TUT protocol - a new tokenomic approach for decentralizing the EdTech industry

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Abstract. Education hasn't evolved since centuries, and even trying to adapt blockchain user cases to solve the main problems of such an endemic industry results are not changing user behaviours. Use adoption from utility tokens is slow and there're no communities building mass-adopted products. We present the TUT protocol, created from inside the sector and implemented over the TUT token that aims to disrupt once for all this industry, adapting security functionalities to a deployed utility token and getting big benefits from users and holders. With the TUT token and the TUT protocol any service or company in the EdTech market could be decentralized.

1. The TUT protocol view

Decentralizing a company is a hard issue. Decentralizing a full industry should be a titanic mision. In order to add value in the Educational market with a decentralization of services and business units we present the TUT protocol: a set of smart contracts and functionalities being able to be added for any kind of company to tokenize their digital assets; assuming that in the Educational sector value is around the knowledge that is generated, the TUT protocol aims to tokenize and to transform it to valuable unit economic, being able to transfer, invest and trade with it.

The TUT protocol could be the one to be implemented in any EdTech company, improving the path through a decentralization and empowering users with a better user behavior.

2. A new digital Architecture for decentralized services and dAPPs for Education

The complexity to aboard a general solution with utility tokens for any kind of problem detected in the educational market took us to create a new framework to be used not only inside Tutellus but also outside our platform, with the use of API functionalities and webhooks associated to the different services provided through the TUT protocol.

We present a new kind of digital architecture designed to be used for any Educational company interested in tokenize their digital assets. In this new framework the TUT token is the door to enter to a wider spectrum of services commanded by the TUT protocol, which interacts with different dAPPS executing a predefined and unique smart contract for each situation. At the same time users and investors will be the main beneficiaries of the model, and third parties (providers, clients or other educational companies) would be able to integrate this framework through API services.

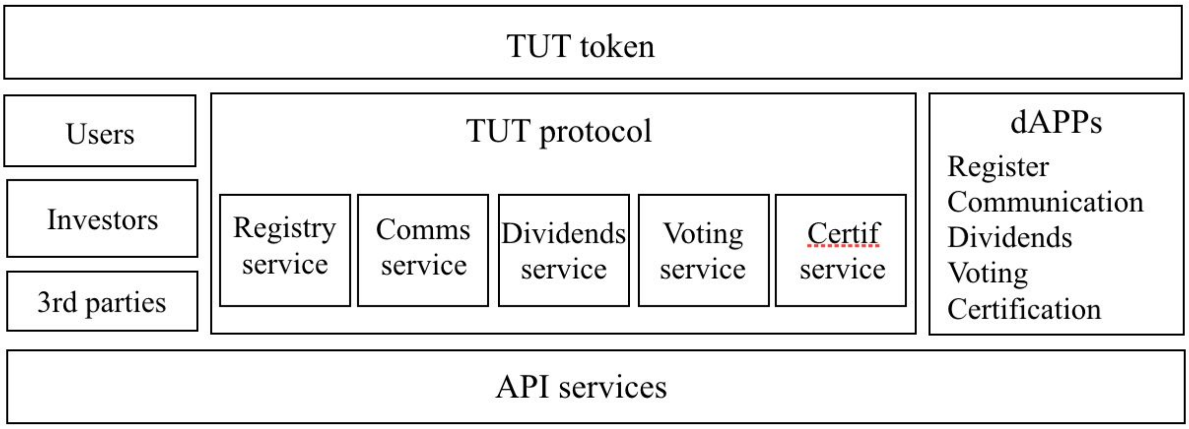

Figure 1. Tutellus' TUT token and protocol framework

The TUT protocol is the framework's key element. It's implemented inside the TUT token and it represents *the gas* that spreads the full architecture; we will analyze each component of this architecture in order to understand the potential for tokenizing any kind of digital asset in EdTech industry.

3. The TUT protocol ecosystem

Tutellus believes that EdTech industry has a key common components in all companies about the value creation, so we have designed this framework being centered on the main services common to all of us. Each company should define which one of the total services need to integrate. At the same time the framework is opened to incorporate new services in the future.

The main components of the TUT protocol ecosystem are:

- **TUT tokens**. Deployed over the NEM blockchain. Already in production in http://explorer.nemchina.com/#/namespace?ns=tutellus

- **dAPPs**. A set of smart contracts that represents different functionalities to be used for users or token holders. Examples are dAPPS to manage the registry service, the communication service, the dividend issue service, the voting or the certification service. We'll review all of them in next chapters.

- **TUT services**. The infrastructure to be used by the TUT protocol to provide the smart contracts anyone can use through the dAPPs. Some of these services are:
  - **Registry service**. To register online investors' information.
  - **Communication service**. To create a channel to inform token holders.
  - **Dividend issue service**. To share profits with token holders.
  - **Voting service**. To decide Operational issues from STUT holders.
  - **Trade service**. To create a relationship between the liquid and non-liquid token; in Tutellus' case it represents the trade decision TUT - STUT.
  - **Certification service**. To certificate any kind of title on the blockchain.

Tutellus adds an API layer in order to improve the model, letting users, investors and third parties to interact directly through the TUT protocol with the TUT services and dAPPs but from any other external tokens, not necessary the TUT token; the only restriction will be to use the NEM blockchain de deploy their tokens, possibly the easiest to do it. Third parties will need TUT tokens as gas to feed the smart contracts the want to execute with their own tokens.

4. The TUT token

The TUT token is a living asset built over the NEM blockchain. It holds utility + security token functionalities, and it's used with several purposed as it's described in the whitepaper;

- Access to products and services in the platform both for students and teachers or companies. The TUT token acts itself as a cryptocurrency.
- Trading from the STUT token (a measure of the relevance or knowledge any user gets in the platform). Any user can trade its relevance (STUT) to TUT at the end of each course.
- Dividend issuance. The TUT holder receives quarterly a percentage of the revenue of the company, regardless on the token fluctuation. Then it's shared between STUT and TUT holders as we describe in chapter 11.

Issuers of other tokens can integrate these functionalities through the TUT protocol, letting run our smart contracts in their platforms and connecting their tokens with the Tutellus dAPPs they require. Tutellus opens a new world of possibilities for issuers and EdTech companies to deploy their tokens and decentralized solutions without the need to build a full infrastructure from scratch.

For example, if an educational platform which competes with Tutellus in the centralized world (let's say "NEWCO") wants to use our framework to deploy their own blockchain solution, they can integrate the TUT protocol in order to create a new token. This new digital asset (the NEWCO token) has an equivalent inside their platform; using the Trade service and the TUT protocol they create the "Smart NEWCO token" to measure relevance's users in order to tokenize their user's knowledge. The NEWCO can use all dAPPs and Tutellus' services for executing our smart contracts in order to run their own business. They will need TUT tokens to feed the smart contracts.

5. The Registry service

The Registry service is the simplest one and it started to work in our own platform in december 2017. It's an onchain service where each investor is identified by a unique hash that contains personal information that allows identification in a privacy-safe way; the hash holds information that includes:

- Investor Country and physical adress
- Investor KYC status and documentation
- Investor amount invested / for investing
- Investor coin used in the process

6. The Communication service

The Communication service should be one of the most important services of the pool, because of the importance of the news the company should notify each period of time to their token holders; updates, business situation, road map, dividend issues, etc. Despite of the fact any company has the full information of investors through the Registry process the problems appear when the tokens are tradeable in Exchanges, where the company cannot control the registry information of token holders; for that case we provide a full API functions implemented over the TUT protocol, to be able to make a call to the Exchange requiring this critical information.

The Communication service is at the same point implemented in the TUT token since this function is working in a native way in any NEM token. It's a core functionality of the NEM blockchain.

In order to control the number of communications a company can make with their token holders a smart contract will supervise some rules in a similar way that email servers control spam and not-wished emails. Using the Communication service will require a quantity of TUT tokens to be determined depending on the size of this message (measured in bytes).

7. The dividend issuance service

The dividend issuance service is a must for security tokens. In our case any holder that acquires TUT tokens directly from the company or from an Exchange holds economic rights over the digital asset. The TUT token interacts with the dividend issue dAPP through the TUT protocol, which acts as 'the secret sauce' being able to execute a set of rules marked in a specific smart contract. The next diagram shows how it works.

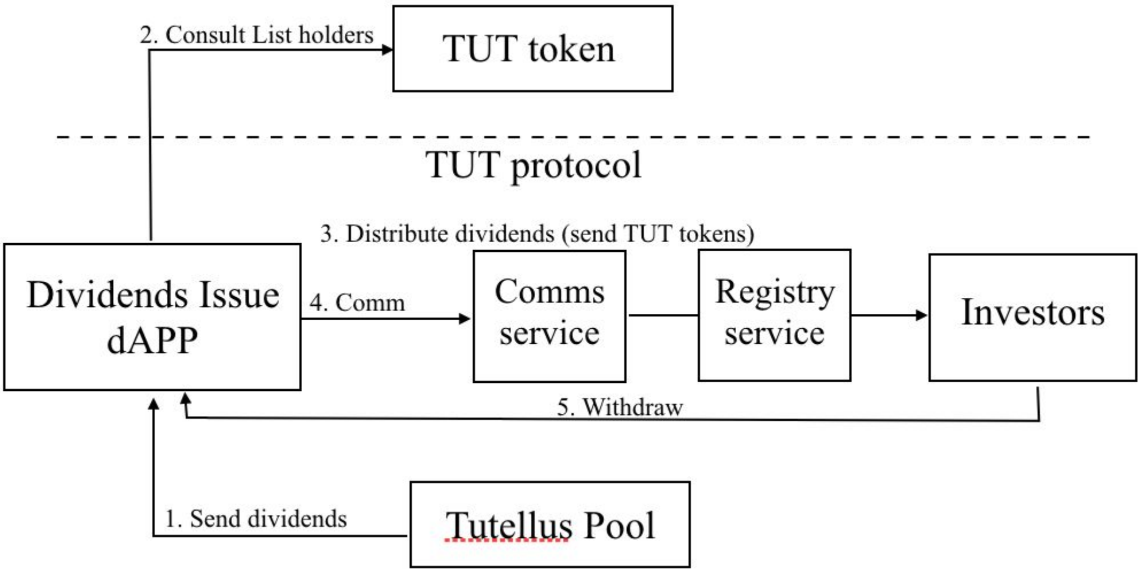

Figure 2. The Dividend issuance service and interactions

The full process follows this order;

1. Tutellus sends dividends from the Pool to the Dividends Issue dAPP. Remember that we feed quarterly the pool with a buy-back of TUT tokens in a percentage depending on the total Revenue of the company.
2. The Dividends Issue dAPP ask to the TUT token -through the TUT protocol- for the List of TUT holders. Some holders can stay since the initial coin offering and others can have acquired TUT tokens in an Exchange.
3. The dAPP distributes the dividends between the TUT holders in that moment. In this scenario we are simplifying the model for a better understanding but we should consider also a consult to the STUT holders List to be included in the dividends distribution as it's described in the whitepaper.
4. The Dividends Issue dAPP uses the Communication service (and Registry service, depending on the stage of the TUT token from a massive distribution perspective) to notify Investors about the dividends information.
5. Investors that couldn't receive their dividends in the distribution can use the withdraw() method in the contract to retrieve their funds at a later date.

8. The Voting service

The voting service is the one that manages and distributes the community power inside the platform, and unlike the previous cases this service refers and acts over the STUT token (the internal token that measures relevance or knowledge).

The voting service is used by STUT holders to decide governance issues in the platform. Tutellus develops several voting dAPPs associated to new courses approval, new careers design or things like that. Most of the operational issues of the company will be decentralized in the community, receiving the ones that participate in that issues a reward based on the own STUT token. Next diagram describes the workflow;

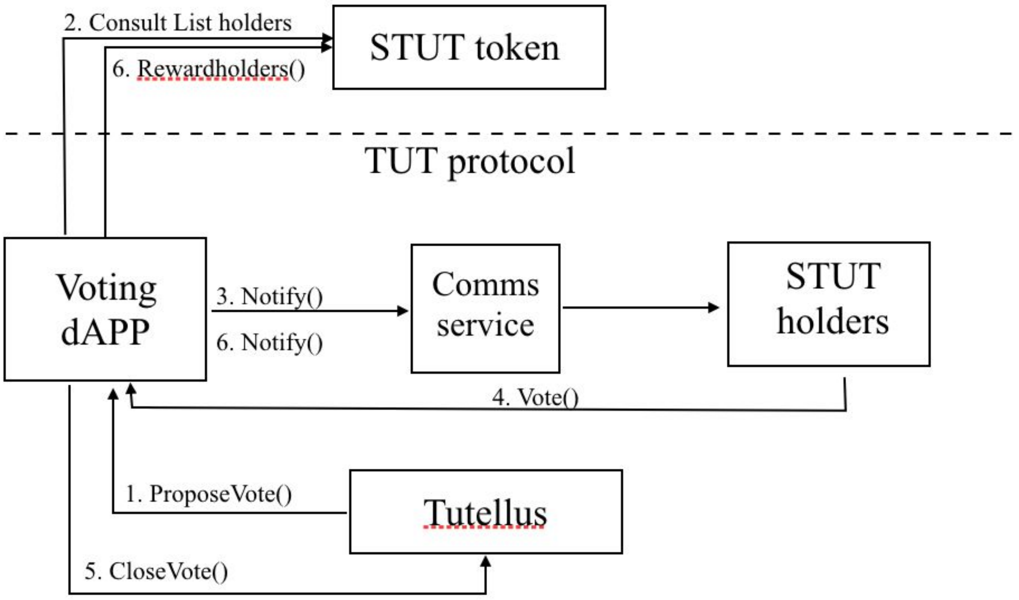

Figure 3. The Voting service and interactions

The full process follows this order;

1. Tutellus starts a Voting proposal; to understand well this point you should consider that we have always active voting proposals, because there are always new courses to approve or reject, for example.
2. The Voting dAPP asks to the STUT token -through the TUT protocol- for the List of STUT holders. The smart contract that rules the dAPP has a clear parameters to control and to filter users depending on their STUT tokens index; for example, the Voting dAPP for approving new courses considers that for approving / rejecting new ones it needs at minimum 3 different STUT holders with a minimum of 5.000 STUT tokens in the skill they need to approve / reject.
3. The Voting dAPP uses the Communication service to notify STUT holders about the voting information. This communication is done by standard channels like email or

web/push notifications because of the STUT token is not tradable and it's always inside the platform, so we know who are all the STUT holders.

4. STUT holders vote and decide (following the example) if the course should be approved or rejected.
5. When the dAPP reaches the minimum control parameters it need to close the Voting process (3 users with a minimum of 5.000 STUT tokens) it notifies Tutellus to finish it.
6. STUT holders that participated in the approval / reject process receive their rewards in new STUT tokens through the Rewardholder() function.

9. The trade service

The trade service manages the relationship between the TUT and STUT token. Remember that attending the tokenomics design at Tutellus a user (let's say "Bob") that is making activities and actions during a course is able to receive STUT tokens as rewards associated, and at the end of that course the user will have to decide if he holds his relevance (STUT tokens) or trade in to TUT tokens (losing the relevance he won).

Using the TUT protocol any company could use their own tokens to interact with the trade service dAPP, asking to the smart contract for the equivalent parameters between both tokens for any user. Next diagram describes the workflow;

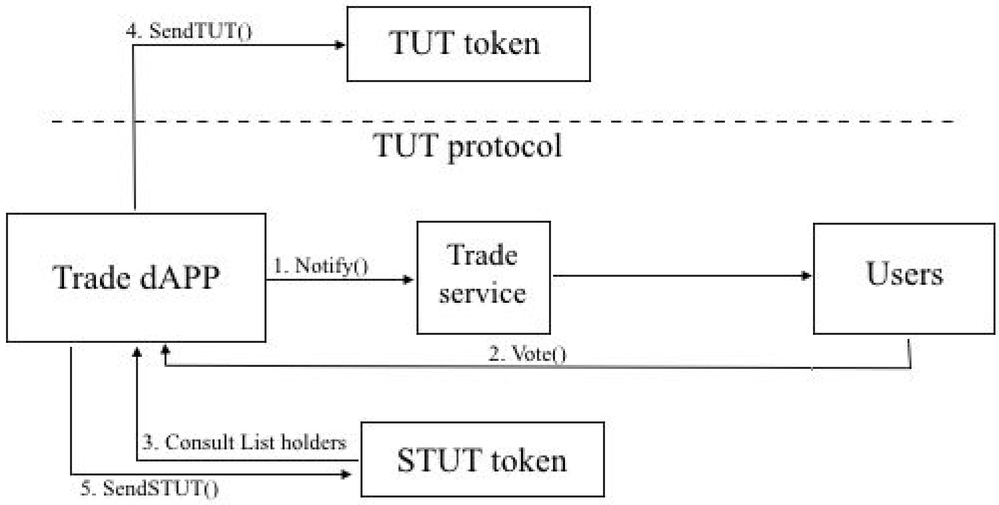

Figure 3. The Trading service and interactions

The full process follows this order;

1. The starting point occurs when a user finishes a course; the dAPP asks Bob what he wants to do with his tokens. So the dAPP notifies through the Trade service the trade decision to the user.
2. Bob votes for that (holds the STUT / trades the STUT / trade the STUT in a percentage) and communicates it to the Trade dAPP.
3. The Trade dAPP through the TUT protocol consults the STUT holders list to check Bob's relevance, and depending on his decision with the vote() function the dAPP sends TUT, new STUTs or whatever.
4. Bob gets a new levels of STUT and TUT tokens.

10. The certification service

The certification service is a must in the education industry. Using the blockchain not only to certify some level of studies but also to apostille it on chain is a valuable service both for students and institutions. Being able to do it in a public blockchain is a proof-of-identity unprecedented until now.

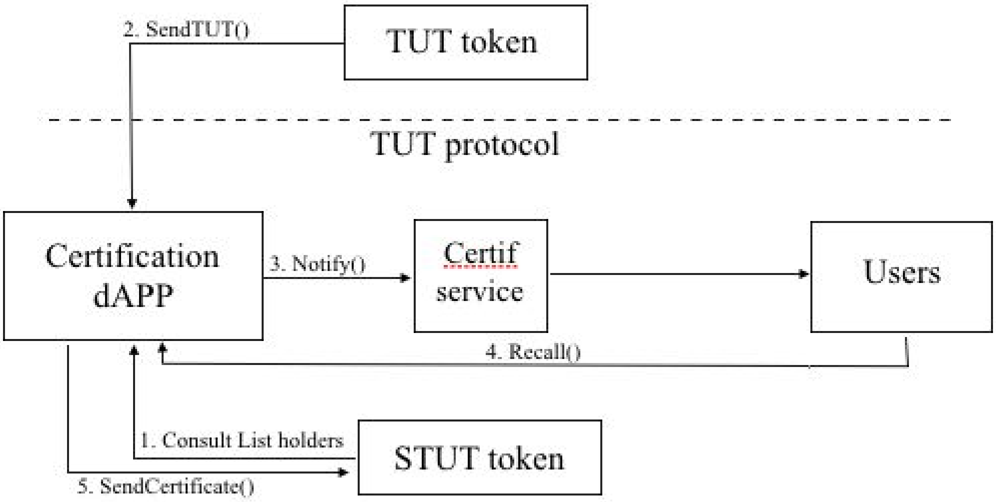

Figure 5. The Certification service and interactions

The full process follows this order;

1. The starting point now occurs when a user ("Alice") wants to certify a learning process she made; the dAPP asks the STUT holders list to check that Alice is there.
2. Alice needs to send TUT tokens, through the TUT protocol, to feed the smart contract that needs to execute the certification and apostille service.
3. The Certification dAPP notifies Alice that she is going to receive the service. If Alice cannot receive at that moment the service (she didn't send enough TUT tokens to execute the smart contract, for example) she can try again with the Recall() function.
4. The dAPP sends the hash with the accredited and apostilled title to Alice.

Any company could use the TUT protocol to apostille their titles in the NEM blockchain using the Tutellus Certification dAPP. Again, the requisite the Newco needs is to have their own tokens deployed and to send TUT tokens to feed the smart contract through the TUT protocol.

11. The TUT protocol full approach and the case of Tutellus

Tutellus is the first project where we are deploying the set of tokens and smart contracts that we described before. In order for a better understanding of the full TUT protocol, we collect the total interactions between the different tokens and players and the full TUT token cycle.

As we said at the beginning, the goal of the TUT protocol and the TUT / STUT token is to provide a complete framework to be able to decentralize all find of services in the educational industry.

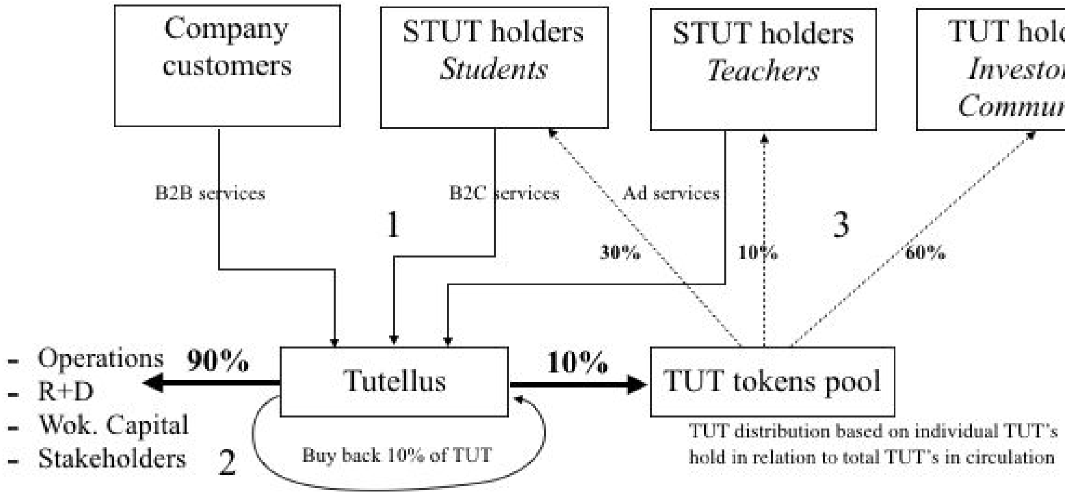

Figure 6. The TUT protocol full approach in Tutellus

1. Tutellus generates Revenues from different sources: main one is Students but we also have Teachers (Ad services for promoting their contents) and Corporates (B2B services). We concentrate the full Revenue in one source.
2. Each quarter Tutellus uses 10% of the net Revenue (cash) to buy back TUT tokens in the market, decreasing the offer at that stage. We have a sustainable business model with the enough profitability to destiny 90% of Revenues to natural P&L expenses and 10% of that quantity for the token purchase. We send these TUT tokens to a pool.
3. With the goal to empower users and reward Community (STUT holders) and Investors (TUT holders) we share those TUT tokens each quarter, encouraging not only Students and Teachers (the ones that got STUT tokens becoming proactive users) but also Investors (getting a quarterly dividend over the company Revenues).

After being deployed during 2019 in Tutellus, we will extend these full approach to other companies with the same goal: to empower users and to improve EdTech industry in favor of those users.

12. Conclusion

After 2 years in the blockchain industry and having matured the TUT token, we are very excited to launch the TUT protocol as a way to improve the global educational market. Any project could be benefited to use it to decentralize their services and tokenize their assets.

The TUT protocol lets a complete modularity over the different parameters that control and execute the smart contracts. It has the power to incentive any ecosystem with a complete rewards cycle that empowers not only investors but also users. Decentralization with the TUT protocol has the chance to improve the educational industry once for all.

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