Version 1.2

TalentLayer: The Extensible Work Protocol

Disclosure: Consider this document a public draft. Nothing described in this document should be taken as final. For the most up-to-date technical information on TalentLayer's live implementation, please visit our documentation at www.docs.talentlayer.org.

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Abstract. An open labor market that is interoperable, desiloized, and decentralized would allow individuals to more efficiently connect and transact with suitable counterparties for labor agreements and insulate their relationships from obstruction, while still allowing businesses to profit from adding value in the hiring process. TalentLayer provides a novel infrastructure and economic model for facilitating this sort of open labor market.

1. Introduction

Today, labor transactions are being conducted at an unprecedented scale. The Internet has allowed us to scale our ability to work with one another across companies, time zones, and nations; significantly reducing geographic limitations on earning power.

With the internet era, labor relationships now more frequently rely on trusted intermediaries to facilitate things like money transfers, finding counterparties, and most importantly, scaleable reputation management. These intermediaries have become popular because when we scale work beyond a single employer, a single town, or a single country, it becomes increasingly difficult to understand who is on the other side of the table; Will they be trustworthy? Will they deliver their end of the agreement?

When it comes to reputation systems, **intermediaries help us to scale reputation past Dunbar's Number: the maximum amount of reputations that humans can hold in active memory.** This is possible by having counterparties who work together leave one another mutual reviews after verified transactions. Over time, users develop extensive reputational histories that are based on actual transactions that happened on the platform. These reputations are trusted because they are in a sense "backed" by the platform; users know the terms under which reviews were given (after a job was completed) and believe the platform will not corrupt the reviews.

When it comes to scaleable pools of counterparties, these intermediaries attempt to amass enough users on their platforms to reach a sufficient network effect, allowing users to connect with optimal matches. **The value of the platform increases in accordance with Metcalfe's law; every time you add a new user to a network, the number of connections increases proportionally to the square of the number of users.**

Unfortunately, an endemic trait of these intermediaries is causing them to not able to fully realize network effect nor scaleable reputation.

This trait is siloization.

1.1 The Inefficiencies in Siloized Reputation

In today's labor marketplaces, all reputational information is custodied by the intermediary. With this custody, users are 1. unable to leverage their reputation on competing intermediary platforms and 2. beholden to the decisions and success of the platform they use.

When reputation histories are siloed across many intermediary platforms, there is never true transparency on the full reputation of a user. This lack of interoperability means there is less data available for counterparties to use to assess one another; this inefficiency leads to more friction in choosing suitable partners.

Additionally, when intermediaries have custody of a user's reputation, users open themselves up to the following types of Platform Risk:

1. Platform Success Risk: When a platform goes out of business, a user's reputation is lost. (i.e. Moonlighting.com's acquisition and subsequent decommissioning in 2021)
2. Nation-State Risk: When a platform must comply with a new law or sanction in their country of incorporation that impacts who can use the platform, users' reputations can be lost. (i.e. Freelancer.com's banned country's list)
3. Internal Policy Risk: When a platform changes internal policies that impact who can use the platform, users' reputations can be lost. (i.e. Upwork's political ban of Russian and Belarussian users)
4. Moderation Risk: When a platform's moderators selectively ban or shadowban users, users' reputations can be lost. (i.e. reported Codementor shadow bans)

While these risk areas are impossible for platforms themselves to avoid, the devastating impact of reputational loss on users can be completely avoided. This is possible by separating reputation management and storage from platforms.

This may seem like a simple solution, but it goes directly against the current business model of most intermediary platforms. Intermediary platforms secure their revenues by onboarding users and making it difficult for them to leave the platform once onboarded;

leaving them free to levy high fees. The primary method they use to prevent users from easily leaving is reputation: the longer a user builds a reputation on one platform, the higher the cost of leaving. Because reputations are non-interoperable by design, when a user leaves a platform, they lose access to the history of reviews that helped them win clients.

This model of onboarding and trapping users has created a highly siloized ecosystem of work platforms, limiting the size of their economies of scale and reducing the efficiency with which hirers and workers are able to connect with one another. **Adopting an interoperable reputation system necessitates evolving the economic model that labor platforms rely on.**

1.1 The Inefficiencies in Siloized Talent Pools

Today, labor marketplaces maintain separate networks of talent and hirers.

Intermediaries in labor experience two simultaneous pressures;

1. The Economy of Scale Pressure: Intermediaries desire to create an economy of scale for users. The larger the economy of scale, the better fit the connections between counterparties will be.
2. The Rent Pressure: They desire to extract rents. Today, this is primarily done by trapping users. If a user onboards and then has a hard time leaving the platform, then the platform has the ability to extract rents. When a user leaves the platform, they no longer have the ability to extract rents.

1. The Economy of Scale Pressure and 2. The Rent Pressure create a catch-22 situation for intermediaries where they desire to allow their users to connect with as many counterparties as possible, but they can not create situations where user flight risk increases. Because of this, we have many thousands of moderate-sized labor market platforms and many hundreds of thousands of small labor market platforms, each maintaining its own non-interoperable user pool. This results in less optimal matching situations for hirers and hires.

Allowing for a true economy of scale for connecting workers and hirers, we must evolve the economic model that labor platforms rely on. This is only possible by providing them with an alternative solution to satisfy The Rent Pressure.

1.3 A Novel Economic Model

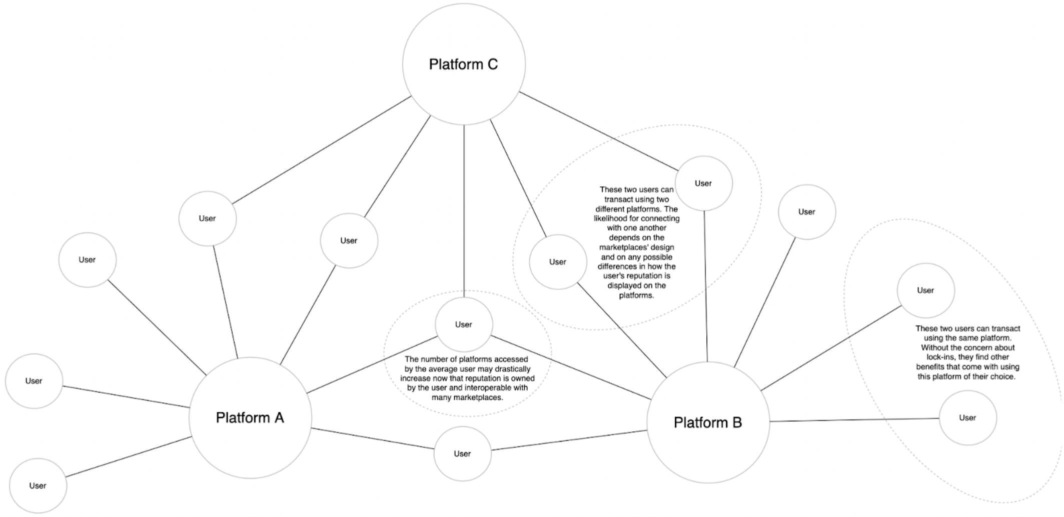
TalentLayer proposes a new economic model and reputation system for labor transactions where platforms are incentivised to onboard their users to one decentralized network through retaining a long-term share of fees generated by that user on other platforms integrated with the network. This network also enables users to directly interface with one another, should they wish. **This network forms one economy of scale for user reputations and labor transactions.** This is facilitated with blockchain technology, a token economic incentive model, and decentralized storage.

By removing the intermediary's role in reputation management and facilitating an economy of scale and bringing increased certainty in relationships, TalentLayer aims to further minimize friction in labor relationships (both on intermediary platforms and off) creating a wide-reaching new standard for how humans work together.

2. Solution

TalentLayer is a decentralized infrastructure layer for open labor markets. It includes functionality to create identities, manage jobs, handle escrow, conduct dispute resolution, and more. TalentLayer-integrated Platforms have access to one unified work reputation system and user pool. With the TalentLayer Reputation System, users own and grow one reputation across all integrated platform interfaces - reputations are owned by users and backed by the protocol.

To create custom experiences for users, platforms can filter the jobs and profiles that show up on their interfaces, allowing them to task-specialize, topic-specialize, and geo-specialize their Platforms. Most importantly, TalentLayer and the Platforms that integrate with it are sustained by a novel economic model that incentivizes marketplaces to onboard users to a shared backend.


Platform C
User
User
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User
User
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User
These two users can transact using two different platforms. The likelihood for connecting with one another depends on the marketplaces' design and on any possible differences in how the user's reputation is displayed on the platforms.
User
User
These two users can transact using the same platform. Without the concern about lock-ins, they find other benefits that come with using this platform of their choice.
User
The number of platforms accessed by the average user may drastically increase now that reputation is owned by the user and interoperable with many marketplaces.
User
Platform A
Platform B
User
User
User

Figure A

Cross-Usage of Platforms with Interoperable Reputation

2.1 Principles

TalentLayer's open labor market protocol has been engineered to be:

1. Self-sovereign: Identities and the reputational data associated with them should be custodied by the End User. They should be unable to be confiscated.
2. Verifiable: Reputation should be based on reviews given by counterparties that were provably transacted with.
3. Open-source: The reputation system and supporting technologies should be fully open-source.

4. Self-sustaining and User-governed: The reputation and supporting infrastructure should be owned and maintained by End Users and integrated Platforms. These actors should make decisions that impact the future of the protocol.
5. Privacy-Preserving: Reputational information should be permissioned; an End User should have the ability to selectively disclose specifics of work completed and reviews given to them.
   a. Provable: While being permissioned, even if specifics are not disclosed, the fact that a job was completed or a review was given must be visible.
6. Chain and Storage Agnostic: The protocol should be able to be implemented on any blockchain or decentralized storage platform in the future. The protocol should be able to run on multiple chains and storage networks at the same time.
7. Modular: The protocol should be able to be implemented in part or in full, to allow compatibility with existing labor platforms.
8. Personhood Agnostic: The protocol should allow any individual to create as many or as few identities as they please. The protocol should allow actors such as AI, organizations, and others to interact with the economy.
9. Configurable: The protocol should allow Platforms the level of configurability needed to effectively meet their diverse needs.

2.2 Solution Design

TalentLayer's infrastructure is composed of a set of configurable integrations that a range of labor Platforms can integrate with. TalentLayer is designed to both provide a self-contained backend for a new breed of labor platforms to build on natively as well as a modular solution for existing labor platforms to integrate with.

TalentLayer has three core components:

1. The TalentLayer Reputation System
2. The TalentLayer Jobs System
3. The TalentLayer Escrow and Dispute Resolution System

A final key component of TalentLayer is The TalentLayer Governance System.

2.2.1 TalentLayer Reputation System

The TalentLayer Reputation System is a searchable on-chain repository of identities and their reputations and the tools by which these identities and reputations are created and updated.

Technical Components

1. **TalentLayer ID System:** A smart contract that can be triggered to mint a TalentLayer ID
2. **Platform ID System:** A smart contract that can be triggered to mint a Platform ID
3. **TalentLayer Review System:** A smart contract that can be triggered to mint a reputation update to a user's TalentLayer ID or Platform ID.

4. **The TalentLayer Graph:** A data querying layer that allows review and TalentLayer ID data to be easily searched and displayed on frontends.

2.2.2 TalentLayer Jobs System

The TalentLayer Jobs System is a searchable on-chain repository of labor agreements that can be posted to and read from by any integrated Platform.

Technical Components

1. **TalentLayer Jobs Contract:** A smart contract that can be triggered to create a job, accept proposals for that job, and allow two parties to mutually initiate the job. Job data is stored in the TalentLayer Jobs Smart Contract and on IPFS.
2. **The TalentLayer Graph:** A data querying layer that allows job data to be easily searched and displayed on frontends.

2.2.3 TalentLayer Escrow and Dispute Resolution System

A simple but configurable escrow system and dispute resolution system.

Technical Components

1. **TalentLayer Escrow**: A system that allows new escrow contracts to be created, associated with Jobs, and fulfilled by End Users. Allows for various configurations including milestone-based payments, streaming payments, lump-sum payments, and more.
2. **TalentLayer Arbitrator:** A dispute resolution contract that enables platforms to configure terms of dispute resolution and manage release of escrow in the event of a closed dispute.

2.2.4 The TalentLayer Governance System

The TalentLayer Governance System is the system of three key processes needed for the continued maintenance of TalentLayer by an eventual decentralized autonomous organization…

A. Processes for making collective decisions
B. Processes for carrying out those decisions - auditably, verifiably, accurately, correctly, completely
C. Processes for tweaking the decision-making rules

As a decentralized application, TalentLayer must remain resilient over the long term by not being controlled or maintained by any one party or cabal. By decentralizing decision-making and implementation, we make TalentLayer sustainable and less vulnerable to attack.

Over the course of TalentLayer’s lifetime, development and strategic direction will be gradually decentralized amongst key actors and token holders in the TalentLayer community as part of our governance decentralization process.

2.3 Applications

TalentLayer has a broad range of applications across platforms that facilitate labor arrangement.

Some of the business applications that TalentLayer directly enables include:

- Freelance marketplaces
- Ride-sharing apps
- House sharing apps
- Food delivery apps
- Full-time employment platforms
- Recruiting tools
- Photography marketplaces
- Wedding services marketplaces
- Childcare marketplaces
- Telemedicine apps
- Rappi-style multi-marketplace apps
- Corporate reputation intra-nets; internal reputation systems that interoperate with external ones
- AI model services marketplaces

2.3.1 Modularity

TalentLayer is designed to allow modular integration; that means a Platform can integrate one component or many components of TalentLayer. For example, an existing marketplace with its own legacy payment rails can choose to integrate only the TalentLayer Reputation System. Similarly, a new platform can use TalentLayer to fulfill the entirety of its backend needs by integrating the TalentLayer Reputation System, TalentLayer Escrow and Dispute Resolution System, and TalentLayer Jobs System.

2.3.2 Configuration

TalentLayer's infrastructure is highly configurable, allowing Platforms to curate how and when information from the protocol is displayed on their user interface. With this, Platforms are able to create highly customized user experiences while still leveraging one interoperable backend.

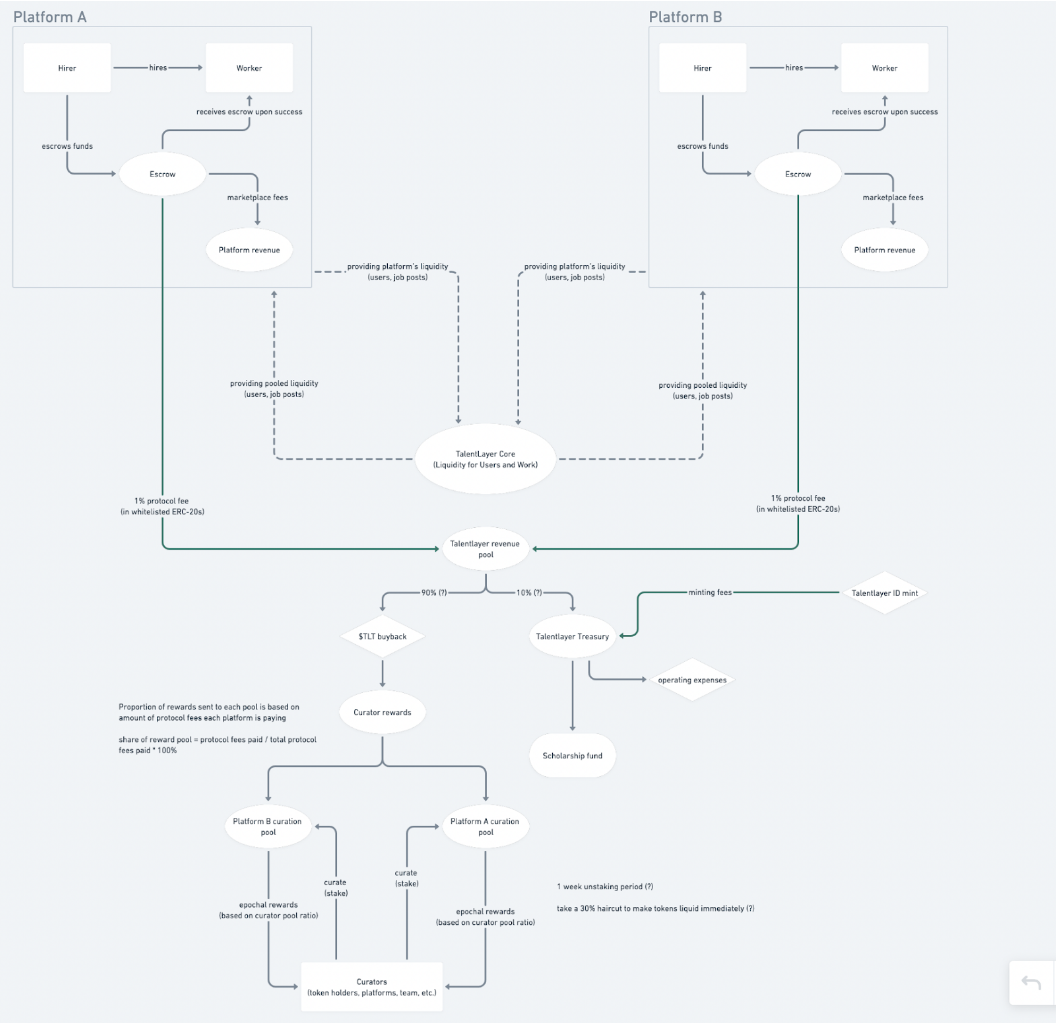
All data structures discussed in Section 2 can be filtered by any piece of metadata. The most common metadata elements to filter for are as follows:

1. Geolocation
    a. *Example 1: Only display End Users that are located in Belgium*
    b. *Example 2: Don't display Jobs that were posted by End Users located in The United States*
2. Keyword
    a. *Example 1: Only display Jobs that mention React*

   b. *Example 2: Only display End Users that have completed a job mentioning Marketing*
3. Originating Platform:
   a. *Example 1: Only display End Users or Jobs that a specific platform onboarded*
   b. *Example 2: Filter out users or jobs from specific platforms known for writing spam*

In addition to filtering based on on-chain data Platforms can also freely add additional layers of filtering for End Users of their Platform including only displaying End Users that have completed KYC on the Platform in question.

3. Economics



Proportion of rewards sent to each pool is based on amount of protocol fees each platform is paying

share of reward pool = protocol fees paid / total protocol fees paid * 100%

1 week unstaking period (?)

take a 30% haircut to make tokens liquid immediately (?)

3.1 Platform Fees System

3.1.1 Origin Fees

Enables platforms to configure fees when one of the Service Posts or validated Proposals that they originated leads to a successful work relationship resulting in the release of escrow.

Technical Components:

- Platform ID: Platforms can configure metadata fields to control the rates they charge for providing liquidity to the network in the form of Service Posts and Proposals (each type getting a separate rate).
- Escrow: Upon escrow release, the payments of the configured fees are automatically routed to the marketplaces participating in the deal.
- Each fee can be configured between 0% and 100% - over time, marketplaces will see what each other are using as reasonable rates and a market equilibrium will occur. Platforms building on TL have seemed to set rates around 5-10% (which is lower than big centralized platforms like Upwork - 20%).

3.1.2 Service Post Fee

Enables platforms to configure fees when a user posts a service. This is paid at the time of the transaction to create the post and is automatically remitted to the marketplace configuring the fee.

3.1.3 Proposal Post Fee

Enables platforms to configure fees when a user posts a service. This is paid at the time of the transaction to create the post and is automatically remitted to the marketplace configuring the fee.

3.2 TalentLayer Fee Summary

3.2.1 Protocol Fee

When one of the Service Posts leads to a successful work relationship resulting in the release of escrow TalentLayer takes a 1% fee on this.

Technical Components:

- Escrow: Upon escrow release, the fee payments are automatically routed to the DAO’s multi-sig (or in the short-term, the core team’s multi-sig).
- Fee Setting Function in Escrow: We have a function in the contract to set the fee amount. The contract is upgradable so that this fee can be changed.
- Configuration: We intend to hand off the configuration of this fee to the DAO upon decentralization - this serves as an incentive for platforms to be active in governance and to hold the governance token - because they’d want to make sure fees don’t go up. Over the long term once the protocol has a wide enough developer and platform community and no longer requires much maintenance,

this fee we expect will trend toward 0%. This thinking is largely inspired by the Hyperstructures Thesis.

3.3 Search, Ranking, and Filtering

3.3.1 SEO for Actors and Platforms

The platform's role in helping users perform queries

Imagine that there exist 1 million data points on TalentLayer. A platform could perform advanced searching for fetching the most relevant data for their users, and while doing so, filter out irrelevant, low-quality data points. If relevant services break platform compliance rules then platforms could decide whether or not to allow their users to view such content. If services are intended to be misleading, then that service lacks integrity and may be removed, ignored, or reported.

Good filtering will be a strong differentiator for platforms and will help them develop moats that let them retain users for the long run. Possible aids to search and matching include AI, curation networks, and more.

In other words, platforms assess "signals" given off by each other and assess their level of trust based on these signals.

The platform's role in helping users post services and proposal

Platforms want to help their users with posting services and proposals without introducing friction. However, platforms may have different types of legal liabilities or internally set policies that could mean that platforms need to monitor services both before and after the services and proposals are published. Monitoring before publishing platform-based functionality whereas monitoring after publishing requires protocol-level functionality. The monitoring can be conceptualized as three levels of firewalls.

Firewall level 1 concerns the moderation of content that is uploaded on the platform applications front-end. Here platforms monitor content to detect if it breaks their internal policies.

Firewall level 2 allows platforms to moderate content that has been published on the protocol level but not yet entered into an agreed-upon exchange. For example, open services and submitted proposals can be monitored and canceled by the platform that facilitated their creation.

Firewall level 3 allows platforms to moderate entered exchanges by canceling the escrow and revoking the receiving fees. This is the last step to protect platforms from liability and should be used as a last resource.

The ecosystem may use financial incentives to promote good behavior. Such incentives could in turn ensure that platforms are encouraged to create incentives to promote good user behavior. To delegate the responsibility of promoting good behavior of the users from the network level to the platform level, platforms could be provided the necessary means to control their users' activities on the protocol level. A platform could choose to close an unfulfilled service published using the platform's application. This won't hurt the user as they can simply move to another platform whose values and policies might be better aligned. The protocol can remain censorship resistant through the freedom of choice while ensuring quality by delegating the responsibility to ensure user-level good behavior to platforms.

Platforms can take an active role in the monitoring and moderation of the services and proposals published using their platform application. The platform's activity further suggests to other platforms that the services and proposals posted using their application may be of higher quality and potentially trusted. Closing services and proposals both before and after the service is validated may have a financial cost to create a negative incentive for platforms to promote monitoring of services and proposals before they are published while maintaining a trusted set of users, which consequently promotes quality on the protocol level. But more importantly, platforms have a relational incentive that encourages moderation of services and proposals. Platforms shall be cautious about canceling services and proposals that have been published on the protocol level as such actions create negative value for the ecosystem and which other platforms notice and may discourage them from further collaborating with the platform.

Through clustering and network analysis on historical data, platforms can predict which services and proposals that are more likely to be of high quality and produce positive experiences and value for their users and choose to only show these for their users. Such analysis can take into account the historical record of platforms as well as users.

Platforms as Labor Search Engines

This is the root of "SEO" for platforms - each platform observes one another's behavior and creates its own standard way of filtering data. This we expect will happen in a market-driven way very similar to how SEO works for search engines. New platforms will not have a track record (of successful services and posts) and therefore will rarely be indexed. As platforms become more trusted for being good at providing good liquidity (good users/service posts) and not bad liquidity (bots, spammers, bad actors) to the network, they will be indexed by a greater and greater number of platforms.

Passive vs Active Signals

Based on on-chain data, platforms and individual actors will observe each other with metrics like job completion rate, rate of disputes, number of users with activity, etc in mind. This data we refer to as a "passive signals" because an actor does not take an action to signal its reputability to the broader network.

In the following section, we will discuss "active signals", which enable platforms and other actors to actively demonstrate to the network that they are trustworthy.

It is essential to have both active and passive signals present in the network because presenting only passive signals means marketplaces that have the longest on-chain history (aka, the oldest ones) will likely be the only ones who get widely indexed. This is because when a marketplace is started or when a new user enters the network, it has no history and therefore can't be assessed as trustworthy or not - this means no early marketplace will get indexed because other actors and platforms won't want to take the risk of it being a bad actor.

Crowd Curation

Crowd Curation is a mechanism that leverages "wisdom of the crowd" to encourage Curators to search for, assess, and commit tokens to specific actors that they think will succeed.

How do curators stake and earn?

- Curator researches new actors to the ecosystem
- Curator finds an actor that seem reputable - the Curator thinks they will succeed
- Curator commits TLT on behalf of these actors (effectively placing a bet that that actor will do well)
- The Curator receives a percentage of profits that the TalentLayer protocol treasury makes from transactions tied to that actor - the earlier a Curator stakes the larger the proportion they earn

Who can be a curator? Anyone can be a Curator - platforms, organizations, end users of platforms, people who want to earn a passive income, etc. This gives an opportunity for anyone to directly contribute to maintaining our ecosystem, and share in the benefits. Actors can also stake tokens on behalf of themselves.

How is this impacted by regulation around securities? Curators are actively completing work for the network in searching for platforms, assessing them, and signaling their opinion. This activity prevents this sort of regulatory concern, as the earnings curators make can not be construed as passive.

Why is time weighting important? Time weighting (having the earliest stakers receive a higher reward) is important to the mechanic because if it were even then everyone would stake on the biggest platforms and the mechanic would not work. Time weighting compensates people for taking early bets - this is where the value of curation is powerful.

When is this valuable? This is most valuable when TalentLayer is a highly mature market. When there are more platforms, bigger the data lake, more noise to sift through. Knowledge of the crowd becomes essential to make sense of this noise.

3.8 Other Mechanisms (5)

3.8.1 Inflation

TalentLayer Token has a hard token cap. TalentLayer Tokens will gradually be minted over time at a scheduled rate until the token cap is reached. TalentLayer Token minted is sent to the TalentLayer Treasury to support the development of the protocol. After the token cap is reached, the TalentLayer Treasury should be sufficiently funded by fees generated from the economic model.

To account for the increased cost over time of TalentLayer Token, through the TalentLayer Governance System we must eventually alter the amounts of TalentLayer Token needed to stake to write to the protocol.

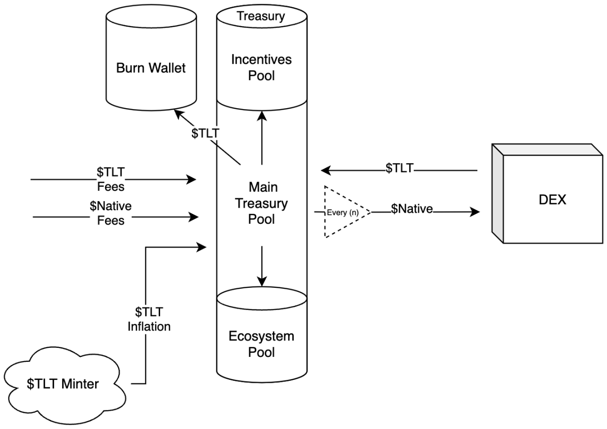


Figure 5

Treasury Management Diagram

3.8.2 Other Token to Native Token Treasury Conversion

When fees come into the TalentLayer Treasury in the form of tokens other than TalentLayer Token (TLT), a percentage of these will be sold on the open market in exchange for TLT.

4. The Future

The work platforms of the future will leverage one open-source backend for reputation, building business models and new industries that look different from the ones we see today.

Some of the new business applications that an open infrastructure for work will enable include:

1. New tools for easy tax filings that pull on-chain data directly from jobs you have completed, correctly categorized based on job metadata
2. New lending resources that take into account length and quality of work history leveraging much more extensive and accurate datasets to provide better rates
3. New job insurance resources that take into account the proven specifics of your work history over time and accurately project future earnings

We’re building something that will fundamentally change how every human on earth connects with one another.

We’re building a new way of working.