EXORDE

WHITEPAPER

THE DECENTRALIZED

INFORMATION MAPPING PLATFORM

PUBLICLY INDEXED KNOWLEDGE GRAPHS

Technical Whitepaper
Exorde, the decentralized information mapping platform.
Web Knowledge Mining as a Service

Térence Gras, Mathias Dail, Damien Pucheu, Flavien Lepine
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Exorde is a collaborative, decentralized, international and information-neutral platform that will be aimed at analyzing, mapping, and describing the information existing on the web. Exorde is built on top of a decentralized knowledge graph, capturing the spread of the diverse content circulating on the web, for the good of the web users. Exorde captures the relevant trends, clusters, patterns and metadata of the Web. It relies entirely on its contributors to create the content as we firmly believe only diverse populations (from various origins, political backgrounds, etc.) are a fit candidate for assessing the credibility of online information. On Exorde, the content is refined collectively and intelligently. The contributors are content-mining valuable information into the platform, by indexing the most relevant parts of the web, the connections between its content, and are rewarded with its native currency. The economic incentives built within Exorde are expected to make the network grow over time, to be an increasingly more valuable and more relevant knowledge platform. We believe that we can build on crypto-currency and blockchain technology, while still creating a novel platform that is simple to use and access.

Exorde as a global platform aims to reward the most relevant internal work because it increases the total value of its network, creating a feedback loop for the contributors. Exorde's hybrid architecture is based on resilient decentralized storage, blockchain technology, elastic peer to peer networks, and economical and reputational incentives.

This allows Exorde to be a decentralized platform of a new kind, enabling greater scalability than most decentralized applications, unrestricted adoption and great user experience by requiring as little technical knowledge as possible. Exorde's core design follows its core principles, to be decentralized, open, content-neutral, self-innovative and above-all, to reach as many Internet users as possible.

1   Introduction

Data growth has been impressive in the past few years and the online world keeps growing and accelerating. An astonishing 90%[1] of internet data has been created in the last 2 years. Today, the Internet hosts close to 2 billion active websites and is an ever-evolving data jungle. In recent years, a great deal of attention has been devoted to the rise in "fake news": everything from satire and misleading content to articles that are completely fabricated. When any type of content (image, news, video, audio, . . .) makes it on the web, it can spread anywhere in a matter of seconds, without any original context, for any purpose. Any authentic content (or not) can be reused to create viral fake information to manipulate the public opinion on a given subject in the short term or hurt the reputation of any entity (organizations, personas, etc). Most of the time, automated programs (bots) are the source of fake news, making it very immediate and dangerous. Recent advances in language generation models such as GPT-3, also increase the fake news risk. These types of systems have shown to have advanced capabilities for producing several paragraphs of realistic text. The rise of this type of technology allows malicious entities to automatically create articles, rewrite them, and spread them online in large numbers and on many different platforms, overwhelming the different systems and companies trying to fight against it. Additionally, the news is consumed more and more via personalized and customized news sites and social media (personalized search, newsfeed). This creates an effect of keeping the users inside a bubble of information, isolated from any news and information that is deemed inconsistent with their bias & beliefs. Rapid technological advancements and this bubbling effect mean that fake news or other informative campaigns have the potential to create a much bigger impact on society over time.

The greatness of the challenge can be clearly seen from the fact that large companies like Twitter and Facebook seem to struggle against misinformation despite the resources invested. According to a report from Oxford University researcher, almost 60% of misinformation surrounding the coronavirus pandemic remains on Twitter without a warning label[2]. Facebook has increased its efforts to combat fake news, by employing human fact-checkers in combination with artificial intelligence systems. Even though the vast majority of Facebook's efforts against fake news are powered by artificial intelligence, those fact-checkers, providing the necessary human touch to reviewing fake news, are overwhelmed with the amount of data flooding the social-medial giant's platform.

The issue of misinformation online, and more generally, handling new, unreviewed data and new websites appearing every day is a global challenge. Therefore we believe that it can only be tackled by a global approach that goes beyond the reach of each social network or individual content creators. This solution needs to be open, uncensorable, collaborative, and fully transparent, to enable trust and longevity in its results.

Blockchain technology, or more broadly distributed ledger technology (DLT), is enabling trust in a fully decentralized peer-to-peer network, has censorship resistance and full transparency at its core, therefore it is the only natural choice to implement this solution. Blockchain technology has recently revolutionized a diversity of industries by developing solutions that can provide trust, security, and privacy. Blockchain networks provide a mechanism for maintaining a distributed tamper-proof ledger to record the transactions in a data structure named blockchain. Cambridge, on their 3rd crypto-asset Benchmark Study, released in September 2020 shows the growth in adoption of blockchain systems. In the last 3 years, the number of users was multiplied by 3 and is still rising. Blockchain technology and especially smart-contracts have recently revolutionized many businesses by developing solutions that can provide trust, security, and transparency in an efficient & easily inter-operable digital ecosystem.

Additionally, Natural Language Processing (NLP), the text-analytics branch of AI, has seen its performance increase dramatically in the last few years. The advent of deep learning-based language models and contextual language understanding systems like BERT & GPT-2, GPT-3 made very relevant use cases possible, including Named Entity Recognition, Sentence Similarity analysis, Semantic Labeling, as well as classification, clustering, and summarization. These NLP systems can now realistically correlate a diversity of texts from different sources, based on their semantics. With blockchain, we believe that NLP & automated text-analytics systems are a critical component of the future of the fight against misinformation. These systems can help do the base work, by automatically correlating similar information across different media platforms. It can extract facts and statements from content found on the web and connect them together. NLP greatly accelerates any analysis, like extracting trending information, tracing back information to its source, extracting the different relays of given piece of information, clustering information, and much more.

The IT research and analysis firm Gartner has predicted that by 2023, up to 30 percent of news and video content will be authenticated by the blockchain[3] . Many blockchain-based projects attempted to address the fake news problem by taking a

closed approach, by having the certified information labeled as such on a blockchain and staying in a closed data circuit. This approach is simple, but it is naïve in the sense that it can only gain momentum if all users start to read only the content referenced on a specific blockchain, dismissing the large majority of the content that isn't. We propose, with Exorde, a completely different and more realistic approach to tackle misinformation: by having a broswer extension acting as a live information assesment system, built on top of a blockchain-based collaborative & transparent web indexing platform. Exorde is inherently built as an additional layer to the current web, with transparency, openness, censorship resistanceand great user experience. The Exorde platform is designed with blockchain peer-to-peer technology, NLP technology, and decentralized collaboration. These are the main pillars that make harnessing a large amount of unstructured online data while tackling the spread of fake news and online misinformation campaigns. In time, Exorde aims to become the reference in terms of mapping the information on the internet and its spread, based on community-driven consensus as to what is trustworthy and what isn't.

External Links:

[1] Big Data, for better or worse: 90% of world's data generated over last two years - ScienceDaily

[2] Twitter Fails To Remove Almost 60% Of COVID-19 Misinformation, Study Claims - Forbes

[3] Gartner Top Strategic Predictions for 2020 and Beyond - Gartner

2   Exorde Core Values and Mission

Exorde has a mission to spread knowledge, thanks to blockchain technology and decentralized networks, to change the way people browse the web and to create an autonomous data economy. The platform aims to fight misinformation, as it is its main project, but Exorde's purpose is to become a data hub, built around an ever-growing knowledge graph database and its data services economy. The vision for Exorde is to become a pillar of modern web infrastructure, by providing accurate and relevant metadata on the web itself, for all users.

The whole platform, economy and community is designed around the core values that we believe are crucial for such a project to thrive and reach mass adoption:

1) **Great user experience**: to enable adoption as much as it is possible. to remove all technical barriers to on-board a maximum of end users or participants. A modern and smooth user experience is key to accelerate community growth, and thus platform growth, impacting its overall value and impact on society.

2) **Openness**: Exorde can only thrive if it works in full transparency, allows everyone to assess its results, its data and participate. Exorde wants to be a foundation layer for the Internet, by being the most open platform it can be.

3) **Innovation**: Exorde has clear goals and will achieve them via collaboration through innovative ways. It will make use of the latest advancements of AI and Natural Language Processing. It will work in a trustworthy environment thanks to blockchain technology and game theory. The platform is autonomous and will improve its functionalities, through constant innovation, to be the most relevant knowledge base of the web.

4) **Neutrality**: Exorde's main goal is to remain neutral with regards to the information it handles. This aspect has been carefully studied through the creation of WorkSystems, a series of collaborative lobbies where collaborators break down the tasks required to index information.

3 Exorde Key Features

We propose an ecosystem, called Exorde, built around a core platform, a web browser extension and powered by its own token-based economy.

3.0.1 Exorde Platform

The Exorde core data indexing platform is the main component and will serve as a base layer for the whole ecosystem. This platform is collaborative, decentralized, open, and transparent. This platform is where the contributors will work together to index the whole web, to extract its information, the relations, similarities, trends, and any type of pattern in the information circulating everywhere on the web, regardless of the platform or media. The Exorde platform is a web data indexing platform that performs a continuous knowledge extraction on the content that is referenced and indexed by the Exorde participants.

This platform is autonomous and has its own decentralized governance, including votes and polls. The governance is decentralized among all the community members, whether they are investors, participants, workers. Collectively, they alter the internal rules and parameters of the systems (rewards, constraints, delays, plannings, etc..) and will have a built-in reputation system. These mechanisms are designed to keep the community interests and its governance aligned at all times, for the good of the Exorde ecosystem.

Functionally, at the platform's core are the WorkSystems, designed in layers. The WorkSystems act as a digital data factory powering the **Exorde Knowledge Graph, or Exorde Graph**, where all the tasks are divided by sector:

1) **WorkSystems**: the first layer of the system where participants index different URLs taken off the internet and their data relationships (similarities, correlations) according to predefined rules AND guidelines. This set of rules is set and approved by the Exorde community and can evolve over time to value relevance and maximize data value creation.

2) **Data Analytics System**: the second layer of the system where participants perform a continuous data analysis of different types on the linked & indexed data of the Exorde Graph. It includes data clustering, trend analysis, information tracing, partitioning, and more. These data operations will increase in quantity and diversity, over time, to follow demand and to maximize value.

3.0.2   A free-to-use data browser extension

We will provide a free-to-use browser extension, to enable safer and more informed web browsing. This extension will be powered by AI and more especially NLP. It will provide trust scores about websites and content. It will highlight parts of articles, for example, that are parts of misinformation campaigns or viral unverified information. The extension is a free public service that has only one main goal: to make the user experience of browsing the modern web safer and more relevant.

This component of the ecosystem is designed to be the most accessible possible so as to reach the greatest audience. Note that its open-source nature will enforce its trustworthiness with regards to data collection.

3.0.3   Exorde Data Services Marketplace (DSM)

The Exorde ecosystem is composed of the WorkSystems, the core engine of the platform, and the Data services marketplace where collaborators act as a collective monetized request-response service-driven community. This service will include:

1) **Specific Data services**: clustering information, tracing a given piece of information/content online, finding the different sources in some data, correlating sources & content.

2) **Coverage requests**: updating given sub-graphs of the Exorde Graph up to date. (high refresh rates, critical information use cases, etc)

3) **Exploration requests**: Coverage of uncharted web territory

This DSM will work jointly with the WorkSystems for the coverage and exploration requests, effectively by implementing bounties for coverage requests and feedback mechanisms for exploration requests. Overall, the DSM will expand its services to match demand. It is expected that, as the WorkSystems run and that the Exorde Graph grows, its intrinsic value will increase exponentially and more advanced data services will emerge on the platform.

4   Market opportunities

Could We Fight Misinformation With Blockchain Technology?
- The New York Times

How Blockchain Can Prevent the Spread of Fake News
- Blockchain Blog | Dr Mark van Rijmenam

The popularity of blockchain-based systems is growing fast. This new sector is expected to disrupt the whole industry of content creation, distribution, contractualization, rights management with even new forms of remuneration. The blockchain and more generally decentralized network technologies, are actually capable of disrupting the entire creation chain. Blockchain helps here with the advent of decentralized autonomous organizations (DAO) that can accompany creators in their creation and production processes. To do this, a computer program executes a smart contract, whose rules are pre-established by the collaborators and recorded in a blockchain. The contracts can't be tempered with. For each task identified within the various processes, the amount of remuneration and the rights acquired on the result of the task are clearly defined. In a creative collaboration between the participants, the creation is then broken down into "creative tasks" (such as writing a verse or a scenario scene, composing a rhythm, in the musical context, for example) whose assembly forms the work.

The assembly, done in a decentralized and collaborative way, without third parties, is a key point, leading to the creation of value through a new form of efficient, transparent and open collaboration. The blockchain records, automatically and in real time, the execution of each task as well as the transaction associated with the remuneration of each collaborator. Motivated by guaranteed remuneration, the tasks are assured to be performed by a skilled collaborator, as DAOs are open systems where skilled workers can join freely and participate as long as they follow the given DAO framework, rules and guidelines.

In the last years, the industry has seen the emergence of indexing platforms like The Graph, serving as a decentralized API infrastructure for querying easily the information existing in blockchains to serve it to web applications. There are new kinds of information retrieval needs that are not matched by current major applications, due to the fundamental complexity and volatile nature of this information.

There is an empty spot in the market for a web data curation and indexing platform. This is where Exorde aims to shine, as it aims to serve a clear purpose in the web and blockchain ecosystem, while not having direct competitors. There is no analogy for Exorde, as the concept of decentralized knowledge creation, to fight misinformation online, to respond to the demand for advanced data services. This use case can only emerge within the context of blockchain technology and decentralized collaboration.

Exorde, as the web knowledge database is expected to grow, by capturing increasing parts of the data market. The more its content grows, the more value will be created by the platform, impacting the value and emergence of new data services around it.

To sum it up, Exorde is a knowledge-as-a-service indexing platform that works similarly to the The Graph one, but at a higher level: web knowledge, information trends, fake news detection and isolation. By becoming the main reference for certified metadata and web knowledge, Exorde aims to attract all content creators and public platforms to be integrated into a single informational ecosystem.

5   Information Mining and Indexing

Information Mining is a term that comes from the analogy with Bitcoin, where participants "mine" to secure the network, maintaining the value of the network while getting rewarded for it.

The analogy here is the same: participants within the Exorde networks are mining valuable, relevant and accurate information about the web to increase the overall value of its knowledge database, and are rewarded accordingly. In concrete terms, participants are scraping (in any way they like, following their own strategies) the relevant parts of the web, to extract the relations between their content, effectively indexing the world wide web data into a solid, censorship resistant and transparent system, the Exorde Platform.

This knowledge is then used to create value in different use cases. The major use case that will tackle Exorde will be to fight misinformation, but more use cases will be added as the platform grows and new needs arise.

Exorde is powered by its community, ruled by its own economy and rules. This community of participants will be working collaboratively on a base layer of indexing. This main layer, which is essentially a collaborative information graph, is "woven" and developed through distributed web-crawling, performed by participants doing their own information mining. Technically, information mining consists for each participant in extracting structured and hierarchical information from web pages, such as text (articles, social media, free text, etc.). This knowledge extraction is a challenging part of the work. It will be realized by a hybrid mix of artificial intelligence and supervision by a human actor. The IA part (using NLP for textual content) will allow: recognizing entities in a text, extracting sentences, facts, correlating them with each other and performing similarity calculations), cutting sentences. The supervision part will add the human touch necessary to the pre-processing done by AI-automation tools provided by Exorde. This approach seems essential to make the work of the participants as efficient as possible, but above all the most relevant in terms of information mined for the network.

As it is a decentralized work, it has to be peer-reviewed by the network. This means that a set of validators will systematically check and assess the quality of the work performed by a given indexer. Validators will evaluate work based on a set of guidelines and charts. More about this can be found in the WorkSystems section below.

6 System Architecture

Exorde is built on 3 major technological pillars:

1) **Ethereum**, a Layer 1 network: acts as a secure & transparent settlement layer. This is the chain that secures the Exorde token economy

2) **SKALE**, a Layer 2 network: an elastic sidechain network connected to the Layer 1 chain, acting as the Execution layer. It is a scalable and elastic environement, enabling high transaction throughput. The Exorde SKALE sidechain is where Exorde contributors and users will connect. It is on this Layer 2 that the Exorde collaborative work architecture is built on. This layer allows a scalable platform to be built on, for thousands of users to participate and interact.

3) **SWARM**, a decentralized storage network: acts as a censorship-resistant distributed storage for the data being created by the Exorde WorkSystems and Analytics systems. SWARM acts as a storage network and as a content distribution network at the same time.

These 3 pillars are critical to achieve Exorde's mission. Ethereum is needed to secure Exorde's governance and economy. SKALE Layer 2 is crucial to have an application that scales with its userbase, reducing interactions costs & latency. Swarm is the storage and content-distribution network of Exorde, serving its knowledge in a scalable way for the entire internet, while guaranteeing the absolute integrity of the data it serves to its users.

Systems built on SKALE:

1) **Data serving and aggregation layer: lowest level (Spotters and Formatters)**

2) **Data curation, indexing and linking of information (Rooters)**

3) **Moderation & Validation (Moderators and Checkers)**

4) **Governance (Voting Systems)**

The Graph, as a lower-level indexing layer will be used by Exorde. It will help to make the data serving & aggregation layer more efficient, allowing Exorde to focus on what it does best: indexing knowledge and performing high-level web content analysis. Exorde will be by providing high level knowledge subgraphs to be re-indexed and served by The Graph.

7   User Experience

Great User Experience is a core value of Exorde. We believe that a lot of efforts have to be made to make Exorde convenient and attractive for the greatest number of users, for both the good of the platform and for Exorde to thrive on the short and long term.

7.0.1   Browser Extension

The browser extension will be free to use, available on all of the most popular web browsers. It will be "plug and play" , and won't require any interaction from the user, just like most popular ad-blockers extension work. These extensions are the most popular as they are passively active.

Functionally it will show a trust score to the user in corner of a webpage, indicating:

1) The trust score of the source website: based on its historical publication patterns. Multiple factors will affect the information trust score of a site:

   a) Its past history of fake news being relayed or not

   b) source and main relayers' reputation

2) Trust scores and information metadata, highlighted directly on the content being consumed by the user. It will provide, optionally:

   a) Content accuracy based on whether or not said content is precise enough to not be considered as being misleading

   b) The sources/origin of each piece of information (the source of a video, the first relayer of a statement, etc.)

   c) The age of a content, to indicate to the user if a given information is recently being propagated online and therefore if it can be considered safe.

All users will have access to a free version of the extension, allowing for trust scores, and a "top-down" macro view of how these trust scores were calculated for the content they are currently viewing. Additional levels of detail will be available for higher tier users. The extension is designed to change the way a user browses the internet, by providing him with the desired information, and an associated trust score based on where that information has been relayed. It is designed to

be non-invasive and to help users be more critical with regards to the information they come across on the Internet. Note that a color code may be added to the displayed trust scores for additional accessibility.

7.0.2   Exorde Platform

The platform has strong foundations on blockchain technology and peer to peer storage networks. Until recently, most decentralized applications (or dapps) were difficult to access, as there was a great technical obstacle.

For non-crypto users, they require:

1) A specific crypto-wallet extension like Metamask

2) Some amount of cryptocurrency to interact with the application (like Ether) to pay the "gas" needed to interact with smart contracts building the different functionalities of a dapp.

3) To handle the safe storage of their crypto wallet keys (backing up the integrity of their funds)

This aspect of the crypto/blockchain revolution creates a lot of friction preventing mass adoption of dapps. Exorde, in the context of aiming for maximal accessibility, will tackle this problem by providing a non-technical user on-boarding and user experience:

1) The platform will offer classic website authentication with email and password

2) Using the platform will not require a crypto-wallet extension to interact with its features.

3) The platform will use a custodian provider, securing the wallet of our users, without impacting their safety: users will stay in total control of their crypto-wallet keys without having to bother with learning technicalities.

4) Users will be given the option to withdraw their EXD tokens to the address of their choice.

This design makes user on-boarding very quick, without bothering them with the difficult learning curve that is associated with decentralized applications and crypto-currency. However, it gives users time to mature this type of application and wallets before they decide to enter the crypto aspect of the application. We believe this creates the best balance between user accessibility and user crypto-funds security.

Secondly, as mentioned above, most dapps require users to pay for "gas" (paid usually in Ether (ETH) on the Ethereum blockchain) for each interaction, requiring them to first own some ETH, and forcing them to interact with a rigid interface. "No need for Metamask, no need to know crypto."

1) The Exorde platform will provide gasless interactions, thanks to the use of a Layer 2 network.

2) The economy and cost of the interactions will be only expressed in EXD, the native currency of the Exorde platform, enabling the user to not have to think about Ether, or any other blockchain-related concerns.

3) Users, during the early months of the platforms will be provided with a base amount of EXD to start using the platform freely. Users will then be guided if they want to purchase more EXD tokens, as it is the only effort we can't remove from the user experience in a decentralized application.

The use of this Layer 2 network will enable cheap interactions and more importantly, scalable interactions. The platform will be able to process thousands of interactions per second, as opposed to Ethereum-based applications (limited by the 15 transaction/second aspect of the Ethereum blockchain). We believe mass adoption can only become reality thanks to a scalable infrastructure, keeping up with a growing traffic and community.

Lastly, the platform is designed with the most simplicity in mind. Indexing, validating, moderating, clustering and other complex technical operations form a technical obstacle to the understanding of many potential users. Exorde will be designed, as much as can be, to simplify all its features, by isolating each functionalities and stages of its data indexing processes. Dashboards will be clean and provide a minimal amount of information for its non-technical users, while crypto-enthusiasts can enjoy more advanced functionalities and interactions.
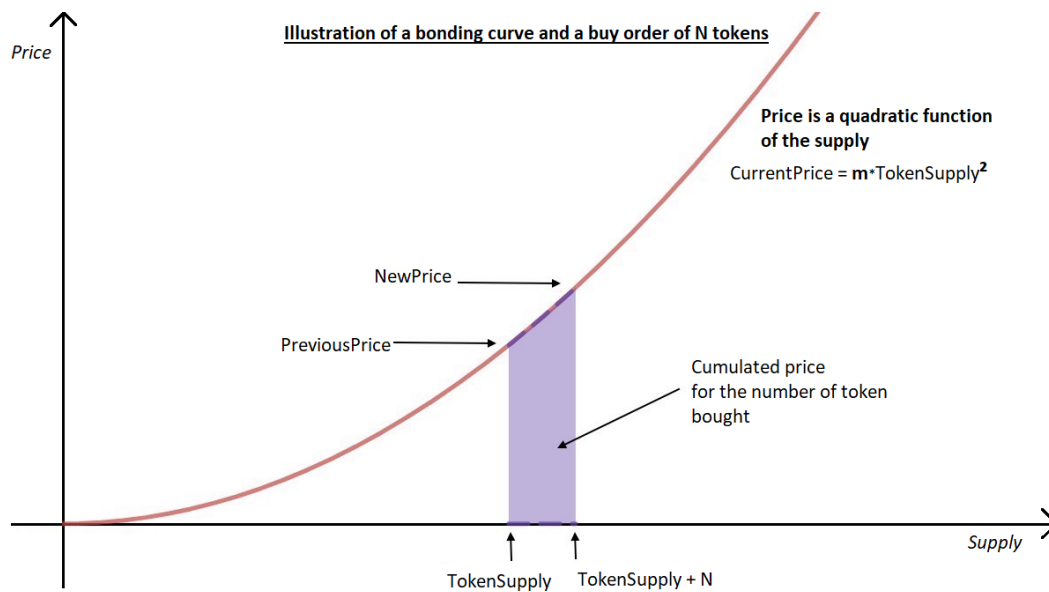
7.0.3   Exorde internal governance

The Exorde governance is decentralized, by nature, and the voting of each member is determined by its token holdings and its reputation, to reward active participants with voting rights in the decision-making processes. Governance enables Exorde to create new features, to update the inner parameters of its protocols (WorkSystems settings, Voting Systems settings), it can help the needed internal reorganisation as the platform's community grows and becomes highly multi-lingual and international.

This governance is implemented with a blockchain-based distributed autonomous & flexible organisation (DAO), that works with simple primitives that can enable Exorde to add micro-services and update its own backend services in a fully decentralized manner. Governance, in this way, is fully agile. The Exorde platform blockchain-based backend is completely modulable and securely upgradable, enabling Exorde to transition, to implement more complex and adaptive decision-making processes, for the long-term good of the platform.

8   Token Economy

The native token of the Exorde ecosystem is the utility token EXD. This multi-purpose Utility Token will be used for Governance, Staking and for all types of value transfers inside the ecosystem.

The token will be issued through a continuous token model, called a bonding curve. In this system, the current token price is mathematically related to the current token supply. The price will follow a quadratic growth function of the current supply. The Bonding Curve model is defined under a $y = m * x^e$ type of equation, with m being the slope and e the exponent of the curve.

Illustration of a bonding curve and a buy order of N tokens

Price is a quadratic function of the supply

$CurrentPrice = m * TokenSupply^2$

NewPrice

PreviousPrice

Cumulated price for the number of token bought

TokenSupply   TokenSupply + N

Launching a token with a bonding curve system, implemented as a smart contract is a strong decision, as it is a perpetual market making system. Once this contract is launched, users can buy or sell into the curve. Buying pushes the token price up along the curve, while selling pushes the token price down along the curve.

This modern distribution model provides many advantages. It includes being a automated and highly customizable automated market maker. It allows early participants to buy and sell early while enjoying a liquid system. It gives early buyers an additional incentive to buy into the curve, creating a positive cascading dynamic over time. If a project has a solid foundation, its continuous improvement should attract more buyers ultimately driving the price up the curve. We believe that it is important to allow for the token to derive its value from the real-world

value created by the project, as it creates an economic feedback loop enabling a sustainable system.

8.1   Utility Token

The Exorde Protocol is managed by people around the world who participate economically or technically into the ecosystem. The Exorde Protocol is governed mainly by EXD token holders.

The EXD token, based on the ERC-20 standard, is the native asset of the Exorde ecosystem. It is a utility token with multiple purposes:

1) Acts as the exchange medium in the Exorde ecosystem to buy data indexing, analysis or requests services.

2) Used as rewards (economic incentives) for the participants in the Exorde WorkSystems. It powers the "wheels" of the data "industry" behind the core of the Exorde ecosystem.

3) Acts as voting power during governance events: the amount of token a user holds determines his voting rights weight during Governance polling and votes.

A system of governance involving Protocol Executive Voting and Ecosystem Polling, the EXD holders govern the Protocol, its parameters (reward rates, rules, reputation system parameters, etc) and its functionalities. The system is economically designed to align the economic interest of the EXD holders with the platform's interests, to ensure its long term stability, to keep its data relevant, and to guarantee a maximal value creation by the ecosystem.

The EXD token will be based on a token-bonding curve smart contract, acting as an automated market maker ensuring:

1) Great liquidity for trading the EXD token against ETH or stablecoins, even at launch

2) Economical independence from third party crypto-exchanges, during the first weeks of the life of the Exorde platform

8.2   Token economics

The long term financial sustainability of the Exorde Platform will be guaranteed by two different token income streams:

1) Trading Exchange Fees: each sell order on the token-bonding curve will include a 2.5% fee, applied to the transaction value.

2) Data Services market: any type of data service (data analysis requests, analysis requests, Exorde Graph exploration, etc) will include a 3% fee, applied to the transaction value.

These fees will be redistributed, via smart contracts, to finance the Exorde Ecosystem. They will be split between the Developer Fund and the Rewards Pool, ensuring the continuous development, and the neutrality of the WorkSystems by providing continuous economic incentives to its participants. These fees are parts of the protocol and can be adjusted through its Governance.

Overall, the design of the token streams guarantees that: **as long as there is economic activity on the platform, there is a continuous financing model**. The Exorde platform's long-term economic sustainability is always ensured and scales with the growth of its community and the size of its data services economy.

9   WorkSystems

9.1   What are WorkSytems?

WorkSystems are a new set of collaborative virtual & anonymous "lobbies" in which collaborators (user and "bots" alike) will work together to achieve specific clear-cut goals. WorkSystems offer a reward in EXD to all its contributors upon completion & validation of the work required from them.

Participation in WorkSystems is regulated in two ways:

- **Reputation** (RP): As a contributor contributes to Exorde's WorkSystems, said contributor is rewarded in EXD and RP (Reputation). Reputation is not tradeable and attests to the contributor's involvement in the Exorde environment. Certain WorkSystems such as Moderation are only available to contributors with a very high amount of RP, acting therefore as a testimony to that contributor's trustworthiness with regards to Exorde.

- **Staking**: So as to prevent spamming and ill-intentioned contributors, every participation in every WorkSystem requires an "entry-fee" or stake. The stake is paid in EXD and is either paid back in full if the contributor's submission is accepted, or permanently withdrawn if it is not.

How to participate in the WorkSytems?

Participating in a WorkSystem simply requires having an Exorde-compatible virtual wallet activated. These wallets can be created directly through Exorde's main website. If this option is privileged, user wallets will be protected by Exorde Labs (double authentication, support & more..).

Certain WorkSystems are locked as they will require a set amount of RP to be available. WorkSystem selection can be performed directly on Exorde's main website or through the API that Exorde Labs will provide.

Each WorkSystem will come with a tutorial explaining how that WorkSystem works that contributors will be forced to follow on their first contribution to it. After going through the tutorial, the contributor will enter a queue to be allocated the most critical work in the WorkSystem to which he/she has subscribed.

Upon completing the work related to the WorkSystem, that contributor will obtain a reward in EXD and RP put on "hold" . This "hold" will be released when a verification has been performed on the work done. If validated, the contributor is rewarded according to the quality of his/her participation. If rejected, the contributor's reward will disappear as well as his/her stake.

Why use the Exorde WorkSytems?

WorkSystems are the core of Exorde. They are built to be:

- **Neutral**: contributors are anonymous, only identifiable by an ID created for the Exorde platform. This anonymity enforces Exorde's neutrality, and therefore its value as a service specialized in providing trust scores for information

- **Transparent**: all contributions are publicly accessible through the use of the blockchain

- **Fair**: contributors know the maximum of EXD they can make in participating

- **Collaborative**: almost all WorkSystems require a consensus of votes to be reached to produce value

- **Accessible**: WorkSystems can be accessed through Exorde's official website with no background tech knowledge required, or through an API provided by Exorde Labs for those more comfortable with technology

- **AI-Powered**: Exorde Labs will provide open-source AI modules to help contributors automate Exorde's WorkSystems. Such open-source modules will not be sufficient to fully automate the processes but will act as a guiding template for those willing to work on making them better

- **Modulable**: All WorkSystems rewards can be adjusted through a series of votes so as to make sure that the available workforce for Exorde is evenly spread out. Further modulation can be brought about by adjusting stakes for these same systems, further balancing the entrance of certain systems
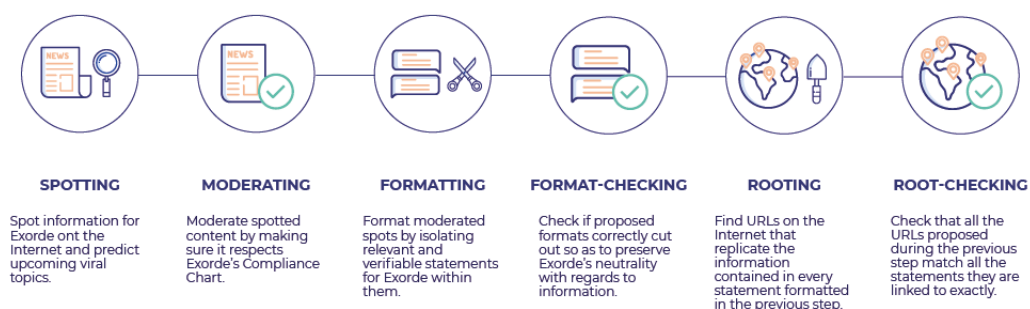
Concerning the following graphs:

Note that all base reward values present in the graphs below have been adjusted to keep rewards within a similar spectrum across WorkSystems for the writing of this whitepaper. These rewards will not match the reality as these values will be adjusted dynamically by the community governing Exorde.

The ability the community will have to dynamically adjust their rewards per WorkSystem guarantees an even spread of Exorde's workforce. Additionally, this is made to ensure that depending on how Exorde's token (EXD) evolves, rewards will be adjusted accordingly.

An additional system to avoid greatly varying rewards will be put in place. This will enforce trustworthiness within the WorkSystems and avoid situations where certain WorkSystems would pay considerably better than others in an unfair way.

Rewards can be changed through Exorde's Voting System, though a good amount of RP will be required to partake in the vote, as only Exorde's most trusted collaborators will be trusted to adjust them while keeping Exorde's best interests in mind.

This summarized process of the WorkSystems workflow will be detailed below:

| **SPOTTING**	**MODERATING**	**FORMATTING**	**FORMAT-CHECKING**	**ROOTING**	**ROOT-CHECKING**
Spot information for Exorde ont the Internet and predict upcoming viral topics.	Moderate spotted content by making sure it respects Exorde's Compliance Chart.	Format moderated spots by isolating relevant and verifiable statements for Exorde within them.	Check if proposed formats correctly cut out so as to preserve Exorde's neutrality with regards to information.	Find URLs on the Internet that replicate the information contained in every statement formatted in the previous step.	Check that all the URLs proposed during the previous step match all the statements they are linked to exactly.

9.2   Spotting

Objective: Spotting is a simple WorkSystem where a Spotter places a vote on a URL in exchange for a small stake in EXD. Spotters are asked to prioritize viral information (URLs that are prone to generating the most internet traffic). Spotted URLs are eventually Moderated to make sure they respect Exorde's Compliance Chart (which Spotters should keep in mind while placing their votes therefore). If the Spotted URL is accepted during that phase, it will move on to the next WorkSystem: Formatting.

Reward: Spotters are paid in EXD inversely proportional to the number of Spotters having voted on the same spotted information before you and scaling with the amount of people voting after you. This ensures that it will be less and less profitable to vote on an already-viral article as its yields will be minimal and might not outweigh the stake required to vote on it. A specific spot is capped in terms of how much EXDs it can yield. This is made to ensure that Spotting does not become a more profitable activity than Rooting for instance, as it is noticeably shorter (only requires a vote) and therefore very simple to automate. Reward is unlocked upon Moderation validation. Note that Spotting is the **only** WorkSystem that does not provide **any** RP. This is done to avoid "RP Farming" through an easily automated WorkSystem.

Checking: All Spots are moderated by Moderators. Payment for a Spot will only be unlocked once it has been accepted by the Moderators. Visit the Moderating section below for more information.

Algorithm: $R_S = \min\left(B_S^{-y} \times \sum n, \; C_s\right)$

- R_S is the total reward for a Spot (in EXD)
- B_S is the base default reward for a Spotting session (in EXD). As with all base values, it can be adjusted to balance Exorde's workforce. Note that B_S will probably be higher than any other base reward as it is strongly regulated by y
- y is the number of contributors having voted before you upon placing your vote
- n is the number of contributors having voted after your vote upon Moderation
- C_S is the max amount of EXDs a single Spot can yield

Spotting Reward Simulation with Base Reward = 1 EXD
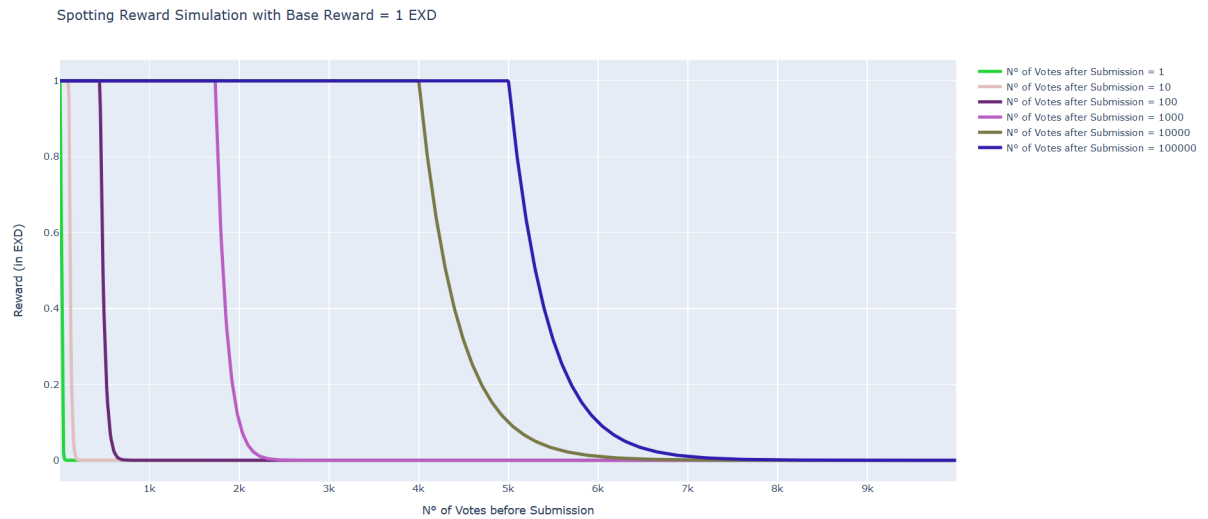
Acces: Spotting is accessible to every contributor regardless of RP and requires a stake such that it will not be worthwhile to vote on an information source unless X contributors also vote on it (X should be dynamically modifiable). This stake will ensure that Spotting stays free of spammers. As for all stake-related WorkSystems, this stake will be dynamically adjusted to balance out the workforce.

9.3   Moderating

Objective: Ensure that Spotted content for Exorde respected Exorde's Compliance Chart.

Reward: Moderators are paid a fixed number of EXDs and RP per vote which both scale with the V_{RP} coefficient.

Checking: Moderating, like all similar Checking WorkSystems, is the final layer of checking and quality-validation applied to a specific WorkSystem, in this case Spotting.

Algorithm: $R_M = B_M * log\left(V_{RP}\right)$

- R_M is the total reward for a Moderation vote (in EXD, RP)
- B_M is the base reward for a Moderation vote (in EXD, RP). As with all base values, it can be adjusted to balance Exorde's workforce.
- V_{RP} is the reputation coefficient attributed to the information source

A Spot requires X positive votes or Y negative votes from the moderators. X and Y should be fairly small as to reflect the number of moderators connected at all times with Y < X as it should be easier to reject a Spot than do accept it. Once a Spot is accepted or rejected, it will no longer be modifiable. If a Spot is accepted, all the Spotters having contributed to its V_{RP} will be rewarded accordingly. If on the other hand it is rejected, the stake is lost and only the moderators will be paid. This is made to ensure Spotting maintains a high standard for quality.

Moderating Reward Simulation with Base Reward = 0.25 EXD
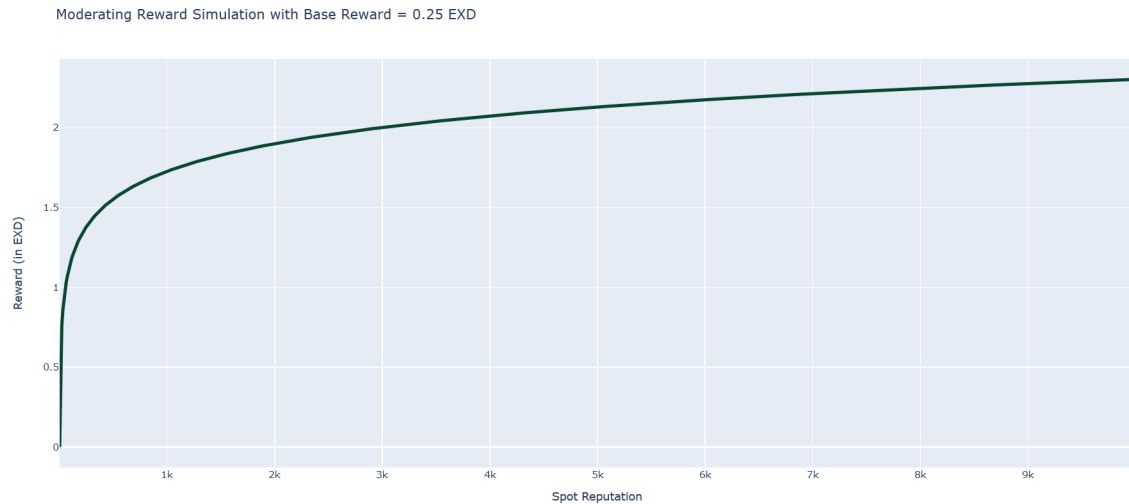
Access: Moderating is a WorkSystem only accessible to collaborators having a specific amount of RP above a given threshold T_M. This threshold automatically adjusts itself so as to encompass a percentage of the total population of Exorde. This percentage P_M can be adjusted by the community so as to obtain more Moderators within Exorde. This RP threshold is important due to the subjective nature of Moderating, as only collaborators with high RP should be trusted to perform this task.

9.4   Formatting

Objective: Format information sources in such a way that they can be Rooted effectively and in a deterministic way. Formatters are asked to follow a series of guidelines to establish how an information should be Formatted. Information sources are broken down in "Formats" or series of "facts" that are relevant to Exorde, neutral in the way they are cut (not leaving out important contextual information), and verifiable.

Reward: Formatters are paid a fixed amount of EXDs and RP that will both scale with the V_{RP} coefficient and the number of accepted formats you have voted on. Rewards are unlocked upon Format-Checking validation.

Checking: Formats are checked during the Format-Checking step. This step is done directly after a Format has been submitted to Exorde. Note that a fully

Formatted information source is either accepted entirely, or completely rejected. This is done to avoid bouncing a failed Formatting session back and forth because one or more Formats were rejected within it.

Algorithm: $R_F = B_F * max\left(\sum F,\ 1\right) * \log\left(V_{RP}\right)$

- R_F is the total reward for a Format session (in EXD, RP)

- B_F is the base default reward for a Format session (in EXD, RP). As with all base values, it can be adjusted to balance Exorde's workforce.

- $\sum F$ is the sum of all the accepted formats the user has voted on (and therefore contributed to getting accepted). **Note that if $\sum F = 0$, R should still be greater than 0 (to ensure that someone connecting only to vote on the "Close Format Session" button should still be paid).**

- V_{RP} is the reputation coefficient attributed to the information source

A consensus of X votes is required to lock a Format. Once locked, a specific Format becomes un-modifiable and all contained proposed Formats within it will also be removed. **A consensus of X votes is required to close a Format session but that will not contribute to $\sum F$** (unless that is the only action that was taken by that contributor during the work session).

Formatting rewards follow this curve:

Formatting Reward Simulation with Base Reward = 0.005 EXD
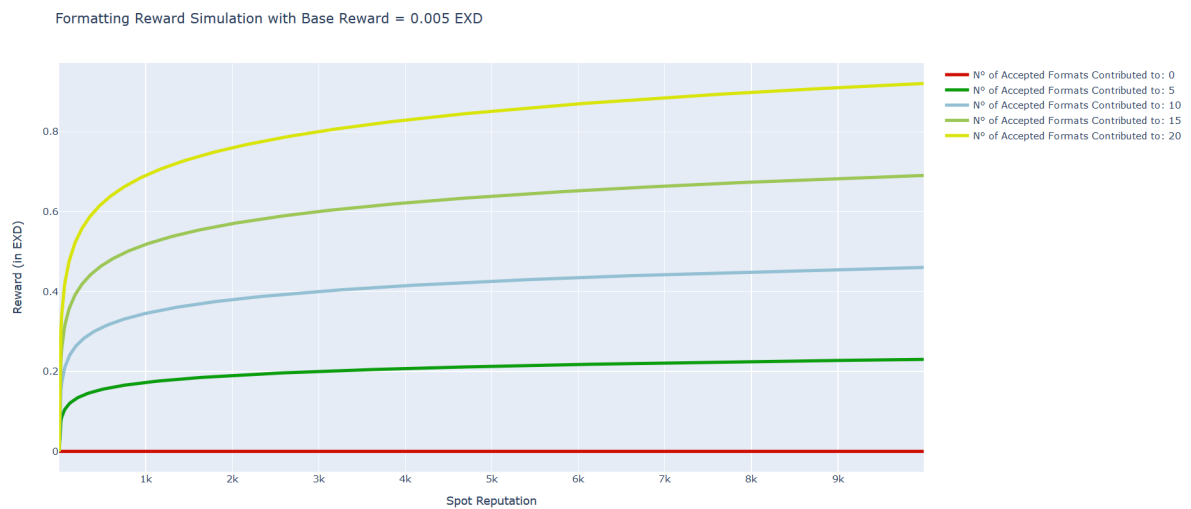
Access: The Formatting WorkSystem is available to all entry-level contributors and requires a stake to participate. As for all stake-related WorkSystems, this stake will be dynamically adjusted to balance out the workforce.

9.5 Rooting

Objective: Root Formatted content by finding URLs on the Internet for every Format or 'fact' within the information source that directly repeats said Format. Rooting is the centremost important WorkSystem of Exorde. This is where content within an information source will be linked to other contents elsewhere on the Internet, therefore creating a 'map' of the Internet in the process.

Reward: Rewards for Rooting is based on the B_R and scales with the V_{RP} coefficient, the number of formats for the specified information source, and the number of URLs linked to each Format. Rooting should be one of the most profitable WorkSystems of Exorde as it is the core of the system itself, but all the reward parameters can be adjusted dynamically to obtain an even workforce spread. Rewards are unlocked upon Root-Checking validation. Note that a specific number of Rooters will be required to perform the Rooting of a Formatted information source. Once that number has been reached, Rooting for said information source will be closed. The number of Rooters for an information source follows this algorithm:

$N_R = V_{RP}RR + N_{F}RF$ where:

- N_R is the number of Rooters required for said Formatted information source

- V_{RP} is the reputation coefficient attributed to the information source

- C_{RR} is the coefficient converting Spot RP to Rooters

- N_F is the number of Formats present in the Formatted information source

- C_{RF} is the coefficient converting the number of Formats to Rooters

  C_{RR} should scale with the virality of information as the more a URL is viral, the more coverage it should obtain on behalf of Exorde.

  C_{RF} should scale with the number of Formats present in said information source after being Formatted so as to counter-act the subjectivity that results from having more 'facts' to check.

Checking: Roots are checked during the Root-Checking phase immediately after having been submitted. A consensus of X Root-Checkers is required to approve a Root. This is done for every Root. Note that Rooting is the only non-collaborative WorkSystem, and therefore every Root will be treated independently of one another. This is made to enforce Exorde's neutrality with regards to information.

Algorithm: $R_R = B_R * \sum_{j=0}^{n} \left(\sum_{i=0}^{n} \left(F_j * U_i \right) \right) * \log \left(V_{RP} \right)$

- R_R is the total reward for a Format session (in EXD, RP)

- B_R is the base default reward for a Root session (in EXD, RP). As with all base values, it can be adjusted to balance Exorde's workforce.

- V_{RP} is the reputation coefficient attributed to the information source

- F_j is the sum of all the Formats present inside an information source about to be Rooted

- U_i is the sum of all the URLs associated to each Format of the Rooted information source
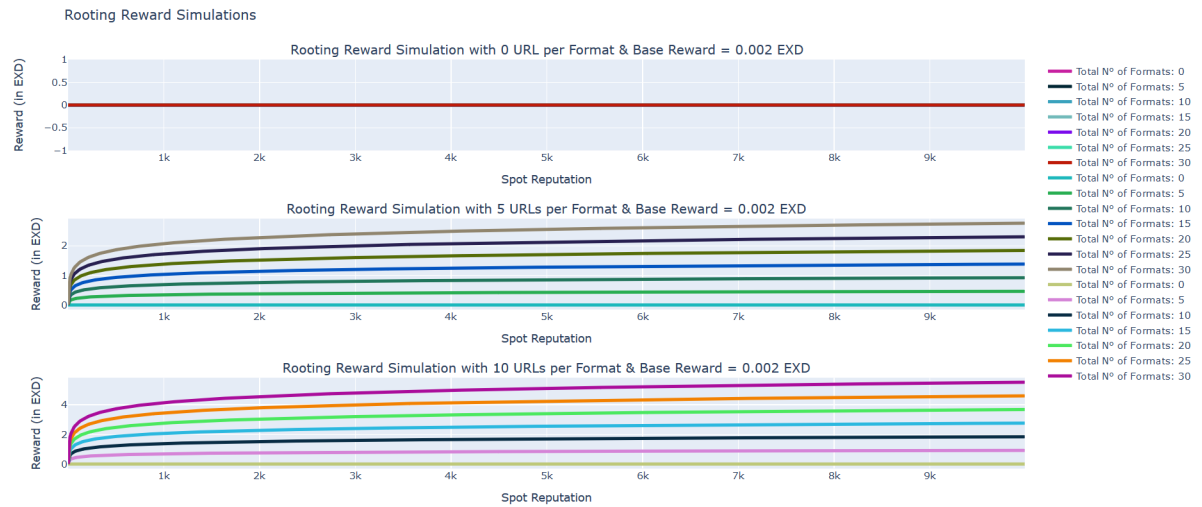
Access: The Root WorkSystem is available to all entry-level contributors and requires a stake to participate. As for all stake-related WorkSystems, this stake will be dynamically adjusted to balance out the workforce.

9.6   Checking
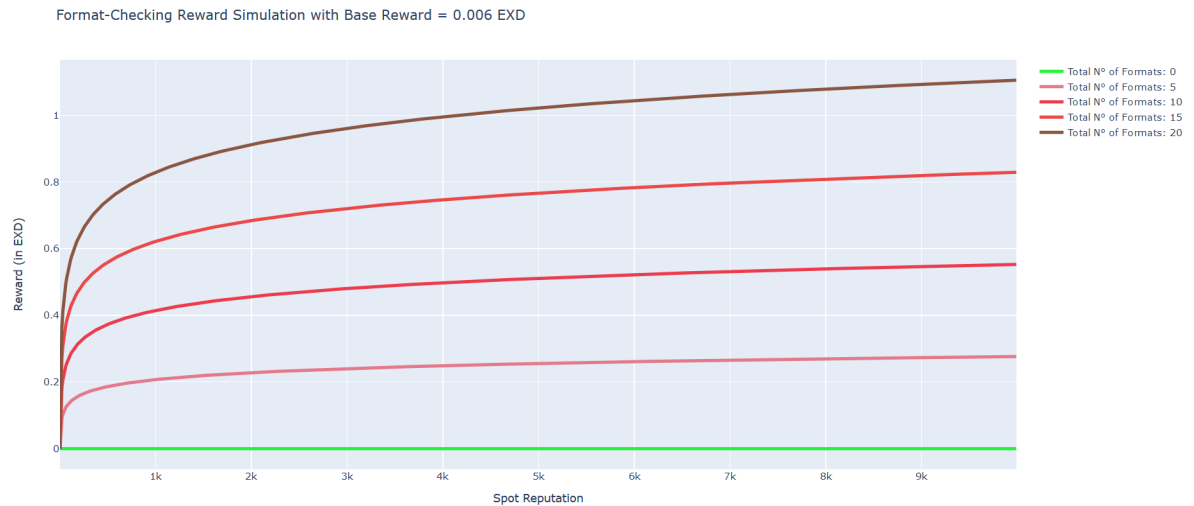
9.6.1   Format-Checking

Objective: Assess the quality of a Formatting session by reviewing its resulting Formats and their compliance with Formatting guidelines. A Formatting submis-

sion is either accepted in full or not at all. This all or nothing system allows for more simplicity within Exorde and avoids having recursive Formatting sessions where only certain Formats would have been accepted for instance. This will also enforce collaboration between Formatters to reach a consensus faster while maintaining quality.

Reward: Rewards for FC is based on the B_{FC} and scales with the V_{RP} coefficient, and the number of Formats for the specified information source. A consensus of X Format Checkers will be required to validate the Formatting, and Y to reject it, with X > Y.

Algorithm: $R_{FC} = B_{FC} * \sum F * log\left(V_{RP}\right)$

- R_{FC} is the total reward for a FC session (in EXD, RP)

- B_{FC} is the base default reward for a FC session (in EXD, RP). As with all base values, it can be adjusted to balance Exorde's workforce.

- $\sum F$ is the sum of all Formats present within the information source.

- V_{RP} is the reputation coefficient attributed to the information source

Format-Checking Reward Simulation with Base Reward = 0.006 EXD

Access: Format-Checking is a WorkSystem only accessible to collaborators having a specific amount of RP above a given threshold T_{FC}. This threshold automatically adjusts itself so as to encompass a percentage of the total population of Exorde. This percentage P_{FC} can be adjusted by the community so as to obtain more Format-Checkers within Exorde. This RP threshold is important as only

contributors with high RP should be trusted to perform this task. As for all stake-related WorkSystems, this stake will be dynamically adjusted to balance out the workforce. Note that the stake and its associated reward are lost upon voting against the consensus.
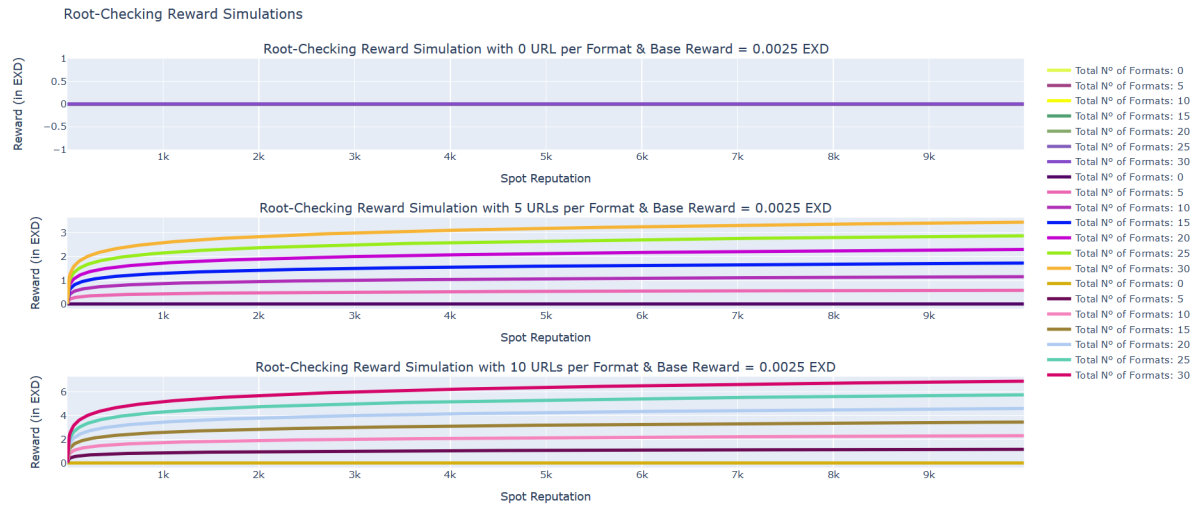
9.6.2   Root-Checking

Objective: Assess the quality of a Rooting session by reviewing its resulting proposed URLs and their compliance with Rooting guidelines. A Root submission is either accepted in full or not at all. This all or nothing system allows for more simplicity within Exorde and avoids having recursive Rooting sessions where only certain Formats (and their URLs) would have been accepted for instance.

Reward: Rewards for RC is based on the B_{RC} and scales with the V_{RP} coefficient, the number of Formats for the specified information source and the number of URLs linked to every Format. A consensus of X Root-Checkers will be required to validate the Root, and Y to reject it, with $X > Y$.

Algorithm: $R_{RC} = B_{RC} * \sum_{j=0}^{n} \left(\sum_{i=0}^{n} \left(F_j * U_i \right) \right) * log\left(V_{RP} \right)$
- R_{RC} is the total reward for a FC session (in EXD, RP)

- B_{RC} is the base default reward for a FC session (in EXD, RP). As with all base values, it can be adjusted to balance Exorde's workforce.

- F_j is the list of all the Formats present inside the information source

- U_i is the list of all the URLs associated to each Format of the Rooted information source

- V_{RP} is the reputation coefficient attributed to the information source

Access: Root-Checking is a WorkSystem only accessible to collaborators having a specific amount of RP above a given threshold T_{RC}. This threshold automatically adjusts itself so as to encompass a percentage of the total population of Exorde. This percentage P_{RC} can be adjusted by the community so as to obtain more Root-Checkers within Exorde. This RP threshold is important as only contributors with high RP should be trusted to perform this task. As for all stake-related WorkSystems, this stake will be dynamically adjusted to balance out the workforce. Note that the stake and its associated reward are lost upon voting against the consensus.

10   Voting Systems

What are Voting Systems?

Voting Systems are a subset of Exorde's Systems aimed at regulating the inner workings of the Exorde platform. Through them, Exorde's community will be able to fine-tune anything ranging from the rewards given by the WorkSystems (modulable for every WorkSystem), all the way to the trust scores allocated to every information source (done for every domain name on the Internet).

Participation in Voting Systems is regulated in two ways:

Reputation (RP): As a contributor contributes to Exorde's WorkSystems, said contributor is rewarded in EXD and RP (Reputation). Reputation is not tradeable and attests to the contributor's involvement in the Exorde environment. Certain Voting Systems such as changing WorkSystems-related variables are only available to contributors with a very high amount of RP, acting therefore as a testimony to that contributor's trustability with regards to Exorde.

Staking: So as to prevent spamming and ill-intentioned contributors, every participation in every VotingSystem requires an "entry-fee" or stake. Unlike WorkSystems, this stake is not paid back. VotingSystem stakes are far lower than those that can be found in WorkSystems, as their role is mostly to fight against vote spamming.

How to participate in the VotingSystem?

Provided they have the right amount of RP to partake in the vote, any contributor can decide to participate in a VotingSystem. Unlike WorkSystems, Voting Systems offer no real 'reward'. A vote is placed once per virtual wallet. Until the vote is finished, any vote can always be changed.

Certain Voting Systems like the one on the Reputation of Information Sources has no 'end date'. As to avoid volatility, votes will be orchestrated following specific timeslots defined by the community. Voting or changing your vote in between these timeslots will be impossible.

Why use Voting Systems?

Voting Systems are essential to Exorde. They are built to:

Modulate Exorde: Exorde is a platform that will be prone to undercoming many modifications in the future, some more serious than others. Exorde's community will play a key role in making sure the platform remains viable in the role it must fulfill.

Empower the community: In Exorde, the collaborators hold all the cards. Voting Systems enforce Exorde's neutrality and transparency by letting all its contributors decide how it should work.

Be fair: Voting Systems work through establishing a consensus. Votes are cast publicly and are open to all the eligible participants.

10.1   Reputation of Information Sources

Objective: In this VotingSystem, collaborators have the opportunity to place a vote under the form of a "thumbs-up" or "thumbs-down" over a list of domain names linked to different information sources. Missing domain names may be added by any collaborator at any time (provided they are not already in the list). Domain names may be presented as the following: https://www.nytimes.com/ ; https://www.lemonde.fr/ . Voting with a "thumbs-up" or "thumbs-down" system ensures that for more representative votes with regards to the entire community as a vote of "0% " or "100% " would be far more drastic.

Access: Collaborators with RP over a defined threshold will be able to vote in this VotingSystem. This is done to avoid having vote bots that would corrupt the final trust scores by spamming the VotingSystem.

Voting: Voting requires a small stake (a neglectable amount of EXD). The final trust score of a domain will be calculated using the following algorithm:

$T_s = \frac{P}{P+N}$

Where:

- T_S is the final trust score for the concerned domain name (expressed as a percentage of trustability)

- P is the amount of positive votes it has received or "thumbs-up"

- N is the amount of negative votes it has received or "thumbs-down"

10.2   WorkSystem-Related Variables

Objective: Most of the WorkSystems variables mentioned previously can be dynamically modified by the Exorde community to match current events, EXD price and so as to spread the workforce more evenly over Exorde's different processes.

Access: As this VotingSystem defines the rewards for all the collaborators of the Exorde community, it is paramount that only collaborators with very high amounts of RP be allowed to partake in it. A threshold will therefore be defined for it. This can be changed through the variable: P_{WRV}.

Voting: Voting requires a stake (paid in EXD). A consensus of 50% of the active population allowed to partake in this VotingSystem is required for every change brought about to every variable. A collaborator is considered active if he/she has taken part in a WorkSystem or VotingSystem in the past week.

10.3   Extension Modifications Proposals

Objective: Provide Exorders a way to accept or reject new proposals brought about to Exorde's open-source extension module. A certain understanding of code is required to participate in this VotingSystem. Exorde Labs will often provide regular updates to the extension module during the early phases to patch recurring bugs and help offer the best service possible.

Access: Access to this VotingSystem will be granted to collaborators having a moderate amount of RP in Exorde. This can be changed through the variable: P_{EMP}. Collaborators with very little coding knowledge may be filtered out from this VotingSystem for obvious reasons. This vetting may be carried out directly by Exorde Labs.

Voting: Voting requires a small stake (a neglectable amount of EXD). As for the WorkSystem-Related Variables VotingSystem, this VotingSystem will require a consensus of 50% of the active community to accept/reject a commit proposal brought about to Exorde's official extension module.

10.4   Accepting / Rejecting Commits for "Appointed" Modules

Objective: Provide Exorders a way to accept or reject new proposals brought about to Exorde's open-source "appointed" modules. "Appointed Modules" consist of any open-source "add-on" a collaborator could use to help automate/speed-up his/her participation in a WorkSystem. A certain understanding of code is required to participate in this VotingSystem. Exorde Labs will often provide regular updates to said modules during the early phases to patch recurring bugs and help offer the best service possible.

Access: Access to this VotingSystem will be granted to collaborators having a moderate amount of RP in Exorde. This can be changed through the variable: P_{OAM}. Collaborators with very little coding knowledge may be filtered out from this VotingSystem for obvious reasons. This vetting may be carried out directly by Exorde Labs.

Voting: Voting requires a small stake (a neglectable amount of EXD). As for the WorkSystem-Related Variables VotingSystem, this VotingSystem will require a consensus of 50% of the active community to accept/reject a commit proposal brought about to one of Exorde's "appointed" modules.

10.5   Guidelines & Ethics Charts Modifications

Objective: Give Exorders the power to change Guidelines and Charts regulating how WorkSystems should be used and therefore redefining Exorde's objectives.

Access: Access to this VotingSystem will be granted to collaborators having a moderate amount of RP in Exorde. This can be changed through the variable: P_{GECM}.

Voting: Voting requires a small stake (a neglectable amount of EXD). As for the WorkSystem-Related Variables VotingSystem, this VotingSystem will require a consensus of 50% of the active community to accept/reject a modification to a set of Guidelines/Chart.

10.6   Future Integration Proposals for Exorde Labs

Objective: Give Exorders the power to propose new ideas for the platform through a VotingSystem. Proposed ideas will be reviewed by Exorde Labs for implementation or implemented directly by the community.

Access: Access to this VotingSystem will be granted to all of Exorde's entry-level collaborators.

Voting: Voting requires a small stake (a neglectable amount of EXD). Unlike the most other Voting Systems, no consensus needs to be reached here. The amount of votes on a specific proposal will help Exorde Labs prioritize ideas and take actions accordingly.

10.7   VotingSystem-Related Variables

Objective: Give Exorders the power set their own thresholds with regards to the RP required for who is allowed to partake in the different Voting Systems.

Access: Access to this VotingSystem will be locked for the 2 first years following Exorde's ICBO so as to give time for the community to settle in. In the meantime, Exorde Labs will have sole control over these variables. As this VotingSystem defines the voting thresholds for all the collaborators of the Exorde community, it is paramount that only collaborators with very high amounts of RP be allowed to partake in it. A threshold will therefore be defined for it. This can be changed through the variable: P_{VRV}.

Voting: Voting requires a stake (paid in EXD). A consensus of 50% of the active population allowed to partake in this VotingSystem is required for every change brought about to every variable. A collaborator is considered active if he/she has

taken part in a WorkSystem or VotingSystem in the past week.

10.7.1   Exorde's WorkSystems' related variables

- **Spotting:**
    - B_s: Base Spotting Reward Value
    - C_s: Max amount of (ROOT, RP) a Spot can yield
    - $C_{D:}$ Max amount of (ROOT, RP) the Spot WorkSystem can yield in one day to one contributor
    - Sc: Stake for Spotting

- **Moderating:**
    - B_M: Base Moderating Reward Value
    - X_M: Amount of Positive Votes required to accept a Spot (quantified in % of total Moderators)
    - Y_M: Amount of Negative Votes required to reject a Spot (quantified in % of total Moderators)
    - S_M: Stake for Moderating
    - P_M: Percentage of Exorde's Population with the highest RP allowed to participate to the Moderation WorkSystem

- **Formatting:**
    - B_F: Base Formatting Reward Value
    - X_F: Amount of Positive Votes required to accept a Format (or to vote to close the Format Session)
    - S_F: Stake for Formatting

- **Rooting:**
    - B_R: Base Rooting Reward Value
    - S_R: Stake for Rooting
    - $C_{RR:}$ Coefficient converting Spot RP to Rooters
    - C_{RF}: Coefficient converting the number of Formats to Rooters

- **Format-Checking:**
    - B_{FC}: Base Format-Checking Reward Value
    - X_{FC}: Amount of Positive Votes required to accept a Formatting
    - Y_{FC}: Amount of Negative Votes required to reject a Formatting
    - S_{FC}: Stake for Format-Checking
    - P_{FC}: Percentage of Exorde's Population with the highest RP allowed to participate to the Format-Checking WorkSystem

- **Root-Checking:**
    - B_{RC}: Base Root-Checking Reward Value
    - X_{RC}: Amount of Positive Votes required to accept a Root
    - Y_{RC}: Amount of Negative Votes required to reject a Root
    - S_{RC}: Stake for Root-Checking
    - P_{RC}: Percentage of Exorde's Population with the highest RP allowed to participate to the Root-Checking WorkSystem

10.7.2   Exorde's WorkSystems' related locked variables

- **WorkSystem-Related Variables:** P_{WRV} the percentage of Exorde's population with the highest RP allowed to partake in this VotingSystem.

- **Extension Modifications Proposals:** P_{EMP} the percentage of Exorde's population with the highest RP allowed to partake in this VotingSystem.

- **Accepting/Rejecting Commits for Open-Source "Appointed" Modules:** P_{OAM} the percentage of Exorde's population with the highest RP allowed to partake in this VotingSystem.

- **Guidelines & Ethics Charts Modifications:** P_{GECM} the percentage of Exorde's population with the highest RP allowed to partake in this VotingSystem.

- **VotingSystem-Related Variables:** P_{VRV} the percentage of Exorde's population with the highest RP allowed to partake in this VotingSystem.

11   Exorde Analytics System

On top of the Exorde WorkSystems, powering the decentralized indexing engine that represents the core of the system, there is an Analytics layer. This layer is where data science is performed to create knowledge and insights from the indexed data by the lower layers of the system. Exorde Analytics is the layer where data scientists are competing and collaborating at the same time, to create new data on top of the Exorde indexed data (relations between contents, trends, fake news propagation).

11.1   Goal

The main goal is to extract the most value from the Exorde Graph Data, by harnessing the predictive potential of relationships within the graph. This newly created value is then served/used in the Data Services Marketplace, but more importantly as public certified knowledge through the free browser extension, as Exorde's value will be mainly correlated to the relevance of the free extension. This quality directly results from the accuracy and coverage of the analytics made by the contributors of the Exorde Analytics layer.

11.2   Architecture

Participants train and execute a set of data science algorithms, in a distributed manner, to perform a variety of data science sub tasks on the Exorde data. The Exorde data can be seen as a streaming graph data being ingested at all times by the Exorde's decentralized architecture, and thus must be treated as such for many analytics tasks. Exorde Analytics Systems will be divided in 3 layers:

1) Streaming analytics

2) Extension analytics

3) Top-layer analytics

The Exorde Analytics Layer acts as a perpetual data science tournament, as best data scientists (participating in the Analytics system) will be rewarded the most. These economic incentives create a healthy competition-based environment, similar to the WorkSystems, provoking the continuous emergence of

the most relevant and valuable analytics for Exorde and its users. The extension analytics, is a place where data scientists work to create the best models, using mostly NLP techniques (as the core of the challenge about online misinformation is handling free text), to continuously improve the user experience of the extension. It will mostly focus on making WorkSystems participation easier, by providing an AI-assisted environment, accelerating spotting, formatting and rooting. Finally, the Top-layer analytics is the layer where metadata and metrics from previous layers are aggregated to produce the key indicators that will be shown dynamically to the users, via the browser extension.

11.3   Analytics

Streaming analytics are performed continuously, as the Exorde data grows continuously as well. Many types of data science tasks will be performed:

- Sub-graph/community extraction/importance detection: Determines the importance of distinct sources/websites in the web

- Shortest paths, pathfinding, Trends analysis: extract trends about information circulating online (fake news, viral information, etc)

- Cycle detections: detection of subset of sources (e.g. websites)

- Minimum spanning tree: detection of information relays on the internet

- Graph partitioning / Node embedding: data science supporting the other tasks, by aggregating complex graph data into simpler representations.

This list is non exhaustive and will be expanded as the data science potential of the platform grows. Exorde's data will be available, as Neo4j graph data files for data scientists.

11.4   Machine learning inside Exorde

A common way to test accuracy in machine learning (and data science), traditionally, is to break the dataset into train and test sets. A trained model can be tested for accuracy on the test set, which it has never seen. Usually, a data scientist explores the test set multiple times and uses that score to do its model selection, there's a risk of training a model that overfits the test set, hurting the model's ability to perform on new data. In a machine learning competition there is an incentive to overfit to the historical data because performance on that data dictates immediate relevance. In the Exorde Analytics System, overfitting is intentional in the first Streaming layer. The extension analytics layer is where overfitting is an issue that must be tackled constantly, as the goal of this layer is to produce generalizable models that can work on new data.

11.5   Top Layer Analytics

Final trust scores allocated to URLs within Exorde are attributed by "clusters". Clusters are created by Exorde Top Layer Analysts whose role it is to index facts by similarity in different clusters.

As these clusters are critical to how the final trust scores will be computed, and seeing as this step requires in-depth understanding of NLP and data science as a whole, Exorde Labs will undertake this task during the first stages of Exorde deployment. As the platform grows, Exorde Labs will offer the possibility to Exorde's collaborators to partake in the indexing, provided they can justify an understanding of data science and data indexing. This part of the organization will become fully decentralized over time.

Trust scores resulting from the VotingSystem on Reputation of Information Sources will be used to compute the trust scores for these clusters. These trust score will be displayed in the Exorde extension.

A reward will be given to Top Layers Analysts for their contributions based on the quality of the work done and the quantity of clusters found/created per fact. These clusters will constitute metadata (Knowledge Graph, relations, mappings) that will be available in the front-end for exploring, and for developers of the ecosystem to build on top.

12   Data Services Marketplace

Exorde is a next-gen decentralized Web Data ecosystem. It is designed with a core knowledge graph, and data services revolving around it. These services are part of the Data Services Marketplace (DSM). All the data services are paid with the EXD token. Requests for the different services are added into a pool of requests, and will be completed by competing Exorde Workers, which have public reputation scores and an EXD stake as collateral/guarantees.

The data services are built with a "request/response" model, and are split in two categories:

1) Internal data services, acting directly on the Knowledge Graph

2) External data services, using indirectly and optionally the Knowledge Graph

Requests are performed by clients of the Exorde Ecosystem and require input parameters (depending on the context of the requests) that will be detailed during the process. Most parameters will be optional but will impact the speed and quality of the responses by the competing workers of the DSM.

12.1   Internal data services

Internal data services impact or utilize the Knowledge Graph (its core public database) as a source:

1) **Refresh Request**: Update a sub-graph (or elements of the Graph)

    a) **Punctual refresh:** update a sub-graph, once

        (i) update webpage status & information (if webpage changed, if removed or renamed, etc)

        (ii) to update the sources & linked Metadata of a given webpage (or set of webpages making the subgraph)

    b) **Continuous refresh**: update a subgraph (or elements of the Graph) over time. Requires parameters to be performed:

        (i) Duration of the refresh

      (ii) Frequency of the refresh (default frequency of 1 refresh every 4h)

      (iii) sub-graph size (the number of webpages)

2) **Exploration Request**: explore a sub-graph of the web and add it to Exorde

   a) The response to such request depends on:

      (i) A given list of URLs as input

      (ii) A depth parameter (impacting how the web crawling work will be performed)

      (iii) Number of entities to extract (nodes on the Graph, analog to a precision)

3) **InfoTracing Request**: Trace a given information to its most probable sources OR to where it has spread publicly online, and optionally to have it stored on the Graph.

4) **Data Analysis Requests**: clustering, correlation, graph partitioning analysis, trend extraction, etc. A set of data analysis to be performed on the input (a subgraph, the whole Exorde Graph, etc).

12.2   External data services

External data services can make use of the Knowledge Graph, depending on the context of the request, but are not provoking any changes to it:

1) **File request**: requesting an URL to download a file, must comply with rules

   a) Requires a hash to re identify the file

   b) Request can be completed by a list of URLs (dead links, dead website, etc)

2) **Source Tracing request:** requesting the source (URL, website, forum poster, etc) of a given information (document or even a file)

3) **Advanced Search Requests**. (on demand, rules & parameters to be detailed over time by the marketplace)

12.3   Private Data Requests

Some Internal and External services can be only of value if the results (i.e. the response) to a given request is private, for example a trend extraction analysis on the Exorde Graph, or a Source Tracing request. Some clients of the Exorde platform will want privacy, therefore **it will be optional.** This privacy will increase the price of a given request, as it requires additional work and a more complex consensus mechanism to ensure the quality and validity of a response.

A private data request requires a different setup than public requests:

1) Private requests will be only accessible to highly reputable workers.

2) Requests will be sent to a random set of workers, collaborating to perform the request.

3) A private (encrypted communications) consensus channel between a set of workers will be deployed if the request requires it.

4) If possible, the data that composes a request will be split up in different parts and distributed to a subset of workers. This will ensure that potential request data leakers get identified.

5) Reputation & economical incentives maximize the good behavior of workers:

   a) In case of pre-splitted private data request, if a leak is recognized, the associated worker will see its stake fully slashed (all EXD put as insurance collateral will be burned) and its reputation set to 0 (hard to gain, easy to lose principle).

6) Data interactions will be encrypted end-to-end to guarantee privacy. The initiator of the request will use pgp-like encryption and will receive (if not provided by the requester) a private/public key pair to read the response on the platform.

A set of highly reputable workers acts as a police force in this distributed setup to correlate any data leaks from malicious workers, as they get attributed to different groups when random selection occurs. This group can detect which worker is malicious and slash his stake & reputation completely. This group has also the task to report the need for a change in the rules & parameters before a vote is taken (e.g. to raise the minimum required stake and reputation level for workers to participate in the private setup).

Market Prices and Rules.

The prices paid (in EXD) depends on the type of requests and the input parameters. The price for a continuous refresh request, for example, depends on the duration and given sub-graph size, as it impacts the amount of work required. Prices will be determined by the data request supply and demand. A small percentage of the transaction's value will be taken and redistributed to finance the neutrality ecosystem (as it is the basis that allows the marketplace to exist and grow). The rules of this data services marketplace can be updated through the Exorde Governance, and new functionalities will be added over time to follow demand.

13 Platform launch

13.1 Roadmap

The Exorde Labs roadmap is split in 3 axes: frontend development, platform development (smart contracts and DAO continuous improvement) and general improvements. This roadmap will be subjected to changes during the project and the last version will be available on exorde.network.
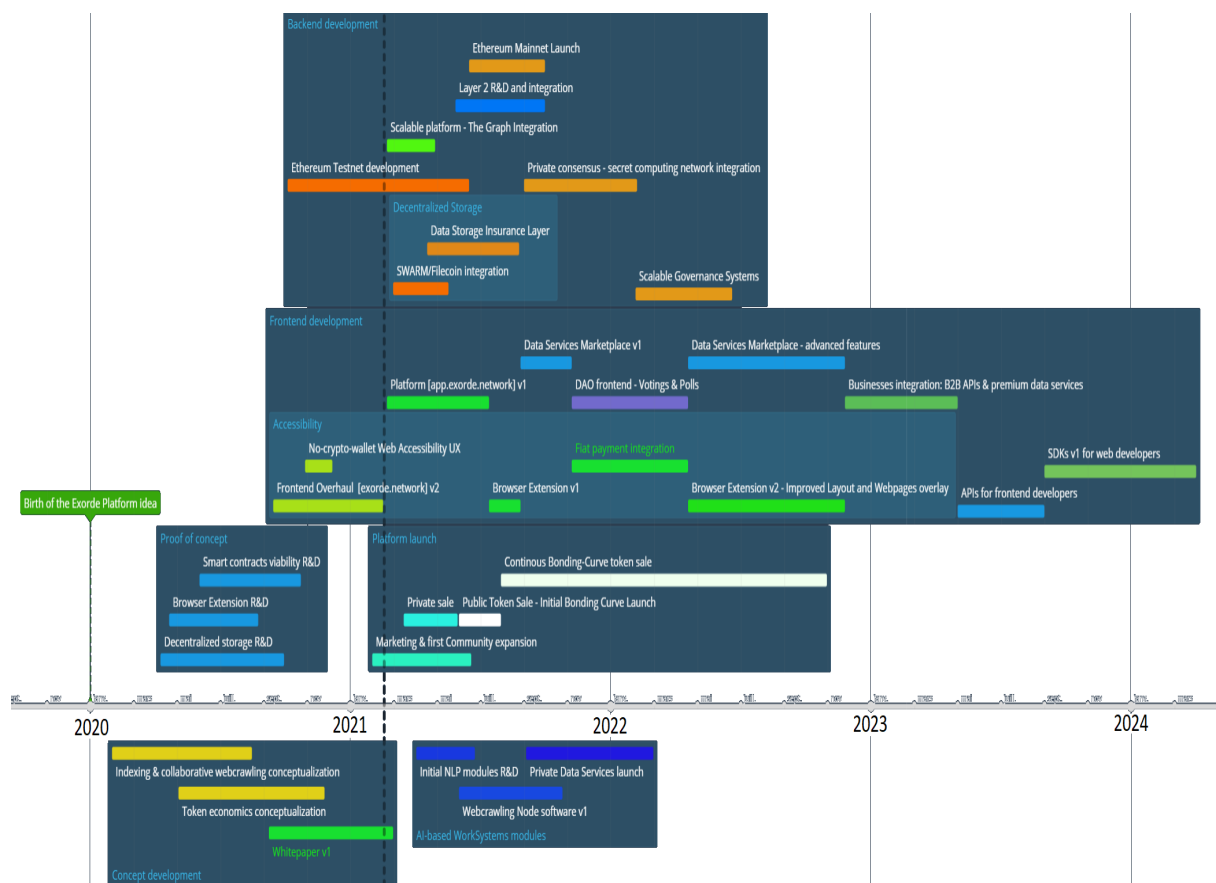
13.2   Marketing Strategy & Goals

The goal is to position the Exorde decentralized ecosystem and platform as leader in the open web knowledge industry. The Exorde Platform is aimed at highlighting data relationships, patterns, trends. Exorde aims to be the standard for open & decentralized public online data analysis. Through its fight against misinformation online, and its focus on user accessibility, Exorde aims to gain traction and reach mass adoption. Once Exorde has a good foothold in the market, with a large and growing ecosystem, it will be able to establish a major position on the emerging data indexing market.

13.3   Definition of Target audience

The general target audience are people of different age groups. They include:

- **Financial investor:** a type of user who seizes investment opportunities in the purchase of EXD and identifies a financial return on them, as he expects demands for the utility token. Has high educational qualification aged 25-30+ and has interests in investments and the finance of digital markets and/or the emerging decentralized industry.

- **End User**: The most heterogeneous target including users of different age groups, qualifications, geographical origin and interests. They are the main target for the end use of the Exorde Extension. They have a-priori no technical knowledge on blockchain technology, crypto-currencies and enjoy accessible interface and "plug-and-play" features. In this target we can find users interested in purchasing EXD tokens to participate in the ecosystem and use the Exorde data services.

- **Companies**: A very specific target that has good chances to buy data services, to either have their own content updated and refreshed, but also to user Exorde as a pure data mining service. This target is interested in indexing services and specific news/information APIs for social-media platforms and content creators/relayers.

- **Developers**: An important target with a medium-high level of education, with a high percentage from 22-25 years, with interest in the field of apps, software, crypto-currency, web 3.0, smart contracts development and next-gen web user experience. They are expected to be interested to participate in the Exorde ecosystem, specifically in the technical parts of the WorkSystems. They will do so for ethics reasons and/or the economical opportunities that

come with the Exorde ecosystem rewards. They are expected to make the Exorde platform more efficient, more relevant, impacting the above targets' interests in purchasing EXD tokens.

- **Governments/Politicians/Celebrities**: As Exorde's extension becomes widespread due to the value of the service it provides for free, users will become more dependant on said extension's trust scores to remain objective on the information they are ingesting. As Exorde is a neutral system, this becomes a great opportunity for politicians and/or celebrities that may become the target of slander, helping them restore their public credibility by financing Exorde to systematically prioritize information that is related to them. Additionally, governments may be interested in doing the same thing so as to fight effectively against potential misinformation campaigns that would be targeting their country and jeopardising said country best interests.

13.4   B2B Usage

Company usage (B2B) is an exception in the business model. Exorde Labs will offer its services through simple APIs for companies to connect to easily. Payments will be made available in fiat currency, on a monthly or yearly basis, to have a frictionless on-boarding from companies that don't wish to use the token. Obviously, the value generated from this type of services will be redirected to the Exorde ecosystem in the form of token buybacks and potentially token burning (destroying tokens to reduce supply, thus increasing the value of the holders tokens).

14 Initial Bonding Curve Offer

14.1 Terms and Conditions

Exorde Labs is a company based in Lyon, France, managing the issuing of the EXD tokens. The EXD utility token will act as medium to interact with the Exorde platform, as well as with the services and products available on the Exorde ecosystem.

14.2 Token Emission

EXD Token is based on ERC-20 standard, the emission of tokens is done through a bonding-curve system, implemented via a smart contract. EXD token will be issued and created in two phases:

1) The **Initial Token Distribution** event

2) The **Initial Bonding Curve Offering** event.

During the initial token distribution event, EXD tokens will be issued for the following categories:

1) Equity sale / seed investors

2) Private sale/ Strategic partnerships

3) Team members

4) Advisors

5) Community rewards

6) Bounty program

7) Initial Liquidity

The rest of the EXD tokens will be created and distributed via an Initial Bonding Curve Offer (IBCO). 15 days after the launch of the IBCO an EXD/DAI and/or EXD/ETH exchange market will be created also on Uniswap with the initial liquidity token pool and a small portion of the funds raised during the ICBO.

The IBCO is scheduled by Mid 2021 and has the following rules:

- Is open to participants from permitted jurisdictions who perform KYC.

- There is no minimum contribution to participate in the Initial Bonding Curve Offering.

- Tokens purchased from the IBCO has no cliff or vesting period, those can be immediately claimed, transferred or sold back to the Curve.

- When tokens are bought from the Curve, new ETH tokens are created and the price of the token increases, when tokens are sold back to the Curve ETH tokens are destroyed and price of the token decreases.

- Bonding curve is inspired from the Bancor∗ continuous liquidity protocol. **Explore Bancor Whitepaper Here**

- There is no fixed hard cap for the number of tokens, as opposed to traditional ICOs, that can be minted by the Bonding Curve. However there's a practical limit given by the market. Indeed, a linear growth in token emission results in an exponential growth in token cost. The token supply is expected to reach an equilibrium (or multiple over time), depending on current supply and demand.

- Liquidity for sellers on the Bonding Curve is granted by the DAO smart contracts that limits the ability of EXD Holding to withdraw the DAI/USDC collateral.

- An exit tax is taken from any sell order made on the token bonding curve. This tax is redistributed into a Funding pool and an Ecosystem pool (including ecosystem rewards).

The initial token distribution will have the following structure and smart contract enforced vesting, totaling **55.000.000 EXD**:

- **Seed investors**: **10.000.000 EXD** reserved to early/seed investors cliff period IBCO launch + 15 days; vesting period linear release of 48 months. Vesting Smart Contract: [To be defined on launch]

- **Development Fund**: **20.000.000 EXD** tokens reserved for Exorde Labs to develop the protocol and the frontend. This is necessary so Exorde Labs employees can contribute full time to the project with a long term mindset. Cliff period IBCO + 15 days; vesting period linear release of 48 months. Vesting Smart Contract: [To be defined on launch]

- **Team Fund**: **5.000.000 EXD** tokens reserved to incentivize the Exorde Labs team members to contribute full time to the project with a long term mindset. Cliff period IBCO + 15 days; vesting period linear release of 48 months. Vesting Smart Contract: [To be defined on launch]

- **Advisors**: **500.000 EXD** tokens reserved to Advisors who support the project. Cliff period IBCO + 15 days; vesting period linear release of 24 months. Vesting Smart Contract: [To be defined on launch]

- **Community/Bounty Program**: **5.000.000** EXD tokens reserved to the community members who participate in the community-organised data science tournaments and other campaigns, aimed at improving the technology and adoption of the ecosystem. Cliff period IBCO + 15 days; vesting period linear release of 3 months.

- **Ecosystem rewards**: **14.000.000 EXD** tokens reserved for rewards to community members participating in the WorkSystems and the broader Exorde ecosystem. Cliff period IBCO + 15 days; vesting period linear release of 72 months. Vesting Smart Contract: [To be defined on launch]

- **Contingency liquidity bootstrapping**: **500.000 EXD** funds are reserved for liquidity bootstrapping on Uniswap and other exchanges. The reserve will be used only in case of network congestion or excessive price volatility on the initial moments of the IBCO launch will not allow for liquidity supplying. Unused tokens will be burned.

Token Repartition
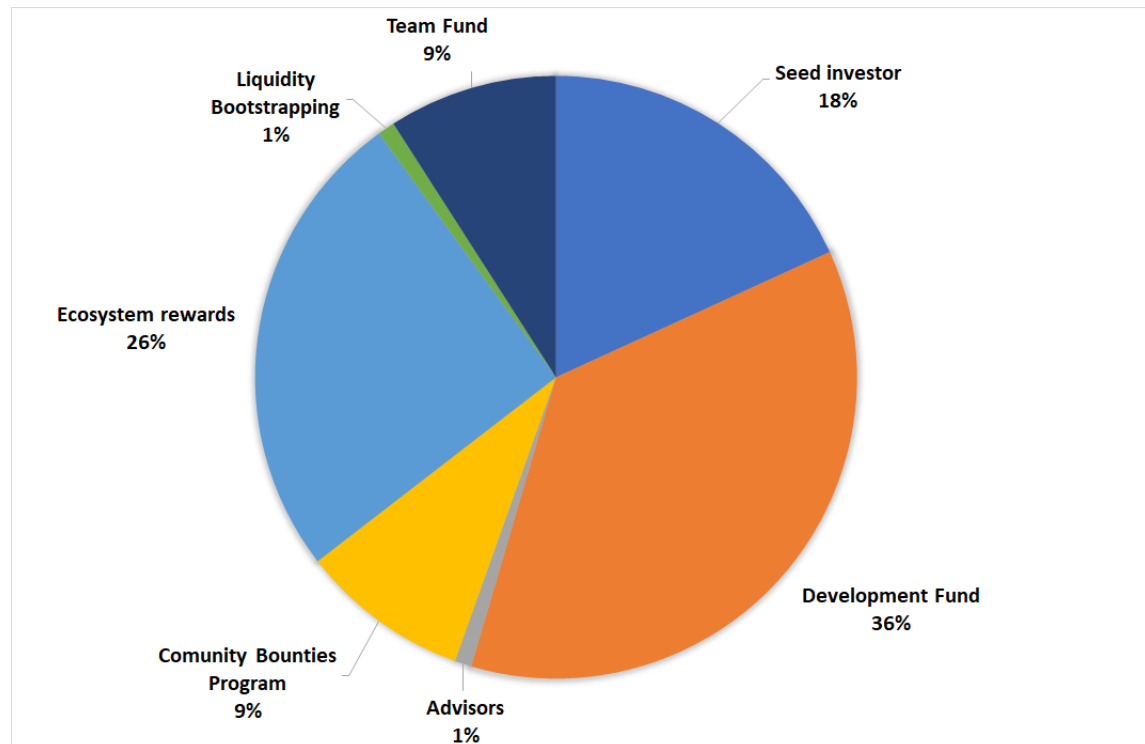
Why pre-minted tokens? Why not just going out with a minimum amount of tokens and then mint those later with the consent of the token holders through governance voting? We believe, like many other projects, that declaring a total amount of circulating tokens in advance is much more fair and clear than minting those later on. It allows for a more informed price discovery since token investors have a clear idea of both circulating market cap and maximum fully diluted market cap. Additionally, it can create a coordination problem to make a vote proposal to token holders to allow for minting new tokens. Indeed, while the minting is likely to have a positive long term impact for the project, holders could fear dilution in the short term, therefore hurting the project stability in the long run. It's much better to have a reserve, with vesting mechanism, that can be burned later on, this is therefore the choice that Exorde Labs have made for its long term stability.

In the setup that has been designed, there is no entity that can mint more token, except through the bonding curve smart contract. The initial token amounts are

fixed and can't be changed later on, and by doing so, we prove to our potential investors that the Exorde ecosystem is committed to its original business plan.

14.3   Exorde Labs Budget Allocation
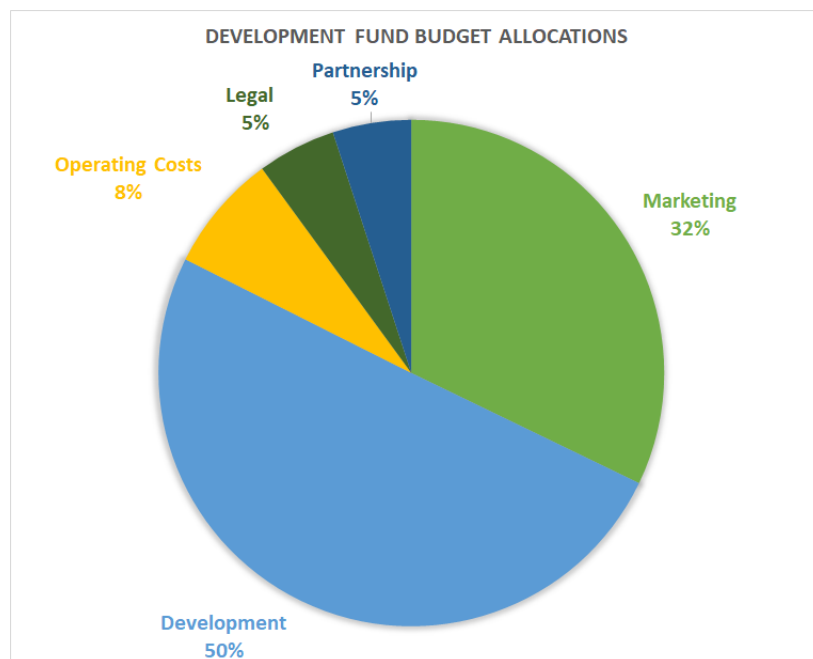
14.4   Token Release schedule

Funds will be used to ensure the development and launch of the platform, as well as to maximize its success and growth chances. The initial business plan is designed for only one goal: to make Exorde a successful long-term project.

There is a token releasing process, which releases Exorde Labs tokens progressively over time, to sustain the development of the platform, ecosystem and communication on the medium and long term. This system give absolute guarantees to early investors that a disproportionate amount of token is not going to disrupt the early market.

3-Year Budget allocation:

- **Year 1 - 30%:** Initial boost to create a mass critic user base (early stage)

- **Year 2 - 25%:** Guarantee budget for user acquisition integrated with the Exorde platform marketing re-investments (expansion stage)

- **Year 3 - 25%:** Guarantee budget for user acquisition integrated with the Exorde platform marketing re-investments (expansion stage)

Development: Dedicated Dev team focused on managing the launch of Exorde's most amazing features. They include all expenses related to product development. This budget will allow for increasing staff and accelerate Exorde development on all its tracks (backend, AI modules, frontend).

Marketing: Marketing activities to guarantee a worldwide diffusion and success, to increase the appeal of the extension and platform to an always wider audience. At Exorde Labs, we are well aware that communication is key for a project to succeed, and we think that with a project like Exorde, it has to be an even more important part, as the product and services are designed for the general public, as opposed to traditional decentralized projects.

Operating costs: General operating costs. Front-end hosting and scaling the service with user growth.

Partnerships: Creating partnerships and strategic initatives for the long term well-being of the project.

Legal costs: IBCO-related legal costs, ensuring continuous legal compliance over the growth of the platform. This budget serve to cover costs of all legal activities including financial administrative work (AMF token regulation compliance, KYC integration).

15   Team

Térence Gras, CEO

Computer Vision Software engineer, always been very interested by Artificial Intelligence as whole, and more specifically so: Deep Learning. Entrepreneurship is in its DNA, and he has looked for innovative ways to fight the rising tide of misinformation that is crippling our societies more and more every day. With Exorde he hopes to tip the balance by applying the latest technological modules available to date to one of the most complex problems of our generation: misinformation. He aims to build a sustainable and reliable solution, based on science and collaboration, to face this challenge, while creating a new kind of digital product, to help make the Internet a better place of learning.

Mathias Dail, CTO

Software engineer, with a specialization in data engineering. Initially with a background in in programming, networking, and back-end systems, he has worked with both data engineering and data science. He studied deep learning but the one field of AI that retained his attention was Natural Language Processing (NLP). This field has improved tremendously in the last 3 years and deep learning language models have unlocked a whole new way of handling the large amount of unstructured text of the web. Always fascinated with the potential of peer to peer networks and smart contracts, his mission is to link NLP with the power of decentralized systems, through a new form of organization, to make Exorde emerge as a truly innovative product of the digital space.

Damien Pucheu, COO

Damien is a software engineer who worked for Suez, Monsieur Tshirt and Lectra. He joined Exorde to build all the visible part (platform and extension) with the aim of offering the best experience to all users. Great operational leader, he always knows what web technology to investigate and integrate to make a better product. He identifies the best solution quickly and always keeps scalability in mind. As the company will grow he will focus on its COO role by working on business and processes to help Exorde reach its goals.

Flavien Lepine, CFO

IT Chief Project Manager, he has always been fascinated by creating ideas for digital products. The IT world is vast, and he motivated him into being more curious about new things. He evolved in different kinds of projects, from mobility to infrastructure. This gave him a broad view of project management and how

to adapt it to the technologies in use. He had the opportunity to manage highly valued projects and this made him learn how to spend a budget to reach goals as efficiently as possible. This made him dig deeper into learning corporate finance, market finance and now fully committed in developing the emerging decentralized finance ecosystem.

Letitia, UX/UI Design

UX/UI designer, Letitia has a strong technical background and worked in development for many years before pivoting towards UX/UI design. A good user experience is crucial for a web platform like Exorde, to reach a large audience. She is very comfortable with choosing the best themes, colors and designing modern and clean interfaces.

16   Legal Disclaimer

The delivery of this White-paper and the offer, sale of Coins, do not constitute a representation that the information contained here is correct after the release date of this White-paper. Exorde Labs has taken all reasonable care to ensure that the information written in this whitepaper is correct and up to date in all material respects and that there are no other facts, the omission of which would make misleading any statement herein whether of fact or opinion. Changes and updates can be frequent and will be made over time. The most up-to-date version of this document will be available on https://exorde.network website. The contents of this White-paper should not be construed as investment, legal, or tax advice..