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Reputation-Based Incentive Model for Decentralized Analysis of Development Proposals

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Abstract — **In this paper we present a reputation-based incentive model for community-driven decentralized analysis of cryptocurrency platform development proposals. Firstly, we consider how the rewards of Proposal Assessors (who write assessments on proposals) and Veteran Proposal Assessors (who rank assessments) depend on the different types of work they've done. Then, we consider the definition and properties of the reputation function and present a rationale for selecting coefficients for different types of work.**

Keywords* — *blockchain; cryptocurrency; decentralized treasury system; reputation

I. Introduction

Many modern cryptocurrencies and platforms introduce decentralized governance to provide effective self-management. Bitcoin [1] doesn't have a governance system directly integrated into the protocol – decisions are made off-chain through Bitcoin Improvement Proposals (BIPs) [2]. Usually, protocol updates are proposed by the core developers. Then BIPs are discussed amongst the Bitcoin community. The final decision is made by miners for soft forks and all users for hard forks [3].

Ethereum has something similar to Bitcoin called Ethereum Improvement Proposals (EIPs) [4]. Here decisions on protocol updates are made by a small group of Ethereum core developers who vote on proposals.

Dash introduced the mechanism of self-funding [5]. Besides voting on protocol changes, it also supports treasury fund allocation. Dash governance is a hybrid of off-chain and on-chain systems since votes are not stored in the blockchain (they are propagated through the p2p network and stored in internal storages of masternodes). Moreover, votes are public, so there is no anonymity in Dash.

One of the first on-chain governance systems is implemented in Tezos [6]. It supports delegation: delegates called bakers have the right to produce blocks and vote. However, Tezos also only satisfies pseudonymity [7].

Polkadot [8] is a mostly-on-chain governed blockchain platform. To make any changes, active token holders and the council administrate a network upgrade decision. Each proposal goes through a referendum to let all token-holders, weighted by stake, make the decision [7].

More information about the mentioned governance systems can be found in [3], [7], [9]–[12].

Project Catalyst [13], maintaining the Cardano treasury system, provides funding of hundreds of proposals aimed at improving the platform. At the last funding round $\$16,000,000$ were available for authors of proposals and this value is constantly increasing. One of few, the Cardano treasury system supports full anonymity of votes [14]. There are different actors in Catalyst who are responsible for a successful governance process:

- *proposers* who submit their ideas in the form of proposals on a special web platform called IdeaScale [15] and pretend to receive funding;
- *Proposal Assessors (PAs)* who consider submitted proposals and write assessments evaluating them; any Cardano stakeholder can be a Proposal Assessor;
- *Veteran Proposal Assessors (vPAs)* who rank assessments written by PAs; there are 3 types of ranking: ”Really excellent”, ”Good” and ”Filtered out”; vPAs are selected from experienced and productive PAs;
- *stakeholders* who vote on proposals by themselves or delegate this right to delegates; to be able to vote a stakeholder must register with a minimal required voting power (a minimal stake threshold);
- *delegates* (to be introduced in Catalyst since Fund10) who offer to take on the work of voting; stakeholders with trust and expertise possessing a minimal required amount of stake.

PAs are needed to independently evaluate submitted ideas and give stakeholders and delegates a basic understanding of the quality and prospects of proposals. In turn, the quality of assessments is ensured by the work of vPAs. If anyone can be a PA, a vPA is an experienced participant selected from a pool of PAs who have already proven their competence (writing enough number of "Really excellent" and "Good" assessments in the previous votings).

There are several challenges in one Catalyst funding round. Each challenge is dedicated to a certain topic and has its own budget. PAs evaluate proposals according to the following three criteria giving from 1 to 5 points for each criterion:

- this proposal effectively addresses the challenge;
- given experience and plan presented it is highly likely this proposal will be implemented successfully;
- the proposal provides sufficient information to assess how feasible it is and how effectively it addresses the challenge.

PAs who wrote "Really excellent" and "Good" assessments participate in the lottery to receive the reward (there is a limited number of assessments per proposal that are rewarded; the probability to win and the reward of "Really excellent" assessment are higher than for "Good" one).

vPAs are also rewarded for their work. If vPA's ranking matches the majority ranking for the current assessment, then she receives the reward.

So, there are good incentives for PAs and vPAs in Catalyst. However, there are still some points that can be improved. The main issues of the current incentive scheme are unpredictable reward amounts for PAs, the absence of benefits for experienced PAs/vPAs, and possible gaming attempts by vPAs.

Mostly, the problems can be solved by introducing *reputation* for PAs and vPAs. By reputation, we mean a quantitative indicator of the quality of work of PAs and vPAs. The reputation and, respectively, the reward of the particular PA depends on the number of "Really excellent"/"Good"/"Filtered out" assessments she wrote. If the PA is also vPA, then her reputation (reward) also depends on the number of qualified rankings she does. Reputation is recalculated after each voting (fund) and influences on PAs and vPAs chances to get a reward. To become a vPA, a PA must have the given (minimal) level of reputation.

Reputation gives the following benefits: incentives for continuous participation with useful contributions; people who do not have a good track of Catalyst activity cannot exhaust rewards of experienced PAs; negative influence of vPAs (attempts to game the system or irresponsible ranking) greatly harms the reputation and is fined.

A. Related Work

In decentralized networks, reputation is commonly used to determine the level of trust of nodes participating in blocks production, governance etc. It is especially important to be confident in the reliability of nodes in systems with delegation.

In [16] it is proposed the Blockchain Reputation-Based Consensus protocol which requires nodes to have a reputation score higher than a given network trust threshold to be able to add a new block to the blockchain. The node reputation score is determined by a vote of randomly-selected judges that monitor the behavior of miners.

In [17] a reputation-based voting scheme is used to ensure secure miner selection in the Internet of Vehicles. Candidates' reputation depends on historical interactions and opinions from other vehicles. The candidates with high reputations are selected to be active miners.

Authors of [18] propose a new consensus protocol called Delegated Proof of Reputation. The idea is to replace a pure coin-staking system with a reputation ranking system based on ranking theories.

The paper [19] proposes a decentralized trust model for maintaining the reputation of publicly available fog nodes. The reputation is determined according to users' opinions about their past interactions with the public fog nodes.

In turn, Dash, for example, instead of the reputation uses Proof of Service – a scoring system including metrics that helps to determine if a masternode is providing network services in good faith.

There was no use of reputation in the form in which we propose, namely, to assess the quality of work of participants of the governance system.

B. Our Contribution

In this paper we present two models that define:

1) how the payments (rewards) of PAs and vPAs depend on the different types of work they've done (writing and ranking assessments);
2) how the reputation of PAs and vPAs depends on the different types of work they've done.

In Section III we give the ratio between the amounts of payment for different types of work in the presence of priorities (the first model). In Section IV we consider the definition and properties of the reputation function (the second model). Finally, in Section V, we present a rationale for selection of coefficients for different types of work for two models (the model with payments and the model with reputation).

II. Auxiliary Results and Notation

Let's denote:

- α – the payment (reward) for "Really excellent" assessment;
- β – the payment (reward) for "Good" assessment;
- μ – the payment (reward) for ranking assessment correctly (vPA's opinion is in line with the majority);
- γ – the penalty for writing "Filtered out" assessment;
- ϕ – the penalty for ranking assessment incorrectly;
- T – the time that each PA spends for work in one fund (in our model, we assume that all PAs spend the same amount of time in one fund, but the value of T may be different for different funds);

- $e_n^{(j)}$ – the number of “Really excellent” assessments written by j-th PA in nth fund;
- $g_n^{(j)}$ – the number of “Good” assessments written by j-th PA in nth fund;
- $f_n^{(j)}$ – the number of “Filtered out” assessments written by j-th PA in nth fund (and, maybe, those which were not written after registration);
- $u_n^{(j)}$ – the number of assessments that j-th vPA evaluated as “Really excellent”/”Good”, as well as the majority (or they both evaluated assessments as “Filtered out”) in nth fund;
- $v_n^{(j)}$ – the number of assessments that j-th vPA evaluated as “Really excellent”/“Good”, but the majority – as “Filtered out” (or otherwise) in nth fund;
- $\Delta_n^{(j)}$ – utility function; the reward of j-th PA in the nth fund, which depends on the strategy $\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right)$; it is defined as follows:

$$\Delta_n^{(j)} = \Delta_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right) =$$

$$= \alpha e_n^{(j)} + \beta g_n^{(j)} - \gamma f_n^{(j)} + \mu u_n^{(j)} - \phi v_n^{(j)}. \quad (1)$$

Let’s denote $\tau_G^{(j)}$, $\tau_E^{(j)}$, $\tau_R^{(j)}$ as times which j-th PA spends on writing one “Good” assessment, writing one “Really excellent” assessment and ranking one assessment, respectively. Then

$$\forall i, j : \tau_G^{(j)} g_i^{(j)} + \tau_E^{(j)} e_i^{(j)} + \tau_R^{(j)} u_i^{(j)} = T, \quad (2)$$

assuming that writing “Filtered out” assessments and poor quality ranking take negligible time. In this case, regardless of the type of work, the amount of effort spent will be equal to $s^{(j)}T$.

Let’s also denote u_E, u_G, u_R as the amounts of work required to write one “Really excellent” assessment, one “Good” assessment, or rank one assessment, respectively.

We also will use the following assumptions:

- writing a “Really excellent” assessment is a times more time consuming than writing a “Good” one, for some $a > 0$ (e.g. $a = 3$).
- writing a “Really excellent” assessment is b times more time consuming than making ranking, for some $b > 0$ (e.g. $b = 20$).

According to the conditions, the next equalities hold:

$$u_E = a u_G = b u_R, \; u_G = \frac{b}{a} u_R = c u_R, \text{ where } c = \frac{b}{a};$$

$$\tau_G^{(j)} = \frac{u_G}{s^{(j)}}, \; \tau_E^{(j)} = \frac{u_E}{s^{(j)}}, \; \tau_R^{(j)} = \frac{u_R}{s^{(j)}}; \quad (3)$$

$$\tau_G^{(j)} = \frac{b}{a} \tau_R^{(j)} = c \tau_R^{(j)}, \; \tau_E^{(j)} = a \tau_G^{(j)} = b \tau_R^{(j)} = ac \tau_R^{(j)}.$$

III. Payments for Different Types of Work in the Presence of Work Type Priorities

Let’s consider how we define payments in the case when there is a certain system of priorities for various types of work: for example, it is necessary that as many PAs as possible try to write a “Really excellent” assessment (and not “Good”), and vPAs perform as much rankings as possible instead of writing assessment.

In this case, it is also sufficient to analyze the behavior of the value $\Delta_n^{(j)}$.

Statement 1. *Let the inequality*

$$a\beta < \alpha < b\mu \quad (4)$$

and the restriction (3) for the corresponding parameters hold. Then:

1) *for vPA the following statement holds:*

$$\forall e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)} :$$

$$\Delta_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right) \leq$$

$$\leq \Delta_n^{(j)}\left(0, 0, f_n^{(j)}, \frac{T}{\tau_R^{(j)}}, v_n^{(j)}\right); \quad (5)$$

2) *for PA (who is not vPA) the following statement holds:*

$$\forall e_n^{(j)}, g_n^{(j)}, f_n^{(j)} : \Delta_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, 0, 0\right) \leq$$

$$\leq \Delta_n^{(j)}\left(\frac{T}{\tau_E^{(j)}}, 0, f_n^{(j)}, 0, 0\right). \quad (6)$$

Proof. To prove the statement, it suffices to calculate the value of $\Delta_n^{(j)}$ according to (12) and show that it doesn’t depends on values $e_n^{(j)}, g_n^{(j)}, u_n^{(j)}$. Thus,

$$\Delta_n^{(j)} = \alpha e_n^{(j)} + \beta g_n^{(j)} + \mu u_n^{(j)} - \gamma f_n^{(j)} - \phi v_n^{(j)} =$$

$$= b\mu e_n^{(j)} + c\mu g_n^{(j)} + \mu u_n^{(j)} - \gamma f_n^{(j)} - \phi v_n^{(j)}$$

$$= \mu\left(b e_n^{(j)} + c g_n^{(j)} + u_n^{(j)}\right) - \gamma f_n^{(j)} - \phi v_n^{(j)} =$$

$$= \mu \frac{T}{\tau_R^{(j)}} - \gamma f_n^{(j)} - \phi v_n^{(j)},$$

due to (15). □

That is, if condition (4) is met, the most profitable work for vPA is ranking, and for PA (not vPA) – writing ”Really excellent” assessment.

IV. Definition and Properties of Reputation Function

Let's introduce the notion of reputation. We define the reputation function of j-th PA after n funds as:

$$R_n^{(j)} = q \cdot R_{n-1}^{(j)} + \alpha_1 e_n^{(j)} + \beta_1 g_n^{(j)} - $$
$$-\gamma_1 f_n^{(j)} + \mu_1 u_n^{(j)} - \phi_1 v_n^{(j)},\ R_0^{(j)} = e, \tag{7}$$

where

- e – initial reputation for newcomers;
- q – the coefficient of the impact of the previous fund;
- $e_n^{(j)}$, $g_n^{(j)}$, $f_n^{(j)}$, $u_n^{(j)}$, $v_n^{(j)}$ – as defined above;
- $\alpha_1, \beta_1, \gamma_1, \mu_1, \phi_1$ – corresponding coefficients.

Further, the increase in reputation in the nth fund will be denoted as

$$r_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right) =$$
$$= \alpha_1 e_n^{(j)} + \beta_1 g_n^{(j)} - \gamma_1 f_n^{(j)} + \mu_1 u_n^{(j)} - \phi_1 v_n^{(j)}.$$

Now let's formulate the properties of the proposed reputation function.

Statement 2. *Let the following inequality holds:*

$$\gamma_1 \geq \frac{\alpha_1}{\epsilon}. \tag{8}$$

Then, for any non-negative integer values $e_i^{(j)}$, $g_i^{(j)}$, the inequality $f_i^{(j)} \geq \epsilon\left(e_i^{(j)} + g_i^{(j)}\right)$ implies the inequality $\alpha_1 e_i^{(j)} + \beta_1 g_i^{(j)} - \gamma_1 f_i^{(j)} \leq 0$, where $\alpha_1 = a\beta_1,\ a > 1$.

Proof.

1) Note that from (18), in particular, the inequality $\beta < c\mu$ follows, therefore,

$$\Delta_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right) =$$
$$= \alpha e_n^{(j)} + \beta g_n^{(j)} + \mu u_n^{(j)} - \gamma f_n^{(j)} - \phi v_n^{(j)} <$$
$$< b\mu e_n^{(j)} + c\mu g_n^{(j)} + \mu u_n^{(j)} - \gamma f_n^{(j)} - \phi v_n^{(j)} =$$
$$= \mu\left(b e_n^{(j)} + c g_n^{(j)} + u_n^{(j)}\right) - \gamma f_n^{(j)} - \phi v_n^{(j)} =$$
$$= \mu \frac{T}{\tau_R^{(j)}} - \gamma f_n^{(j)} - \phi v_n^{(j)} =$$
$$= \Delta_n^{(j)}\left(0, 0, f_n^{(j)}, \frac{T}{\tau_R^{(j)}}, v_n^{(j)}\right).$$

2) First, note that for $u_n^{(j)} = 0$ from (15) we obtain:

$$c g_n^{(j)} + b e_n^{(j)} = \frac{T}{\tau_R^{(j)}} \text{ or } \frac{b}{a} g_n^{(j)} + b e_n^{(j)} = \frac{T}{\tau_R^{(j)}},$$

which is equivalent to

$$\frac{1}{a} g_n^{(j)} + e_n^{(j)} = \frac{T}{b\tau_R^{(j)}} = \frac{T}{\tau_E^{(j)}}.$$

As a result of this, as well as conditions (14), we obtain:

$$\Delta_n^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, 0, 0\right) =$$
$$= \alpha e_n^{(j)} + \beta g_n^{(j)} - \gamma f_n^{(j)} <$$
$$< \alpha e_n^{(j)} + \frac{\alpha}{a} g_n^{(j)} - \gamma f_n^{(j)} <$$
$$< \alpha\left(e_n^{(j)} + \frac{1}{a} g_n^{(j)}\right) - \gamma f_n^{(j)} =$$
$$= \alpha \frac{T}{\tau_E^{(j)}} - \gamma f_n^{(j)} = \Delta_n^{(j)}\left(\frac{T}{\tau_E^{(j)}}, 0, f_n^{(j)}, 0, 0\right).$$

The statement is proved. □

Statement 3. *Let the following inequality holds:*

$$\phi_1 > \frac{\mu_1}{\delta}. \tag{9}$$

Then, for any non-negative integer values $u_i^{(j)}$, $v_i^{(j)}$, the inequality $v_i^{(j)} \geq \delta u_i^{(j)}$ implies the next inequality: $\mu_1 u_i^{(j)} - \phi_1 v_i^{(j)} \leq 0$.

Proof. From the conditions (23) and (24) we obtain

$$\gamma_1 f_i^{(j)} \geq \alpha_1\left(e_i^{(j)} + g_i^{(j)}\right) =$$
$$= \alpha_1 e_i^{(j)} + \alpha_1 g_i^{(j)} \geq \alpha_1 e_i^{(j)} + \beta_1 g_i^{(j)},$$

due to (26). □

Note. The Statement 3 remains true also if $\alpha_1 \geq a\beta_1$, $a > 1$.

Now we will consider how changes in PA's activity influence on her reputation.

Let for some $N \in \mathbb{N}$ it is satisfied:

$$r_{N+k}^{(j)}\left(e_n^{(j)}, g_n^{(j)}, f_n^{(j)}, u_n^{(j)}, v_n^{(j)}\right) = r_j, \tag{10}$$
$$k \geq 1,\ j = \overline{1, L},$$

where L is the total number of PAs and vPAs.

I.e., starting from $(N+1)$-th fund, all PAs and vPAs work with their own constant intensities, which don't change for future funds:

$$R_{N+k}^{(j)} = R_{N+(k-1)}^{(j)} q + r_j,\ k \geq 1,\ \forall j = \overline{1, L}.$$

Also, let's denote

$$R_n = \sum_{j=1}^{L} R_n^{(j)},\ n \in \mathbb{N}. \tag{11}$$

Statement 4. *Let the condition (10) be satisfied. Then, after a certain number of k funds (big enough), the next approximation holds:*

$$\frac{R_{N+k}^{(j)}}{R_N} \approx \frac{r_j}{R}, \text{ where } R = \sum_{j=1}^{L} r_j.$$

Proof. Using (27), we obtain

$$\mu_1 u_i^{(j)} - \phi_1 v_i^{(j)} \leq \mu_1 u_i^{(j)} - \phi_1 \delta u_i^{(j)} =$$
$$= u_i^{(j)}\left(\mu_1 - \phi_1 \delta\right) \leq 0. \ \square$$

V. The Rationale for Selection of Coefficients for Different Types of Work in the Presence of Work Type Priorities

The Algorithm 1 for choosing parameters α, β, μ.

Input: u_E, u_G, u_R.

1) Calculate a and b: $a = \frac{u_E}{u_G}$, $b = \frac{u_E}{u_R}$.
2) Choose $\beta > u_G$ (the upper limit for the parameter β is determined by the financial policy).
3) Choose α satisfying the condition

$$\alpha > u_E + (\beta - u_G)$$

(the upper limit for the parameter α is determined by the financial policy).
4) Choose $\mu > \frac{\alpha}{b}$.

Output: α, β, μ.

To choose the parameters $\alpha_1, \beta_1, \mu_1, \gamma_1, \phi_1, e, q$ for the reputation function, the following algorithm can be used.

The Algorithm 2 for choosing parameters $\alpha_1, \beta_1, \mu_1, \gamma_1, \phi_1, e, q$

Input: α, β, μ, η, ϵ, δ, z.

1) Calculate $\alpha_1 = \frac{\alpha}{\eta}$, $\beta_1 = \frac{\beta}{\eta}$, $\mu_1 = \frac{\mu}{\eta}$.
2) Choose γ_1 according to the formula (8).
3) Choose ϕ_1 according to the formula (9).
4) Choose e such as $\gamma_1(z-1) < e < \gamma_1 z$, z – a number of "Filtered out" assessments a newcomer should write so that her reputation become non-positive.
5) Choose q in a such way, that if some PA or vPA doesn't work during 5 funds, then she will lose 95% of her reputation.

Output: α_1, β_1, μ_1, γ_1, ϕ_1, e, q.

VI. Experiments

We made a simulation with the parameters: number of PAs – 5; total number of assessments per fund – 100; maximum number of assessments each PA can write per fund – 50; initial reputation for each PA – 10; $\alpha_1 = 1.51$; $\beta_1 = 0.5$; $\gamma_1 = 7.55$; % of "Really excellent" per PA – 20% (1st), 50% (2nd), 0% (3rd), 10% (4th), 35% (5th); % of "Good" per PA – 80% (1st), 50% (2nd), 90% (3rd), 80% (4th), 60% (5th); % of "Filtered out" per PA – 0% (1st), 0% (2nd), 10% (3rd), 10% (4th), 5% (5th).

The results show how experienced PAs, constantly doing a good job, increase their reputation and rewards (PAs #1,2,5). Otherwise, bad-working PAs come to zero reputation after several funds (PAs #3,4). For more details, see Table 1.

Note that if a PA works with the same useful activity from fund to fund, then her reputation once reaches some asymptotic value. For example, if a PA writes 30 "Really excellent", 65 "Good" and 5 "Filtered out" assessments in each fund, then the reputation reaches the asymptotic value (see Fig. 1).

Table I. Simulation example: reputation and total reward

PA	Fund 1		Fund 2		Fund 3		Total $
#	Rep.	Rew.	Rep.	Rew.	Rep.	Rew.	
1	21	$840	36.5	$1260	47	$1260	$3360
2	27	$1200	59	$2310	91.2	$2910	$6420
3	0.9	$540	0.23	$30	0.1	$0	$570
4	2.9	$660	1.2	$120	0.62	$0	$780
5	16	$990	21.8	$1060	23.5	$900	$2950

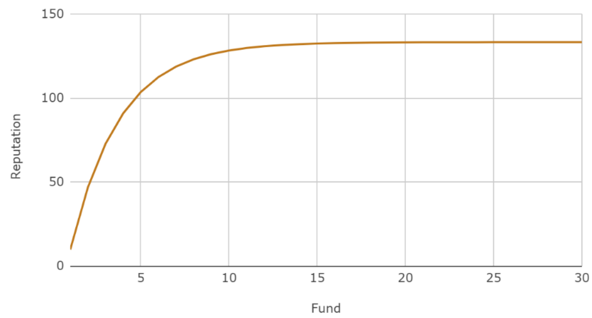

Figure 1. Constant useful activity reaches a specific reputation level

VII. Discussion

Injecting reputation into the incentive scheme for PAs and vPAs improves the quality of the proposal review process. The need for reputation is conditioned by the following:

- counting in the useful contribution to Catalyst in previous funds;
- providing quite predictable rewards well known to each PA before the assessment process is started;
- giving priority to getting well-paid assignments in the assessment process to experienced participants with proven Catalyst PA's activity track;
- keeping the system competitive and open for new participants.

The expertise of PAs and vPAs may be limited in some areas so that they cannot evaluate different proposals equally well. Catalyst solves this problem in the following way. It supports many challenges (each of them maintains a separate governance process) on different topics simultaneously, so PAs and vPAs with a certain area of expertise can work on appropriate types of proposals (i.e., dedicated to marketing, development, etc.). So, within one challenge, proposals on a specific topic are considered and evaluated.

The proposed incentive model with reputation is in the process of implementation in the Catalyst project, so, currently, there are no quantitative estimates of the model behavior in a real-life application. However, simulation gives fairly comprehensive practical results and confirms the expected properties of the model.

When developing the incentive model, we focused specifically on the Catalyst project, however, the proposed scheme has prospects for application in other systems, both with and without blockchain.

The further work involves evaluating the results of introducing the scheme into the Catalyst project.

VIII. Conclusions

In this paper we present the incentive model with a reputation for Catalyst protocol which maintains Cardano treasury system. Firstly, we consider how the rewards of Proposal Assessors (who write assessments on proposals) and Veteran Proposal Assessors (who rank assessments) depend on the different types of work they've done. Then, we consider the definition and properties of the reputation function and present a rationale for selecting coefficients for different types of work.

The proposed reward scheme with reputation gives the following benefits.

- Info on reward amount on each proposal for each PA is known in advance (the lottery is run before writing assessments).
- Previous contributions are counted in (experienced PAs with good activity track will get more assessment proposals with 100% reward in the lottery), which will incentive PAs for continuous participation with useful contributions.
- PAs who perform better than the "average PA" in the current fund will get better chances to win in the lottery in the next fund (increasing rewards and improving reputation).
- Balancing property to keep in the system the best people with optimal workload:
  - well doing PAs (better than average) will increase their reputation and rewards up to their optimal occupancy level (spending desired amount of time);
  - weak PAs will lose their reputation and rewards;
  - newcomers can get a reputation by providing "Really excellent"/"Good" assessments (with small rewards, if there are already enough PAs, or with full rewards, if there is a lack of PAs), then continue as well doing PAs.
- The system strives for the best achievable ratio among "Really excellent"/"Good"/"Filtered out" assessments by incentivizing PAs who provides the best contribution.

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