some perfect solution to blockchain governance that is secure and safe from a myriad of bad decisions and takeover. Like the U.S. constitution a strong framework will be the foundation of changes that need to happen later. We’ve devoted a large part of our design with this sole question in mind, “What is fair governance in a cryptocurrency?”.

1.2.3. Software Challenges

Usability

Vitalik Buterin: “Why aren’t there any useful large-scale applications yet?”
Most blockchains introduce some kind of executable entities - smart contracts, chaincode, etc. Using newly invented or lightweight languages reduces reliability of the code and its expressiveness. Smart contracts are short and simple. The languages and technologies used in blockchains do not allow development of feature-rich and powerful systems. Only a few smart contracts exceed a thousand lines of code.

Can we create a dApp with complex business logic, rich content manipulation, connecting multiple parties? Color Platform's answer - yes!

**Security**

Vitalik Buterin: “Why are there not yet good solutions to account security? When will the problem of account hacks and thefts be solved?”

Most blockchains come with just a compiler to build executable code. No tools for unit testing, continuous integration, code analysis. As a result only simplicity saves smart contracts from security breaches. Complicated smart contracts contain defects and vulnerabilities, and many security reports were already filed for security incidents, as well as high dollar breaches that could have been avoided had the developers had access to better tooling.

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Color Platform is a major breakthrough in construction of feature-rich, efficient and productive environment for Decentralized Applications. We found answers to most of blockchain challenges that we believe will strike the balance necessary for most use cases.

Color is a platform of decentralized app's and contents for the people. The Color Platform is redesigning decentralized governance to enrich those who use the platform. Color endeavors to revolutionize the dApp ecosystem by developing enterprise-level dApps. At Color, we’re building a platform to host sophisticated dApps to attract users and build a community. These dApps employ human-centered design so non-technical users may adopt the platform. By removing the technical barriers to entry and making dApps easy, anyone should be able to use them.

Color dApps will be powered by a single unifying cryptocurrency, the Color Coin (COL). Color is creating a Color Development Kit (CDK) to accelerate the development of dApps with easy to use and powerful dApp development environment to foster extensive growth of the Color Ecosystem.

In Summary, Color Platform can be compared with other prevailing blockchain platforms as follows.
2. Color Platform

2.1. Color Spectrum Technology

The key component of the Color Platform is Color Spectrum technology. Like light that is sliced into colors through a prism, it separates data streams from code and effectively manages concurrent execution of dApp code.

Unlike traditional blockchains where code and data are totally mixed, Color Spectrum consists of distinct layers for data processing and committing data into blockchain.

![Figure 2-1 Color Spectrum Technology](image)

The Color Platform is a blockchain platform that enables the easy creation of decentralized applications. It aims to be the incubator for a host of dApps, such as Dailytto, Color Design, Reward Inc, and others. The Color Platform also provides various services to supercharge the dApp-creation process, among them the Color Development Kit, which enables even inexperienced developers to create sophisticated dApps rather easily. Additionally, the Color Platform provides the
back-end for dApp development so ordinary users don’t need to worry about the intricate details of the consensus algorithm or how to set up a decentralized server.

Blockchain is poised for a technological leap forward that will deliver immense value to all parties in a transaction and Color Platform is ready to take the lead on delivering such value through our own cutting-edge decentralized platform. The Color Platform will outperform other existing blockchain platforms while delivering value to our platform community users. The Color Platform is reviewing various programming languages to integrate to the platform such as Java, Javascript, Python, Php, C#, C++, Solidity, and Go to enable easy development of dApps.

The Color Platform will nurture the next generation of blockchain developers. The central goal is enabling non-technical users to access the power of blockchain, which is why the Color Platform is developing the Color Development Kit (CDK). The Color Development Kit is a development package aimed at accelerating the development of dApps. Color will use a powerful, familiar virtual machine to simplify smart-contract creation, thereby reducing dApp development costs. With its easy-to-use front end and developer tools, the Color Development Kit will enable a new generation of dApps.

The Color Platform not only runs third-party dApps, but plans to launch its own enterprise-level apps through our Core team and partners. Internally, the Color Team is developing various kinds of dApps. Each dApp utilizes the blockchain and cryptocurrencies to enhance existing application features like curation rewards, betting, and immutable royalty distribution. Section 4 of this white paper goes into detail about the individual dApps.

### 2.1.1. Terminal nodes

Terminal nodes are smartphones, tablets, desktops, and browsers. They run the client side of dApps (mobile applications, desktop application or browser applications) and provide end users with access to dApp functions.

**Architecture of Terminal Node**

Terminal Nodes run client side of dApps. They render user controls, transfer users’ inputs to the server side of the dApps and present responses to users.

The Color Platform CDK will provide dedicated components for the dApp client side. They will include:

- **Color Wallet Authenticator**: this component authenticates the Terminal Node prior to any dApp operations. It presents the owner of the Terminal Node to the Platform and makes all operations of a dApp execute on behalf of the wallet owner.
As a result of authentication, a secure channel to The Color Platform Application Protocol Interface and Load Balancing is established, using powerful cryptography of TLS-backed HTTPS transport.

Due to proper authentication, all transmissions between Terminal Nodes and the Color Platform contain implicit Wallet identifiers, and the dApp always "knows" what client is served.

- Color Platform uses JSON to encode data that dApps send and receive. In order to simplify dApp development, the CDK will provide a helper that transforms API calls in a programming language into JSON-encoded requests to the server side of dApps.
- Secure Channels are established during authentication and are used as a reliable transport between Terminal Nodes and Color Platform.

Color Platform is open for extensions, and the Wallet is no exception. Third party Wallets may be constructed as regular dApps providing they adhere to the authentication algorithms of The Color Platform.

### 2.1.2. Application Interface and Load Balancing

The Internet works behind curtains. The average Internet user doesn't understand how data packets are routed from Sydney to Tokyo — the Internet should just work. The Color Platform intends to make blockchain accessible to the average user by simplifying the complexities and separating the back end for developers. When launching a dApp, Color developers won't have to worry about orchestrating a complex smart contract or designing a decentralized storage system.

Color Platform provides unified Application Interface for application developers to invoke their dApps hosted by Color Platform. Load Balancing distributes tasks to Logic Runners that execute dApps code and store results in the underlying blockchain.
Within Color Platform, the business logic of dApps is implemented within Logic Runners. Application Protocol Interface is the gateway that encapsulates the Logic Runners from the outer world and routes data between Terminal Nodes and Logic Runners.

This layer authenticates wallets that users’ utilize for transactions, establishes secure connection between Terminal Nodes and the Color Platform.

Call Router is key to operations of the platform. It receives requests from terminal nodes, and selects the Logic Runner to serve the request. Sophisticated algorithms of load balancing, load distribution, and load accounting ensure high performance of the Platform and minimize the risk of data races.

**Authentication**

Each data stream from a Terminal Node to the Color Platform must carry a distinctive identifier of a user that initiated it. The Color Platform utilizes wallet authentication - the data streams are attributed with wallet ID, which is proved by a corresponding private key during authentication phase.

Authentication doesn't mean that a user needs to enter personal ID or password. It’s major purpose is to ensure that all operations executed on behalf a specific wallet do originate from that wallet.

Modern blockchains use digital signatures to ensure authenticity of requests, but Color Platform targets much higher throughput. This is why we use secure channels, protected with modern cryptography, to exchange data with Terminal Nodes. The
secure channel is established on mutual authentication, and the platform treats all data transported within it as authenticated.

**Application Protocol Interface and Load Balancing**

Color Platform uses JSON to encapsulate messages between terminal nodes and corresponding Logic Runners, which execute the dApp business logic. Color Platform prevents terminal nodes from direct connection to Logic Runners because such direct connection might result significant security risks due to potential misbehaving and compromise of Logic Runners.

Application Protocol Interface is a boundary that encapsulates the platform, protects is from DDoS and (in the future) might be able to provide sophisticated analysis tools to prevent malicious behavior.

Load Balancing distributes requests from terminal nodes to Logic Runners that run corresponding dApp business logic. Each dApp is deployed at multiple Logic Runners. Load Balancing enforces randomization in servicing terminal nodes to prevent risk of running dApp at compromised specific Logic Runner.

Another task of Load Balancing facility is tracking the load of actual Logic Runners. Amount of load is used to count the compensation from the network for running Logic Runners.

**Coin Transfer API**

Color Platform provides dApps with facilities to pay and receive payments in Color Coins or COL-based tokens. The Platform API includes dedicated calls to transfer coins, lock them in a specific wallet, transfer between two wallets, setup allowance, approve transactions, etc. dApps will obtain rich set of services to build business with Color Coins.

Color Transfer API allows third-party wallets to view balance and perform transfers with Color Coins.

**2.1.3. Logic Runner**

Logic Runners are the core of Color Spectrum technology. They host business logic of dApps, perform processing of users’ operations and store results to the underlying blockchain. Business Logic of a dApp, hosted by a Logic Runner, is executed within a devoted environment, provided by Color Virtual Machine (CVM).
CVM provides execution environment for dApp code including language environments, system software, middleware to communicate with API layer, storage and blockchain.

The first release of Color Platform will include CVM capable running applications in Java, Javascript, Python and (being considered) C/C++. A large part of our resources will be devoted to this effort.

![Color Virtual Machine Diagram](image)

**Figure 2-4 Color Virtual Machine**

**Language-specific Execution Environment** provides the code base necessary to run dApp business logic. For Java apps it is Java Runtime Environment, for Javascript - Node.js or Web-assembly runtime, for C++ - necessary runtime libraries.

**Connectors**

dApps in the Color VM need to communicate with the environment. Such means are provided by connectors. While all connectors are the same for all languages, each runtime environment provide language-specific bindings.

**State Database Connector** allows dApp code to keep persistent variables between invocations, such as wallet balance, asset owners, existing bets and so on. Through connector dApps read and write values to state database.

**Storage Connector** provides dApps the capability to access distributed storage provided by the platform. Using this connector dApps can create files, write to them, read files or get status information. Color Platform will provide secure file vault for personal data, and will be accessed through this connector in a secure and efficient way.
Blockchain Connector allows low-level access to the blockchain, for reading. This connector is designed for block viewers, analysis tools and other facilities.

Color Platform doesn’t allow direct writing to the blockchain since it might ruin synchronization between the Ledger and the State Database. All writes to blockchain should go through transactions to the State Database.

Terminal Node Connector supports the communication channel between dApp and terminal nodes. It receives requests from terminal nodes and sends back responses from dApp. It could be used to implement push notifications or complex message exchanges in AJAX style.

When dApp developers want to protect certain data types in their applications, the Cryptography Service will allow for the encryption and decryption of critical data. The file service, meanwhile, will store dApp data in a distributed decentralized network storage system such as IPFS or BigchainDB. These services will work together to mitigate the difficulties of storing off-chain app logic in a decentralized way.

Communication Service implements low-level network operations that all other connectors use. It provides transport and P2P protocols, secure channels and other network-related operations required by connectors.

2.1.4. Middleware

The middleware layer provides CVM with a distributed storage environment. It includes a distributed database to store state variables that are to be synchronised between various Logic Runners, distributed storage for unified and ample access to dApp files and content, uploaded by users. And one of the most important functions provided by the Color Platform middleware is access to blockchain. It is the middleware who handles dApp requests to store transactions into the blockchain.

Like almost all other blockchain-based platform the Color Platform is equipped with a State Database. This database stores dApp persistent variables, such as wallet balance or a list of purchases. dApp business logic that runs inside Color VM on Logic Runners connects to the State DB to read and write variables, to update the state of the application.

The State DB is tightly coupled with Block Builder that uses blockchain to store permanently updates to DB.

When a dApp commits a transaction to the State DB, the latter fires a transaction with new state values to the Color Ledger. One of the nodes in the ledger’s network takes this transaction to build a block. Other nodes validate the block and add them to the network.
Figure 2-5 Color Platform Middleware

Each new block from the network is used to update the state. Special care is taken to resolve conflicts, when a state variable is used in a running dApp transaction and at the same time it arrives in a new block. In this case the state is updated from the new block and the transaction is restarted.

More complicated case happens when Block Builder faces two committed transactions starting from the same state. In this case the Block Builder will reject one of them and inform the Logic Runner that produced the rejected transaction that it needs to re-execute the transaction again.

Color Platform equips dApps with **Storage** to keep files and big blobs of data. Operation with the storage will be synched with Block Builder transactions.

### 2.1.5. Block Builder and Consensus Algorithm

Slow transaction speed and delayed consensus time prevent blockchain technology from reaching mass adoption. Users can tolerate one second delay, but not a one-minute (like in Ethereum) or even up to one hour in Bitcoin.
To achieve mass adoption, Color needs to reach transaction speeds that rival or surpass those of traditional payment providers such as Visa and Mastercard. Scalability issues become more prominent with decentralized blockchain platforms.

The architecture of Color Spectrum is designed to provide unprecedented level of performance. To do so we decoupled computation and consensus - computation is performed by Logic Runner layer, while consensus is performed by Block Builder layer. The consensus in Block Builder is planned to be from PoS family, where the actual Block Builder nodes are selected and replaced based on Color internal scoring system.

The consensus algorithm in Color Platform is responsible for three objectives:

- validating the results of computations in Logic Runners,
- synchronizing the state in heterogeneous and geographically distributed environment,
- keeping irreversible and immutable log of major events of the dApps that run in the platform.

Currently, the Color Consensus algorithm under development has a primary goal of attaining more speed with only making minimal sacrifices to security and decentralization compared to existing models. The Color Consensus architecture being developed already has a theoretical speed of more than two times that of EOS, while maintaining decentralization and security.

Color Consensus can be described as a PoS hybrid that runs in parallel, where the Block Builders (those that provide consensus) are elected not by member votes, but by their stake to the network. Then a weighted system based on performance and platform participation and reputation. The latter systems are still very much in development and these parameters are difficult to quantify and will probably be ever-changing by the will of the Color Council members. This will be further defined in a technical paper and included in a later version of the white paper.

2.2. Color Development Kit

Color Development Kit (CDK) includes all tools necessary to develop, test and deploy dApps for Color Platform.

Color Platform is devoted to the safety, reliability and security of dApps.

The goal has always been to set the Color Platform apart from other blockchains in ways that gave it a distinct advantage. The team is already hard at work changing how
the world will interact with blockchains in the future. To develop on Ethereum, you have to learn Solidity and accept Remix’s shortcomings as an IDE (Integrated Development Environment). This limits who can develop on blockchains.

Though Solidity isn’t a difficult language for the experienced programmer to learn, others may be disinclined to acquire a new language to experiment on the blockchain. Developers are used to full-fledged IDE’s making their lives easier. For the most part, blockchain IDE’s aren’t there yet. The Color Virtual Machine will be accessible in a familiar language, which means the powerful IDE’s for that language will also be available.

The result will be that experienced developers will not have to learn a new language in order to work on blockchain projects, and the barrier to entry will be lower, thus bolstering the potential number of developers. Couple that with our unique incentivization system, and developers will begin to prefer the Color Platform as the ecosystem matures. The evolution of Color Platform will provide non-technical users with the ability to create executable Smart Contracts without the need to conduct highly technical interface development, or to build application-specific contract-generation software.

CDK ships with not only compiler to build dApp executables for deployment in Logic Runners, but also tools to facilitate validation and verification:

- Test Logic Runner to run and debug code,
- Test mini-network with a couple of nodes to launch dApp with terminal side,
- Tools for unit testing;
- Distributed debugger;
- Profiling and code analysis tools.

And to make development more productive the CDK will ship with modern IDE, where all CDK development tools are integrated.
3. **Color Ecosystem**

Color Platform is more than just a platform to execute dApps. It is the core of the whole environment that makes it useful not only for developers but for end users as well.

Color Ecosystem includes wallet applications, useful dApps and a central hub where users can search and connect to various dApps. Unified currency among Color dApps generates network effects.

Other important part of Color Ecosystem is Pixel Program. The program is devoted to promote the gift economy and increase the level of generosity in the world.

![Figure 3-1 Scalability of Color Platform dApp](image)

3.1. **Color Gallery**

The Color Gallery will act as a hub for all the dApps on the Color Platform. Through the Color Gallery, users will have access to a broad array of decentralized applications and resources. The Color Gallery has an innate ranking system that enables users with the best reputations to rank higher. In the Color Gallery, new dApps, smart contracts, and newsfeed, as well as connectors to other distributed social-media platforms, can be aggregated. Imagine a portal that connects you to an ecosystem of applications,
content creators, and news for a rich user experience everyone can enjoy. The best part? It's all decentralized.

3.2. Decentralized Apps

Blockchains are currently reliant on prototype-level dApps plagued by scalability issues. Color intends to revolutionize the dApp ecosystem by developing enterprise-level dApps. The Color Team has dedicated substantial resources to building mega dApps. There are more than 10 in development on the Color Platform. Color dApps are powered by the single unifying Color Coin (COL). In Ethereum, each dApp uses its own data format and cannot share it with other dApps.

3.2.1. Dailytto

Dailytto is a lottery-based reward application. Users can earn lottery tickets when they engage in rewarding ads by downloading the app, registering for the website, watching the video ads and referring friends, etc. Users can get up to 21 coupons a day. Users choose five numbers out of twenty-five numbers in order to apply for the lottery. The winning lottery numbers are decided by an algorithm for choosing the top 5 numbers that are voted by the lottery applicants. With blockchain technology, no one can fabricate or predict the results. Therefore we can ensure the fairness of the lottery process.

The lottery is held and rewards are given every day at GMT 9:00. Once the result is announced, all users' information including lottery ticket submission status, lottery process, and the result is open to everyone. Users can swap lottery credits with the Color Coin. Dailytto can retain a large number of users in a short period of time because users can get lottery tickets for free and Dailytto applies a lottery system which allows it to scale up globally. Users who have experienced the Color platform through Dailytto can contribute to spreading lots of dApps developed on the Color platform. The service becomes available in September, 2018 with Color point mechanism.

3.2.2. Reward Inc

Reward Inc is a reward app where users can earn promotion Pixels through activities such as attendance, participating in advertisements and inviting friends. Users are divided into 12 ranks from intern to president based on the promotion points they've earned within the app. The higher the position, the more base pay and bonuses users earn. Pixels are given out every day at GMT 9:00. These credits can then be exchanged
for the Color Coins. Position changes are made in real-time according to promotion points earned by the user. The higher the position, the more difficult to achieve the promotion points.

Participation in advertisements will result in being rewarded Pixels. Users can receive Pixels by account linkage, referrals, and other methods. This system is especially favorable for social media influencers, thus, engagement with them will create a positive feedback loop into the Color Ecosystem. Reward Inc is a service with a high customer loyalty and these enthusiastic users will be able to participate actively in various dApps on the Color Platform.

3.2.3. Color Design

Color Design is an interior design platform based on ranking. Color Design established a marketing system with high reliability and effectiveness by signing a business contract with renowned architects. Color Design saves and manages information like interior designs, customer evaluation data, and user information on the blockchain.

Color Design simplifies the process and reduces costs to a mere 10% compared with existing interior platforms. Users pay only with Color Coin to use paid services like local advertising products. Designers are recommended and discovered by the Color Design advisor group before they go through a validation process with Color Design official evaluators. Each design project will be evaluated by more than 1,000 customers. Color Design will provide users with a ranking chart developed based on the Color Design unique ranking algorithm.

Customers who take part in a design project assessment will be rewarded with Pixels based on the accuracy of the evaluation. If designs are ranked at the top of the daily chart, designers will be rewarded with the Color tokens according to their rank. Interior design companies will not be subject to huge middleman costs anymore, the savings will be better for everyone. Additionally, construction companies will operate at low costs through Color Design local advertising products. Blockchain technology will facilitate the selection of outstanding construction contractors based on a reputation system.

3.2.4. Color Guide

Color Guide is something like 'Michelin Guide by Users' created by the community. Many existing restaurant and entertainment guides are plagued with fake or incorrect information. Color Guide is devoted to sharing reliable and valid information. Before registering your restaurant information in the Color Guide, you will need a Proof of
Visit with a 3 second short video. If you share realistic and detailed restaurant information such as taste, kindness, cleanliness, waiting time, parking, you will receive Pixels as incentives. The better the food information you share with the Color Guide is, the more Pixels you get.

Consumers who evaluate restaurant information registered in the Color Guide also receive Pixels. Proof of Visit is required for consumers to evaluate restaurant information. Evaluations are done in a way that gives you more detailed score, and the closer you get to the average score, the more Pixels you can get.

Color Guide also provides food information service. Experts like food columnist, restaurant power blogger, publish recommendations based on their reputation. We have strengthened the magazine's ability to expand the breadth of content by providing information on hidden restaurants that are not open to the general public and real restaurant information that impresses experts.

By applying the reward system to information sharing and verification activities, we can secure reliable restaurant data and provide it to users who need real taste information. This will increase confidence in the Color Platform and increase the user base.

More dApps are under development and will be disclosed as launching schedule becomes available.

3.2.5. Color Career

Color Career is a dApp, which records the career path that has been accumulated from birth to elementary, master’s degree, doctoral degrees, qualifications, experience, recommendation letters, and volunteer activities in the blockchain. Color Career allows you to complete your resume and have your academic background and work experience cross-validated with the "confirm" or "recommend" button.

Color Career prevents job seekers and employers from forging resumes or committing recruiting frauds to take advantage of the urgency of job seekers. Color Career combines the features of LinkedIn, Indeed.com, and Monster.com in addition to the features of blockchain that cannot be tampered with, as well as the ability to authenticate an individual’s educational credentials and career records.
3.2.6.  Color Blog

Color Blog is a blockchain-based blog service.

Bloggers or authors can register for posts on the Color Blog and receive Color Coins based on views, comments, and scores. Readers will be able to get more Color Coins by reading the posts on the Color Blog, making good comments, and evaluating them accurately. Members of Color Blog can increase their grades by working as authors or readers, and the higher the grades, the more Color Coins you can get.

Color Blog improves dramatically the problems of existing compensated SNS platforms.

1. Simplified the sign-up process and shortened the sign-up time.
2. We have adopted an editor that greatly improves user's convenience.
3. We have developed a differentiated compensation system to prevent rewards from being focused on very few members.
4. We have further refined categories and enhanced curation capability.

Color Blog stores only the data that requires absolute security, such as posting history, reward history, transaction history, user information, in the blockchain tier - Block Builder, and stores data such as contents and comments registered by the writer or reader in the web service tier – Logic Runner. By saving data separately this way, you can edit and delete it when needed. The whole speed is also much faster. Color Blog also solves the problems of existing blogging dApps with cryptocurrency or token rewards. They often have problems that registered contents and comments are recorded in the blockchain and cannot correct wrong or tempered information.

3.3.  Incentives Programs

Cryptocurrency introduces a whole new way to create an ecosystem for a company or platform. In the old model, a company’s stock, reward system, and currency were all quite different and only accessible through distinct centralized systems governed by a strict set of rules. Today, we can build systems that encompass complex schemes where shareholders, users, and creators can all be incentivized to make a better product or service using a single cryptocurrency token. This has the potential to create a positive feedback loop based on greater system usefulness and an increase in the number of participants.
Color invites partners to join the Color ecosystem and utilize the power of unified cryptocurrency, Color Coin, to create new, value-based incentives programs for their community contributors.

### 3.4. Pixel Program

Fair distribution of tokens has always been a problem. The centralized hoarding of cryptocurrencies goes against the original decentralized philosophy of blockchain. Cryptocurrencies such as Bitcoin are treading the same path as fiat currency, in that wealth is gravitating toward the already rich while poverty-stricken members of society are continuously detached from wealth. The problem is most apparent in PoW (proof of work) cryptocurrencies, in that the initial miners reap the majority of the rewards. Similarly, in the PoS (proof of stake) model, large coin holders continue to be rewarded with coins.

This is why the Color Platform is focused on the fair distribution of tokens and the continued usage of tokens. The Pixel Program is a network-effect-driven issuance program that distributes “Pixels.” Pixels are essentially a referral program turbocharged by the power of the blockchain. The Pixel Program is based on the “gift economy” from Charles Eisenstein's book “Sacred Economics: Money, Gift, and Society”.

**Figure 3-2 Pixel Program Process**

Received Pixels Convert to Color Coin Weekly Proportionally

\[
\frac{\text{Pixel Received by Tom}}{\text{Total Number of Pixel Received by All Wallets}} \times \text{Weekly Issued 200,000 COL} = \text{Number of COL Tom Will Receive}
\]
in the Age of Transition.” The Pixel Program aspires to promote a world of more economic equality through a gift-giving economy:

“Another way to see the unexpected fruits that arise from the mystery is that when we live in the spirit of the gift, magic happens. Gift mentality is a kind of faith, a kind of surrender—and that is a prerequisite for miracles to arise. From the Gift, we become capable of the impossible.”

Pixels will not only be sent to popular users but to those who need financial support such as the Red Cross, the World Health Organization, Amnesty International, and Doctors Without Borders. Additionally, Pixels can be used to fund artistic projects or startups. One example is supporting independent game studios via Pixels. While the core distribution of Pixels is organic, the Color Team is developing various dApps to accelerate the distribution of Pixels.

Pixels will also play a key role in governance of the platform. The key here is that active users of the system will have a say in how the system is governed, for more information on this see section 4.2.

### 3.4.1. Pixel Distribution

Pixels are a type of “airdrop” distributed to all Color Coin wallet holders, five Pixels a day. They are awarded on a periodic basis. Starting from Sunday GMT 0:00, the Pixels have a lifespan of 24 hours. Pixels in their original form do not have any value. The only way Pixels have value is by sending them to other wallet holders. Pixels must be sent to another person’s account within 24 hours or they will become void. Each user can send up to five Pixels to a single account per week. Once a wallet holder receives Pixels, the Pixels will become Color Coins. The received Pixels may be converted to Color Coins on a weekly basis, after Saturday GMT 24:00.

This “conditional sharing mechanism” aims to disincentivize hoarding, provide stable issuance, and increase overall user participation in the system. Most importantly, the Pixel Program promotes the active circulation of Color Coins. It will ultimately increase the circulation of Color Coins.

The equation for converting Pixels into Color Coins is as follows:

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Every week there will be an airdrop issuance of 200,000 Color Coins. Every 52 weeks the total supply of Pixel Program airdrops will drop by a certain rate, adjusted every year by Color Council. For the first 52 weeks, a total of 200,000 Color Coins will be issued weekly through Pixels. The subsequent 52 weeks will see a total of 190,000 Color Coins issued weekly through Pixels if the Council decides the decreasing rate for the next year to 5%. The systematic decrease in Pixels will continue for a span of 50 years.

Tentatively, there may be Pixels issued in other ways to reward users for their participation. We are currently considering app-level integrations with partners, and possible governance on this issue by the steering committee. More details to come in version 1.0 of the white paper.

### 3.5. Color Pay

Color Pay is the hardware-assisted P2P transaction infrastructure of Color Platform. Color adopts semiconductor chips named Physical Unclonable Function (PUF) to implement Color Pay. A PUF chip is a cryptographically secure device that utilizes unclonable physical characteristics. Each PUF chip has a unique, unclonable “digital fingerprint” or “digital DNA” that serves as a key identifier. Christoph Bohm, the author of “Physical Unclonable Functions in Theory and Practice,” defines PUF as follows:

“A PUF is a physical entity which produces an output value at least independence of physical structures, which are hard to clone.”

PUF chips for Color Pay improve on standard memory-based security chips with (a) PUF-based embedded random numbers, (b) PUF-based true-random-number Root of Trust (RoT), (c) PUF-based encrypted data transfer on bus, (d) data stored with PUF encrypted on memory, and (e) a hard-coded crypto algorithm for safer and faster transactions.

#### 3.5.1. Color Pay P2P Transactions

Powered by PUF-based P2P transactions, Color Pay improves transaction speed by enabling consensus between only the two engaged nodes. This Color Pay P2P

---

consensus bypasses the need for third-party confirmation and minimizes the delay between transactions. Color Pay users can send and receive any type of transaction with minimum confirmation delay. With the Color Pay P2P consensus, transactions per second (TPS) become meaningless.

Color Pay P2P transactions utilize two PUF chips and four digital signatures. Each PUF chip is divided into two layers: the Secure Area (security layer) and the Application Data Area (user layer). The pre-transaction and post-transaction data are signed within the user layer. The transacting agent then confirms the transaction and concludes it by recording it in the Secure Area. The security layer of the Color Pay verifies the user-area information and records the transaction to further guard against double spending or forgery. The result of the transaction’s digital signatures allow the Color Pay to verify whether or not the records of the transaction parties were forged. If all the verification results are the same, the transaction will be confirmed. If the verification results do not match, the transaction will be abandoned, and all states in both nodes, participated in the transaction, will be restored to previous states.

3.5.2. Color Pay Consensus With Block Builder

Two Color Pay terminal nodes may use PUF chip without any intervention of a 3rd party, like Color Platform Block Builder. In order to make a transaction between a Color Pay terminal node and Non-PUF terminal node, Color Pay nodes have to store its
state in the Block Builder first in order for it to work like a Non-PUF terminal node. All the transaction metadata will already be confirmed on the blockchain from Color Pay terminal nodes and stored inside the PUF chip.

To make more sophisticated services in real world applications of blockchain, we need Logic Runners between blockchain and terminal nodes. The Logic Runners will provide advanced blockchain services to terminal nodes and will transfer transaction information into the blockchain instead of terminal nodes. Things such as Smart Contracts, advanced blockchain functions, and code that aren’t executed within the PUF chips themselves.
4. Color Platform Evolution

4.1. Roadmap

The Color Team is building out the platform with developer tools such as testnets, IDE's, smart-contract templates, documentation guides, and even boot camps to support the platform's adoption. A key piece of Color's development will come in the form of the powerful Color Virtual Machine (CVM), which will encompass advanced features and make developing sophisticated dApps on Color easy for those new to blockchain programming. The CVM, dApp-development tools, methodologies and IDE's will be released to the community to empower users to create decentralized applications and add value to the platform.

<table>
<thead>
<tr>
<th>Milestone 1</th>
<th>Milestone 2</th>
<th>Milestone 3</th>
<th>Milestone 4</th>
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<tbody>
<tr>
<td>November 2018</td>
<td>December 2018</td>
<td>May 2019</td>
<td>December 2019</td>
</tr>
<tr>
<td>Coins</td>
<td>TGE</td>
<td>Color Token(COL) for Reward dApps</td>
<td>Color Coin(COL) for Color MainNet and Color dApps</td>
</tr>
<tr>
<td><strong>Color Spectrum (Main Platform)</strong></td>
<td><strong>POC (Proof of Concepts)</strong></td>
<td><strong>Minimal Viable Product (MVP)</strong></td>
<td><strong>Color VM for service nodes (Java, Javascript, and C++)</strong></td>
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<tr>
<td></td>
<td></td>
<td>• Basic service node</td>
<td>• Service nodes load balancing</td>
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<tr>
<td></td>
<td></td>
<td>• Dedicated infrastructure for running service nodes and storage</td>
<td>• Protocols for geographically distributed infrastructure</td>
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<tr>
<td></td>
<td></td>
<td>• Private permissioned blockchain</td>
<td>• dApp deployment framework</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Basic dApp deployment facility</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Wallet</td>
<td></td>
</tr>
<tr>
<td><strong>Block Builder with Color Consensus</strong></td>
<td><strong>POC</strong></td>
<td><strong>Validation and Verification</strong></td>
<td><strong>TestNet</strong></td>
</tr>
<tr>
<td></td>
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<td></td>
<td><strong>MainNet</strong></td>
</tr>
<tr>
<td><strong>dApps</strong></td>
<td><strong>Dailytto, Reward Inc, Color Design, Color Guide, and Color Blog</strong></td>
<td><strong>Pixel Program, Color Pool, Color Pet, other dApps</strong></td>
<td><strong>Color Gallery, Media, Music, O2O, more dApps</strong></td>
</tr>
<tr>
<td><strong>Color Pay</strong></td>
<td><strong>Proof of Concepts</strong></td>
<td><strong>Color Pay V1.0</strong></td>
<td><strong>Color Pay V2.0 with Pixel Program</strong></td>
</tr>
</tbody>
</table>

Along with platform development, several partner companies of the Color Platform Team will focus on the continued development of dApps. A multitude of dApps will
become available even before and after the token-generation event (TGE), reflecting Color’s commitment to building an ecosystem of valuable applications. Such dApps can utilize their own point or token mechanism and interface them to ERC20 form of Color Tokens until Color Coins are issued on the Color MainNet. The roadmap stipulates that the platform will have garnered enough Color dApp users from the early stage of Color Platform development. These early dApps will be switch to the true Color MainNet, that will see our decentralized governance and platform in full swing.

4.1.1. Milestone 1: TGE and POC (November 2018)
This Milestone concludes Token Generation Event and demonstration of POC for Color Pay transactions and several dApps.

This Milestone includes releases of the following dApps: Dailytto, Reward Inc, Color Design, Color Guide, and Color Blog. These dApps will use Color Point mechanism even before Color TestNet is operational. Color Points will be converted to Color Tokens by Milestone 2.

4.1.2. Milestone 2: Color Platform MVP (December 2018)
This Milestone is devoted to present the Minimum Viable Product (MVP) - a proof-of-concept platform that will be used to evaluate the basic concepts of Color Platform and establish a test bench for first dApps.

Color Platform MVP will include the following features:

- Basic Logic Runner provides APIs and execution environment for a single language (presumably, Java or Python) for prototype dApp developers;
- Dedicated infrastructure for running Logic Runners;
- Dedicated storage facility to evaluate storage access APIs of Logic Runners;
- dApp deployment framework to validate the strategy of the Color Platform;
- Basic Wallet;
- Color Pay POC(Proof of Concept)

This Milestone will also provide the internet environment to try the first dedicated dApps and Color Point services.

4.1.3. Milestone 3: TestNet (May 2019)
This Milestone will present the first release of the functional Color Platform, serving dApps for end users. This release is community preview, enabling dApp developers to port their applications to Color Platform.

The Milestone includes the following features:
- TestNet for Color Platform;
- Color Virtual Machine for Logic Runners with APIs and execution environments for 2-3 languages (presumably, Java, Javascript, and C++);
- Fully functional Logic Runner Docker, ready for deployment in partners’ infrastructures;
- Basic Color Development Kit, including CVM, compilers, testing framework and a few productivity tools;
- Application interface and load balancing infrastructure;
- Pixel Program as a core dApp (software implementation);
- Block Builder for fast synchronization of geographically distributed state database.

Starting Milestone 2 the Color Platform will integrate partners’ computing and storage infrastructure to host Logic Runners.

At this Milestone the Color Platform will host Color Mega dApps as well as review and accept third parties’ dApps, that will start providing services to end users.

4.1.4. Milestone 4: Development Environment for dApps
(December 2019)

This Milestone will enrich the Color Platform with advanced CDK for more productive development of dApps.

The Milestone includes the following features:

- Color Platform Version 1.0 for MainNet;
- Color Gallery;
- Advanced load balancing feature and application interfaces;
- CDK with Integrated Development Environment, including debugging, simulation, and testing facilities with debugger for Java and (potentially) C++;
- Documents and Tutorials to simplify dApp development;
- Advanced Color Pay wallets with PUF;
- Pixel Program for Advanced Color Pay wallets.

4.2. Governance

4.2.1. Challenges

The community of Color Platform users and owners of the computing infrastructures integrated into the platform, is in effect a Decentralized Autonomous Organization (DAO). And there are some basic governance challenges that all DAO face.
Rich vs. others. The decision making and the money-holders are directly linked, thus leaving those users with less money out of the decision making process. This can create a dichotomy later on which means that proposals that help rich users and don't benefit regular users can be preferred.

This idea of having the largest holders being solely responsible for the direction of the coin and where funds and resources are devoted to makes sense in the beginning, but as soon the logic is propagated at scale, that would be the equivalent to 'banks' making decisions for all users, which is not different than most fiat systems in the world today.

Responsibility. Also, if a core team or the steering committee runs out of funds to support the project, like paying the developers, running ad campaigns, doing community outreach, and attracting new users all need to be the responsibility of the network and its participants.

At the time of writing this white paper, a coin which has these properties does not exist. We’re working hard to address this issue and will update the white paper at a later date once more details are finalized.

4.2.2. Overview

The Color governance system will be at the cornerstone of Color’s strategy to become a dominant coin in the space. The philosophy of our governance structure is such that the decisions that need to be made on the platform from the beginning and ongoing need to keep the five major stakeholders in mind:

- New Users
- Existing Users (with reputation)
- Active Participants on the Color Platform
- Developers/Maintainers
- Network Infrastructure Providers

In existing systems you can see these five stakeholder groups (or less) existing in some kind of pyramid that has clear winners and “losers” on every step of the decision making process and beneficiary scale. Take Dash for example, a regular new user (unless they were really wealthy) would not have much of a say in the decision making process. In existing systems Masternode prices are $200,000+, which dictate your direct involvement capability with the platform’s primary governance engine. If we were to consider who might be the largest beneficiaries to the least in Dash, we might get a pyramid like the following: Masternode owners, Developers/Maintainers, Miners & Existing Users (With reputation), New Users.

This pyramid is similar amongst a lot of coins, where the regular users don’t get a lot of benefit, and block builders are always in a weird position where in a lot of cases block
builders (miners in other networks) can even be hostile to the network, and not have the best interests of it at heart. Not only that, but as Vlad Zamfir so eloquently put it, “When miners become more powerful, everyone else gets less of a say.” The reality is, whether we like it or not, with the advent of pools, the coveted decentralization that we hold so dear has become a lot more centralized than we’d like to admit. While P2P mining pools and decentralized exchanges exist, the incentives to make really great products do indeed stem from the profit motive, which is why it may be quite some time before those systems really take off in any meaningful way.

So then the question becomes, how do we fix it? Regular old user’s don’t have a say, and don’t get benefits right away from using most existing cryptocurrency systems. We want to reward every part of the ecosystem and allow everyone to have a voice. This is why we’ve devised a system that benefits the entire ecosystem and provides them with a platform, not just those few at the top. A design this way from the beginning is crucial.

### 4.2.3. Governance Rewards

We believe that with the addition of the Pixel program and voter compensation it accomplishes two things: Fixing the imbalance of rewards in a system by encouraging real usage and participation, rather than simply chanting the mantra of “Hodl”. By introducing Pixels, users are incentivized in sending and interacting with the platform at large, rewarding them for becoming notable figure on the platform, and possibly recipients of more Pixels. In some respects, they could be seen as upvotes that turn into spendable “points” at the end of a given week. This distribution will be essentially a core dApp for Color and will function as a way for new users to hit the ground running with the Color Platform, or a way for active users to have a voice and be rewarded.

![Figure 4-1 Reward distribution](image)

Figure 4-1 Reward distribution
Tentatively, new coins minted will have a distribution similar to the following:

**Pixel Program:** These are given from the formula introduced in the Pixels section. This will reward new and active users who contribute and utilize the platform. The Platform will generate every week 200,000 COL for Pixel rewards.

**Network Support:** In the Color system, the network pays rewards to those who make the Platform run - to Logic Runner and nodes involved in Block Builder. This will be split with users who are also willing and able to provide infrastructure to the platform and users will be compensated based on their continued availability, and other factors. The Platform will emit 100,000 COL every week (declining every year by a certain rate) and transfer 40% of transaction fees to cover expenses of these nodes. The actual distribution between Logic Runners and the Block Builders is to be specified by the Steering Committee prior to MainNet launch.

However, it is unlikely these rewards will result in voter promise rewards (rewards paid to voters for voting for block builders) because the nodes will become Block Builders based on their ability to provide real infrastructure backing to the dApp creators and those who have needs for a distributed hosting system. In order to provide free or near-free hosting services, we will need to provide rewards to those that host the content. Nodes for Block Builder will be selected by the Council. The exact amounts of Block Builders, tentatively 55, will come out in a future version of the white paper.

**Treasury:** The Treasury will be the lifeblood of the continuing development of the Color Platform. In the future, the community may want to grow and have ideas for the coin that would require something beyond the budget, and eventually the Steering Committee team would hope to compete for Treasury funds in which the Council Members can vote for. The treasury will be a place where anyone can come, pay a proposal submission fee and that proposal would then be up for a vote in the Treasury system. If it gets certain amount of votes and the funds are still available, then that proposal will be paid out.

The Platform will emit 100,000 COL every week (declining every year by a certain rate) and transfer 30% of transaction fees to the Treasury.

**Council:** Council in Color will be those users, who are recognized by the community and proactively contribute to Color Ecosystem. The community reputation is measured by the amount of Pixels received over a specific period of time, and the exact formula for Council member selection criteria will be published in a later version of white paper.

Council members will earn a percentage of rewards if they meet a certain criteria, that will be decided in a later version of white paper. They will also have the opportunity to
vote on proposals concerning treasury funds, changes in governance policies, and changes to the direction of the Color Coin, and vote on the appointment of Steering Committee members.

The Platform will emit 100,000 COL every week (declining every year by a certain rate) and transfer 30% of transaction fees to rewards of Council Members for their activity in governance of the Color Platform.

dApp Creators and Bootstrap Phase: The dApp creators will provide real use cases and value in the system, and can impose their fees within their apps at their own volition. They will enjoy free or near-free hosting within the Color Platform and can charge less prices for their services because they aren't being forced to pay for hosting on the Color Platform. Additionally they can earn money in the form of Pixels that users use to fund its development, acting as a pseudo “ICO” or bootstrapping system, and they can impose their own fees and make requests from the treasury as well.

Most importantly, during the first two years of the Color Platform there will be a dApp bootstrap phase of two years consisting of 100M Color Coins, 50M coins each year. These will be awarded to partners for their continued dApp creation and maintenance and to community members who create and propose dApps. The coins will be allocated to the treasury at the rate of an additional 1,000,000 coins per week for 100 weeks.

4.2.4. The Treasury

The treasury funds make a large part of the block reward, but what are they for exactly? A quick peek into Dash’s Budget tracker⁵ shows us that these funds, at least in Dash, the largest longest running coin with an integrated treasury system, the fund usage is rather diverse. Funding anything from Latin American outreach projects to building up services, and even keeping the Steering Committee around to work on the project. That’s right, if Color Platform users decided that once the Core development team runs out of their own funding, it is going to have to prove its worth to the network through continually requesting the needed funds for the monthly operating expenses to the treasury.

Some examples of expected treasury proposals would be feature adds to existing dApps, new dApps, outreach efforts, our partners and Steering Committee requesting operating budgets, etc. The idea is that the more eyes that are on the treasury, higher quality submissions will be a must. This will prevent waste and amateur proposals from being the only things that are in the treasury system, outside of the monetary incentive and high competition alone.

How Treasury Voting Works

Treasury voting will be determined by a Pixel balance of the user. Top balance holders of Pixels will be able to vote on treasury proposals for the community. Popular accounts like charities, developers, activists, and community leaders, and those accounts that often receive Pixels will have loud voices and be able to vote on proposals to where the new Color Coins in the treasury will be distributed to. Each of these top nodes or ‘Council Members’ will be able to vote on each proposal exactly once, or abstain from voting altogether. The threshold to determine who can vote will be set out in a later whitepaper.

Treasury Proposal Costs

The way the treasury will work within Color is that nodes with a certain balance of Pixels or above become Council Members will be able to vote on proposals (which can be submitted by anyone if they pay a fee). As with other treasury systems there will be a dynamically calculated proposal fee that changes every month. This will take into account three things:

1) The number of proposals submitted last proposal cycle
2) The cost of a proposal in terms of USD now vs. the last proposal cycle
3) The amount of unallocated treasury funds in the last cycle.

This will ensure that there won’t need to be a rule change every time the price of Color changes. If the last proposal cycle went by and almost no one submitted proposals, the cost would drop significantly for that fact alone, but if the price of the Color token going too high was part of the reason no one submitted proposals, that would further drive down the price of proposals as well. We hope to prevent spam proposals, but also not price out anyone who wants to add value to the system.

4.2.5. Steering Committee

Steering Committee will govern the technological evolution of Color Platform. Among their responsibilities will be how major codebase changes (releases) happen, and how larger decisions are put forward on to the community and committed to. The 17 members of the Steering Committee will represent all communities that burgeon from the Color Platform: platform developers, dApp developers, infrastructures for Logic Runners and Block Builder, end users of dApps. The 17 members of the Committee will be elected by the Council Members through direct voting.

The major obligation of the Steering Committee is to oversee the development process of the Color Platform.
Color Platform code will be publicly available at GitHub and open for contributions and issue reports. Open source software is driven by two forces - enthusiasts that code “just for fun”6 and companies that benefit from communities or services that emerge around the software.

In Color Platform we will provide valuable incentives to both categories of contributors. Patches, accepted by the Core Dev team, will receive rewards in COL. The actual volume and procedures are still to be defined, but we believe in coding community and that with little support it will become one of the strongest drivers to Color Platform technology excellence.

Another aspect of the software development is Quality Assurance. In open source software it is the community that voluntarily submits bug reports. Well-written reports, with detailed descriptions on how to reveal a defect, will be rewarded from Governance Support expenses.

Extension of the platform, such as new features and improvements, could be submitted through treasury projects. If the community votes for such a proposal, it receives funding.

4.3. Token Issuance

4.3.1. Token Generation Event Terms

The Color Coin (COL) is a platform cryptocurrency that will be used on every dApp across the Color Platform. The Color Coin plans to unite and create a synergy among dApps, instead of allowing disconnected dApps to slow down the platform.

Total Token Supply
500,000,000 COL

Token Generation Event Token Supply
350,000,000 COL

KYC Requirements for Token Generation Event
First Name, Last Name, Age (Above 18 Years Old), Gender, Nationality, and Residence Country.

Token Generation Event Unsold Tokens
Treasury

Token Generation Event Accepted Currency

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4.3.2. **Token Generation Event (TGE) Breakdown**

![Figure 4-1 TGE Breakdown](image)

**Token Generation Event (350,000,000 - 70%)**
In the token generation event (TGE), a portion of the total 500,000,000 coins will be offered to participants as ERC20 tokens. The TGE breakdown budget and usage will be discussed thoroughly in a future version of this white paper.

**Platform Reserve (50,000,000 - 10%)**
Development may encounter unforeseen circumstances in which more Color Coins may be required. Steering Committee withholds these tokens and may use them to support platform development if necessary.

**Bounty and Partnerships (50,000,000 - 10%)**
Delegates from the Color Project such as the marketing team, dApp-development teams, and others will be given access to a fund used to award bounties. Bounty rewards may include a bonus for finding bugs in the platform (or dApps running on top of it), contests, etc.

**Team and Advisors (50,000,000 - 10%)**
The companies and organizations that came together to make the Color Platform a reality took an enormous risk. These coins will be used to compensate those who made Color possible, which will incentivize further development on the Color Platform.
4.3.3. Token Generation Event Proceeds

This section describes the expected spending of the funds earned during TGE.

Platform Development
The majority of token-generation-event proceeds will be invested in the development of the Color Platform. For the Color Platform to reach its true potential, Color Virtual Machine, Color Consensus, Color Development Kit, Quality Assurance Infrastructure, and Color Wallet must all be developed.

dApp Development
The Color Platform aims to develop 10 dApps. The Color Team is currently working with third-party developers to build dApps on the Color Platform. The bulk of dApp development funds will go toward supporting internal and external dApp teams.

Operation Expense
The Color Platform is a global platform with bases in Singapore and South Korea, with plans to open Color Research Centers in the United States, Russia, Belarus, and other countries soon after. The operation expense will mostly be used to maintain and expand the office-management team.

Strategic Partnerships
The Color Platform plans not only to internally develop dApps but exponentially expand its dApp library by partnering with various third parties. The Color Platform will build upon these strategic partnerships and distribute Color dApps to various markets.

Marketing and Promotions
Marketing is the backbone of any product success. The Color Platform aims to continually invest in marketing Color Platform products. The Color Team intends to devote a separate team to each dApp and execute a cohesive marketing campaign.

4.3.4. Token Emission Over Time

The total supply of Color Coins evolves over time with variable but decreasing inflation rate. The decreasing rate will be adjusted every year based on the demand and supply of Color Coins and the stability of Color network. The decreasing rate will be decided by the Color Council.

There are four long-term channels of coin emission:

- **Pixel Program** will distribute 200,000 coins every week starting from the first year of Color Platform. Every year the emission rate of Color Coins for Pixel Program will decrease by a certain rate.
• **Network Support** will distribute 100,000 coins every week to cover expenses of Logic Runners on execution of dApps code and block producing Block Builder nodes from the first year of Color Platform. Every year the emission rate of Color Coins for Network Support will decrease by a certain rate.

• **Treasury** will receive 100,000 coins every week for the first year. Treasury will be funding projects devoted to further development of Color Platform and Color Ecosystem. Every year the emission rate of Color Coins for Treasury will decrease by a certain rate.

• **Council** will be supported by 100,000 coins every week for the first year. Those coins will be spent as incentives for Council Members to work on community development and voting for new initiatives. Every year the emission rate of Color Coins for Council Members will decrease by a certain rate.

To accelerate the build-up of Color dApp ecosystem during the three year of “dApp Bootstrap Phase” Color Platform will issue 1,000,000 coins each week for Treasury to bootstrap dApps and foster rapid growth of the ecosystem. The program will last for 100 weeks, total coin issuance for the Bootstrap Phase will be 100,000,000 coins.

With the decreasing emission rate over four long-term channels and two emissions during the “dApp Bootstrap Phase”, the total supply of Color Coins is still to be limited in time of 50 years by 980 million of Color Coins.

### 4.4. Transaction Fees

In order to support Color Network operations and its further development, transactions involving coin transfer will be imposed to small fees. The current value of the fee is expected to be 0.05% of the value of the transaction with minimum of $0.005. The reason for transaction fee is to have capped total supply of Color Coins and avoid unlimited inflation. Having transaction fee is also to prevent DDoS attacks.

At the early years the most of expenses of Logic Runner and Block Builder nodes would be covered by direct emission of coins. Over time the business activity in Color Platform network will grow, resulting in constantly increasing income of transaction fees. We expect that around year 10 of Color Platform it would be the transaction fees to cover more than 50% of operational expenses.

Transaction fees will be transferred to the following goals:

- 40%: Rewards for Logic Runners and Block Builders;
- 30%: Treasury;
- 30%: Council.

The actual distribution may change with time according to governance decisions.
5. Disclaimer

Please read this entire section carefully. If you are in any doubt as to the action you should take, please consult your legal, financial, tax, or other professional advisor(s). The white paper may be updated before the main Token Generation Event.

5.1. Legal Statement

(a) This white paper ("white paper") in its current form is circulated for general informational purposes only in relation to the Color Platform ("the Color Platform") project as presently conceived and is subject to review and revision. Please note that this white paper is a work in progress, and the information in this white paper is current only as of the date on the cover hereof. Thereafter, the information, including information concerning ("Pax Datatech Pte Ltd.",”) business operations and financial condition, may have changed. We reserve the right to update the white paper from time to time.

(b) No person is bound to enter into any contract or binding legal commitment in relation to the sale and purchase of the Color Coin (as defined below) and no payment is to be accepted on the basis of this white paper. Any sale and purchase of the Color Coin will be governed by a legally binding agreement, the details of which will be made available separately from this white paper. In the event of any inconsistencies between the above-mentioned agreement and this white paper, the former shall prevail.

(c) This white paper does not constitute or form part of any opinion on any advice to sell or any solicitation of any offer by the issuer/distributor/vendor of the Color Coin to purchase any Color Coin, nor shall it or any part of it, nor the fact of its presentation, form the basis of or be relied upon in connection with any contract or investment decision.

(d) The Color Coins are not intended to constitute securities, units in a business trust, or units in a collective investment scheme, each as defined under the Securities and Futures Act (Cap. 289) of Singapore or its equivalent in any other jurisdiction. Accordingly, this white paper therefore does not, and is not intended to, constitute a prospectus, profile statement, or offer document of any sort and should not be construed as an offer of securities of any form, units in a business trust, units in a collective investment scheme, or any other form of investment, or a solicitation for any form of investment in any jurisdiction.
(e) No Color Coin should be construed, interpreted, classified, or treated as enabling or according any opportunity to purchasers to participate in or receive profits, income, or other payments or returns arising from or in connection with the Color Platform, the Color Coin, or products, or to receive sums paid out of such profits, income, or other payments or returns.

(f) This white paper or any part hereof may not be reproduced, distributed, or otherwise disseminated in any jurisdiction where offering coins/tokens in the manner set out in this white paper is regulated or prohibited.

(g) No regulatory authority has reviewed, examined, or approved of any of the information set out in this white paper. No such action has been or will be taken in any jurisdiction.

(h) Where you wish to purchase any Color Coin, the Color Coins are not to be construed, interpreted, classified, or treated as: (a) any kind of currency other than cryptocurrency; (b) debentures, stocks, or shares issued by any entity; (c) rights, options, or derivatives in respect to such debentures, stocks, or shares; (d) rights under a contract for differences or under any other contract with the purpose, or pretended purpose, to secure a profit or avoid a loss; or (e) units or derivatives in a collective investment scheme or business trust, or any other type of securities.

5.2. Restrictions on Distribution and Dissemination

(a) The distribution or dissemination of this white paper or any part thereof may be prohibited or restricted by the laws or regulatory requirements of any jurisdiction. In the case where any restriction applies, you are to inform yourself about, to obtain legal and other relevant advice on, and to observe any restrictions that are applicable to your possession of this white paper or such part thereof (as the case may be) at your own expense and without liability to the Color Platform or its representatives, agents, and related companies (“Affiliates”).

(b) Persons to whom a copy of this white paper has been distributed or disseminated, provided access to, or who otherwise have the white paper in their possession shall not circulate it to any other persons, reproduce, or otherwise distribute this white paper or any information contained herein for any purpose whatsoever, nor permit or cause the same to occur.

5.3. Disclaimer of Liability

(a) The Color Coin and related services provided by the Color Platform and its Affiliates are provided on an “as is” and “as available” basis. The Color Platform
and its Affiliates do not grant any warranties or make any representation, express or implied or otherwise, as to the accessibility, quality, suitability, accuracy, adequacy, or completeness of the Color Coin or any related services provided by the Color Platform and its Affiliates, and expressly disclaim any liability for errors, delays, or omissions in, or for any action taken in reliance on, the Color Coin and related services provided by the Color Platform and its Affiliates.

(b) The Color Platform and its Affiliates do not make or purport to make, and hereby disclaim, any representation, warranty, or undertaking in any form whatsoever to any entity or person, including any representation, warranty, or undertaking in relation to the truth, accuracy, and completeness of any of the information set out in this white paper.

(c) To the maximum extent permitted by the applicable laws and regulations, the Color Platform and its Affiliates shall not be liable for any indirect, special, incidental, consequential, or other losses of any kind in tort, contract, or otherwise (including but not limited to loss of revenue, income, or profits and loss of use or data) arising out of or in connection with any acceptance of or reliance on this white paper or any part thereof by you.

5.4. Cautionary Note on Forward-Looking Statements

(a) Certain information set forth in this white paper includes forward-looking information regarding the future of the project, future events, and projections. These statements are not statements of historical fact and may be identified by, but not limited to, words and phrases such as “will,” “estimate,” “believe,” “expect,” “project,” and “anticipate” or words of similar meaning. Such forward-looking statements are also included in other publicly available materials such as presentations, interviews, videos, etc. Information contained in this white paper constitutes forward-looking statements including but not limited to future results, performance, or achievements of the Color Platform or its Affiliates.

(b) The forward-looking statements involve a variety of risks and uncertainties. These statements are not guarantees of future performance and no undue reliance should be placed on them. Should any of these risks or uncertainties materialize, the actual performance and progress of the Color Platform or its Affiliates might differ from expectations set by the forward-looking statements. The Color Platform or its Affiliates undertake no obligation to update forward-looking statements should there be any change in circumstances. By acting upon forward-looking information received from this white paper, the Color Platform or its Affiliates’ websites, and other materials produced by the
Color Platform or its Affiliates, you personally bear full responsibility in the event that the forward-looking statements do not materialize.

(c) As of the date of this white paper, the Color Platform has not been completed and is not fully operational. Any description pertaining to and regarding the Color Platform is made on the basis that the Color Platform will be completed and be fully operational. However, this paragraph shall in no way be construed as providing any form of guarantee or assurance that the Color Platform will eventually be completed or be fully operational.

(d) PUF-related forward-looking milestones will heavily depend on the outcome of its POS (Proof of Concept) period. If the POS results in inappropriateness of PUF integration to Color Platform, all the PUF-related projects may be dropped.

5.5. Potential Risks

(a) Please carefully read every piece of information, understand, and analyze the risks and related factors before deciding to participate and purchase the Color Coin. The risks include but are not limited to:

(i) risk of losing access to the Color Coins due to loss of identification information, loss of requisite private key(s) associated with the digital wallet or vault storing the Color Coin, or any other kind of custodial or purchaser errors;

(ii) fluctuations of the value of the Color Coin post-issuance due to the general global market and economic conditions. Such volatility in the value of the Color Coin may lead to the Color Platform not being able to fund the development of the Color Platform ecosystem or not being able to maintain the Color Platform ecosystem in the manner intended;

(iii) changes in political, social, economic, and stock or cryptocurrency market conditions, and the regulatory environment in the countries in which the Color Platform or its Affiliates conduct their businesses and operations, and the ability of the Color Platform or its Affiliates to survive or compete under such conditions. It is possible that certain jurisdictions will apply existing regulations to, or introduce new regulations addressing, blockchain technology that may be contrary to the Color Coin and/or the Color Platform ecosystem that may, inter alia, result in substantial modifications of the Color Platform ecosystem and the Color Platform project, including termination and loss of the Color Coins;
changes in the future capital needs of the Color Platform or its Affiliates and the availability of financing and capital to fund such needs. A lack of funding could impact the development of the Color Platform and the uses or potential value of the Color Coin;

for a number of reasons including, but not limited to, an unfavorable fluctuation in the value of the Color Coin, the failure of business relationships, or competing intellectual property claims during development or operation, the Color Platform project may no longer be a viable activity and may be dissolved or simply not launched, negatively impacting the Color Platform ecosystem, the Color Coin, and the potential utility of the Color Coins;

the lack of interest from a large number of companies, individuals, and other organizations for the Color Platform and services and that there may be limited public interest in the creation and development of distributed applications. Such a lack of interest could lead to a lack of funding and also impact the development of the Color Platform and the uses or potential value of the Color Coin;

significant changes made to the features or specifications of the Color Coin or the Color Platform before the release or implementation of the Color Platform project and/or the Color Platform ecosystem. While the Color Platform intends for the Color Coin and the Color Platform ecosystem to function as described in this white paper, the Color Platform may nevertheless make such changes;

competition from alternative platforms that may have been established, which could potentially adversely impact the Color Coin and the Color Platform (e.g. lack of commercial success or prospects caused by competing projects);

interference with the use of the Color Coin and the infrastructure of the Color Platform due to any weaknesses or malware that may be intentionally or unintentionally introduced into the software of the Color Platform, whether or not by a third-party member, the Color Platform, or its Affiliates. The blockchain used for the platform is also vulnerable to attacks that pose a risk to the platform and the performance of related services;

occurrences of catastrophic events, natural disasters, and acts of God that affect the businesses or operations of the Color Platform or its Affiliates and other factors beyond the control of the Color Platform or
its Affiliates. This includes mining attacks and attacks by hackers or other individuals that could result in theft or loss of proceeds of the Color Coin sale or the Color Coin and impacting the ability to develop the Color Platform ecosystem;

(xi) The Color Coins and other cryptocurrencies are a new, untested technology and constantly developing. The full functionality of the Color Coins is not yet complete, and no assurance can be provided of such completion. As technology matures, developments in cryptographic technologies and techniques or changes in consensus protocol or algorithms could present risks to the Color Coin, the Color Coin sale, the Color Platform project and/or the Color Platform ecosystem, including the utility of the Color Coin and the functionality of PUF (Physical Unclonable Function) chip;

(xii) The Color Coins confer no governance rights of any kind with respect to the Color Platform project, the Color Platform ecosystem, and/or the Color Platform, and all decisions will be made by the Color Platform at its sole discretion, including decisions to discontinue the Color Platform’s products or services, the Color Platform project, and/or the Color Platform ecosystem, to create and sell more Color Coins for use in the Color Platform ecosystem, or to sell or liquidate the Color Platform; and

(xiii) The tax treatment and accounting of the Color Coins is uncertain and may vary among jurisdictions. There may be adverse tax consequences, and independent tax advice in connection with purchasing the Color Coin should be obtained.

In addition to the risks stipulated above, there are other risks that the Color Platform and its Affiliates cannot predict. Risks may also occur as unanticipated combinations or as changes in the risks stipulated herein.

(b) If any of such risks and uncertainties develops into actual events, the business, financial condition, results of operations, and prospects of the Color Platform or its Affiliates could be materially and adversely affected. In such cases, you may lose all or part of the value of the Color Coin.

5.6. No Further Information or Update

No person has been or is authorized to give any information or representation not contained in this white paper in connection with the Color Coin, the Color Platform, or its Affiliates and their respective businesses and operations, and, if given, such
information or representation must not be relied upon as having been authorized by or on behalf of the Color Platform or its Affiliates.

5.7. No Advice

No information in this white paper should be considered to be business, legal, financial, or tax advice regarding the Color Coin, the Color Platform, or its Affiliates. You should consult your own legal, financial, tax, or other professional advisor(s) regarding the Color Coin, the Color Platform, or its Affiliates and their respective businesses and operations. You should be aware that you may be required to bear the financial risk of any purchase of the Color Coins for an indefinite period of time.