Original White Paper

The following document was produced in 2016 and represents early thinking associated with early experimentation with blockchain as a distributed ledger for storing Tal records. The present version of the Tal Registry is a test version of a non-blockchain iteration.

Tal™ Stories: A new concept for creative teams to share project ownership and revenues

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Abstract: *This paper discusses the challenges faced by creative teams when they come together to develop new creative IP. This consideration is set in the context of the UK Games Fund and other projects run by UK Games Talent and Finance CIC (UKGTF). As a not-for-profit, Community Interest Company UKGTF is seeking to improve the UK's early stage ecosystem for video games developers. The paper focuses on a new business process that UKGTF is experimenting with allowing a new type of IP share called a Tal. Tals can be issued by small teams of creatives so that company formation can be delayed until the potential business has a clearer line of sight to success whilst still maintaining a record of intent. The purpose of this business process is to set new creative projects up with a cost effective way of tracking the founding creators' shares (as Tals) and other stakeholders associated with the business so that the transactions could be recorded via a distributed ledger of some sort. This would then allow the Project Proof to define revenue shares at any point, based on Tal distribution. UKGTF is piloting this with the Digital Catapult[1] on the Tranzfuser[2] graduate games development project. The Digital Catapult's open innovation approach is seen as critical to support our SME community. The paper notes how the concept of "smart contracts" often associated with this type of activity is somewhat of a misnomer, with UKGTF electing to describe the process as Project Proofs. The "human factors" in creative team formation are summarised with a list of issues that creative teams should resolve at the outset. The paper describes a vision for a more connected ecosystem for creative teams connected by Project Proofs and building measures of integrity through contractual performance. The paper does not set out to address the most effective type of distributed ledger to use for this application though does provide a summary of the user requirements for the pilot project, the rules for Tals used in the pilot and details of the Tal Registry[3] established.*

1. Background

Independent creative teams (such as games developers) planning to create new, original IP come together through various serendipitous routes. There may or may not be a fully shared vision of the project they aspire to tackle together at the outset. The individuals capable of delivering the project may be present at the start, or they might join along the way. Throughout the creative process there's also significant potential for change through both positive and negative events. There may be key individuals without whose talent and creativity the project will never achieve greatness or whose loss mid-project will leave the remaining team high and dry. The work itself may include third-party assets or content that have distinct rights that require to be embodied in

1 See https://www.digitalcatapultcentre.org.uk

2 See https://twitter.com/search?q=%23tranzfuser&src=hash

3 See www.talregistry.com

the finished work. In addition to all of these challenges the speculative outputs from creative teams are pitched into hit-driven markets where commercial success is not assured.

These are just some of the reasons why standard legal frameworks and company law do not serve creative teams well, particularly before they have sufficient working capital. Many emergent, hit-driven projects cannot risk spending money on formal legal agreements at day zero and frankly the budgets and risk of market failure simply don't include scope to cover such costs. Formal agreements are less helpful where there is significant project and personnel flex as they date rapidly and are rarely updated. Failed projects can also leave founders unpicking one-project companies that never traded.

Technologies that can provide a semi-automated digital distributed ledger, as originally derived from cryptocurrency applications, are attracting interest for developers seeking to build distribution, immutability and transparency into various applications. It's thought these technologies could provide potential to help creative teams through so-called smart contracts. Despite the name, there's nothing very smart about smart contracts. They're really smart registries that provide evidence of events and actions. They don't read the minds of the creative team. They can't make decisions for the creative team. They require underpinning rulesets. There's high potential for a classic case of "garbage in, garbage out." We plan to substitute the words "smart contract" with "Project Proofs" for our early stage experimentation.

This paper primarily focuses on developing the business process that could allow creative teams to harness distributed ledger technology and create a Project Proof. It's not really clear quite yet what the ideal distributed ledger solution will be for this. However, it is fairly clear that there will be a solution – and the easier it is for a creative team to plug a well-defined business process into the emergent solution the better. UKGTF has been fortunate to identify the Digital Catapult as a partner for this work. There is a significant innovation challenge for SMEs working in the digital space both jointly (as in the context of the community that UKGTF serves) and severally for small companies pioneering their own ideas. UKGTF falls into both these definitions as we want to serve our community and we also want to innovate as a company in our own right. The Digital Catapult represents a highly significant, expert innovation resource and is also ideally placed to convene[4] the key players to drive the critical mass needed to build scale around new ideas. For the time being the underlying technology under development at the Digital Catapult uses Ethereum[5].

We also believe that creative innovation levels can be increased if talented people find ways to work outside their circles of trust. If we can provide an open template for teams to adopt and build proven use-cases where the deployment has worked for all concerned we believe that we'll gradually inspire wider circles of trust and potentially greater levels of innovation.

Ultimately, this thinking can be applied to any project that requires a group of individuals to undertake work towards a single output formed from their blended inputs. For now, the focus is on the creative digital industries where the complexity of team collaboration across different disciplines is growing in areas such as VR and cross-media, with a heightened need for early stage experimentation and pre-visualisation as well as digital-to-physical such as 3D printing. However,

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4 We are particularly grateful to Matt Ward, Senior Manager Creative Programmes at the Digital Catapult for his oversight of this work

5 https://www.ethereum.org/

our proposed approach could apply to a group collaborating to undertake pretty much anything where there's a complex blend of inputs and unpredictable outputs and outcomes. The overarching aim is to provide an open solution built around trusted standards, available as an "out of the box" solution for creative teams to adopt and utilise to drive democratised creative team work.

2. Introducing Tals™

So at UKGTF we've gone back to basics. We've started to conceptualise a whole new type of share mechanism. We've created a new name for project shares using the word "Tal." The word Tal has been derived from a blend of the "Talents" of ancient currency, the talented people who will own Tals for their work – and finally as a derivative of the word digi**tal**. We've developed a principle that Tals can be created in a whole range of different classes. Just like shares in a company. We're using the names of metals to describe Tal classes as that allows us to begin with Gold, Silver and Copper Tals with potential to create new classes above and below (using names of metals and their atomic number to signify hierarchy). We'll return to this later in this paper.

Before any of that, creative teams need to make important decisions as early as possible after deciding to work together. No level of automation or proof can substitute for a basic agreement around the main principles at the outset. Key points for teams to consider:

- Who's done what already in the way of prior work at the start?
- What else is being vested in as ideas, unpaid work, finance etc?
- What is actually being done together (and who's responsible for doing what)?
- What third party assets need to be incorporated and what rights are associated with them?
- What are the future plans (who else, how much, where from etc.)?
- What happens if consensus can't be reached, who'll hold the key to unlocking a disagreement?
- How will the various collective efforts be traded as an exploitable unit (e.g. set up a new company, use one of the team's existing business, wait until commercial interest or early-access success etc)?
- What are the team's personal and collective ambitions and where do they align or clash?

So a real "smart contract" would need to read minds if it could automate this initial step. Some futurists envision autonomous agents collecting declared preferences from the profiles of prospective parties and auto-writing smart contracts. This may be appropriate for data sharing in the Internet of Things but is less practical when considered in connection with our use case.

Clarifying these aspects in any event is just plain "good business housekeeping". We have previously developed the IP Manifest which includes a self-audit tool and post-audit tracking tool[6] for video games IP.

It's worth stating here that merely making these agreements and recording them though a Project Proof or any other means doesn't guarantee that there won't be disputes. Like any contractual

6 See www.gamesipmanifest.co.uk

system (including a witnessed verbal contract) this is primarily about enhancing an evidence base from which a dispute could be equitably resolved.

We've defined a set of rules in Section 4 backed by formal Terms and Conditions (reproduced in Appendix 3) that begin to capture equivalent provisions to those found in the Articles of Association and Shareholders Agreement in a conventional company. We used the template documents kindly made publicly available by the British Venture Capital Association (BVCA) to inspire our thinking here. The rationale for providing this information clearly in the project set-up form is to allow the starting position and methodology for change to be set out robustly for teams at the outset. The rules cover matters such as the governance of voting, majority definitions, provisions for issuing Tals within exiting classes, creating new Tal classes, policies for Creative Founders leaving in different circumstances, other powers of the Creative Founders, policies for licence and sale of the completed work etc. Essentially in just the same way that investor-focused professional associations such as the BVCA provide template agreements for equity investment we believe that we can embody similar frameworks in our project set-up tools. There is an extent to which this can be simplified and automated by forms and drop down menus combining "pick 'n mix" style, but as noted previously, an effective smart contract can only originate from a firm foundation. Given the present intention to structure our business process in such a way as to have a built-in arbiter holding a Gold Tal (i.e. UKGTF), the greater the level of detail and clarity in the founding documentation the better.

No express or implied warranty of legal veracity is offered with our experimental approach. Like many situations this represents a risk vs. reward trade-off for consideration by interested parties. In many cases we think that this will at least improve the situation where project participants aren't taking any formal steps to underpin their relationship contractually. In time, we hope that the disciplines and rights we create around the intangible asset of IP will provide a basis for legal judgement in much the same way as the steadily growing area of e-signature case law.

We acknowledge that there's plenty more to consider from a compliance perspective in terms of VAT accounting, unintentional formation of taxable entities, PAYE etc. Nothing we are doing is intended to subvert any legal requirements or tax liabilities and we hope that HMRC and others will approach our experimentation in this spirit.

3. Looking ahead

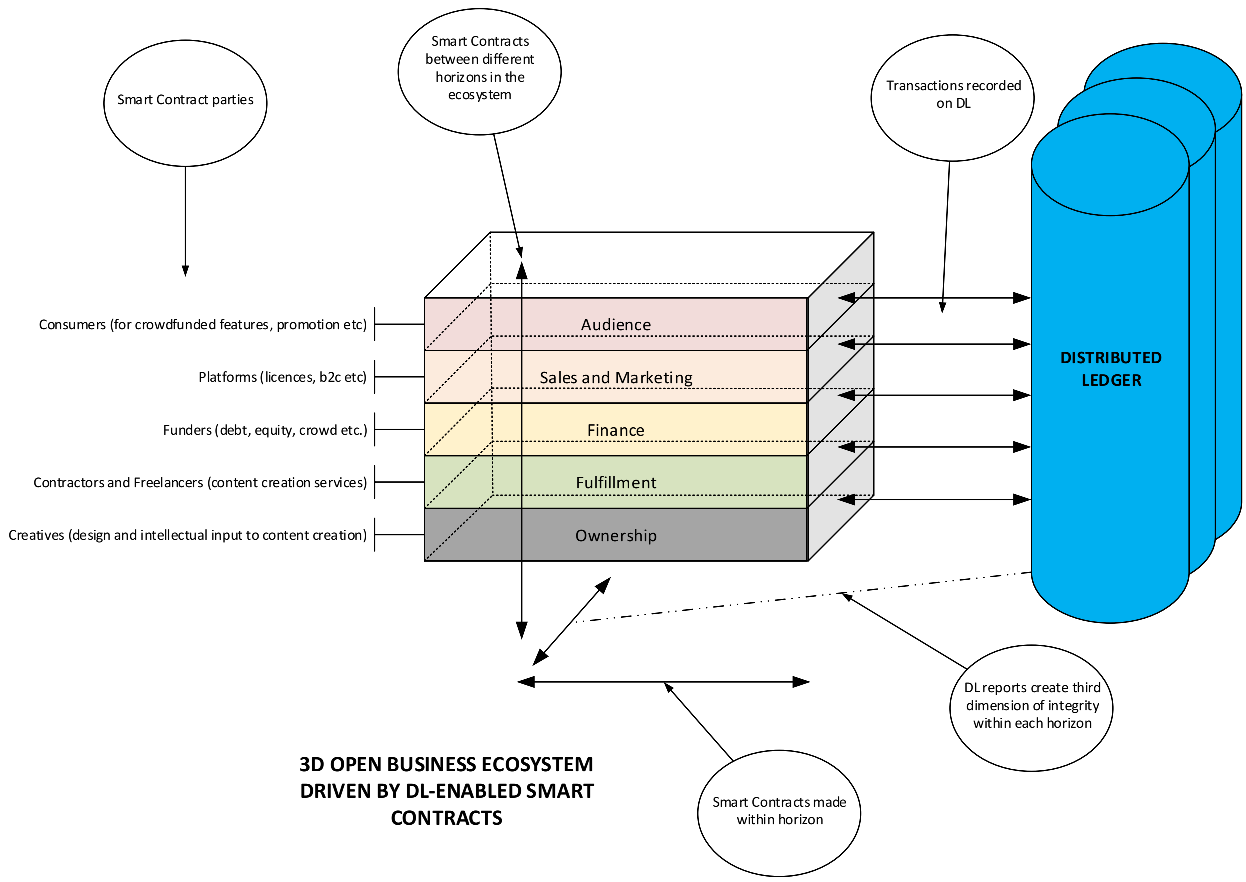
Over time, we believe that professional creative individuals participating within teams and abiding by Project Proofs will be able to build **professional integrity** based on the way in which they've participated in and honoured Project Proofs, almost like a cross between e-commerce seller reputations, service-economy ratings and professional social network endorsements.

There'll come a time with most projects where a legal entity is required to provide a warranty shield or limit liabilities or be a contracting name for a revenue deal. There's nothing to stop the creation of (or relationship with) that entity being recognised through the the issue of a specific class of Tals. This may even be the point of transfer to conventionality for some teams (for example where there's a "too good to refuse" equity funding offer on the table). The Tal register at that point would represent an excellent "Founders Agreement" to build the deal around in such cases. For those with the appetite to scale whist retaining the Project Proof alone, perhaps independent arbitration service entities will be established that can hold Tals across a wide number of Project Proofs in order to resolve disputes. In our initial experiment UKGTF is taking such a role. Some people believe that the essence of "smart contracting" is the opposite to this level of intervention. They think that the very existence of the distributed ledger record will act as a substitute for any intermediaries.

Further ahead, we hope that automated reports of Tal definition and ownership extracted from the distributed ledger can be used through an API to connect to platform payment systems[7]. Once we have that functionality, revenues can be distributed according to Tal ownership. We plan to explore the potential of some of the Payment Platform APIs such as PayPal's Adaptive Payments systems to see if there might be an "out of the box" solution here to provide interim solutions and experimentation potential.

There's scope for other API connectivity too. Third party digital asset stores provide an ideal opportunity both for creative teams selling assets to use a Project Proof as well as incorporating purchased third-party assets into a Project Proof. Project management system integration with a Project Proof via API will also allow greater sophistication in the definition of the project and may also provide additional layers of team member authentication.

Beyond that, some commentators believe that three-dimensional open business systems driven by DL-enabled contracting might emerge in different industries. In translating this vision to the creative digital industries, different layers of activity from original creation through to audience participation are interlinked by DL-enabled contracting, with inter-layer contracting, in-layer contracting and integrity measurement representing the three dimensions of the ecosystem. We've visualised this in the diagram that follows.



3D OPEN BUSINESS ECOSYSTEM DRIVEN BY DL-ENABLED SMART CONTRACTS

7 Visualised in the second figure in Appendix 2

At present, our work with Tals focuses only on the "Ownership" horizon in the diagram with some connection to the "Fulfilment" horizon (e.g. when the consideration for a contractor's deliverable includes the issue of Copper Tals). This Fulfilment horizon could also include interactions with asset stores and project management software as noted earlier. Each horizon and the inter-trading between needs careful business process consideration. In theory at least, there's no reason why the approach we are taking couldn't be scaled and other business processes developed to create the "scaffolding" for such an ecosystem. Our API approach will facilitate ecosystem connection points.

For the moment, we are looking at plugging into revenue distributions via conventional fiat currencies as that reflects the manner in which most revenue sharing is undertaken, but we recognise that for many there is a broader interest in connecting with cryptocurrency payments in the future. Compliant platforms have yet to be secured for any type of payment distribution as the case is difficult to make until we show a working pilot. Our first deployment of revenue distribution will require a manual intervention to match a Tal Registry report to BACS payments to team members and we're also exploring the generic payment system APIs previously mentioned.

It's also possible to imagine that the finance horizon might include contracting with investing (or lending) entities designed to hold a portfolio of revenue shares from multiple creative projects. This is an approach UKGTF could also consider for basic grant funding.

Scaling this ecosystem won't be easy and will require breakthroughs with various key stakeholders (platforms, project management systems, ratings widgets, payment systems, funders, HMRC etc.) There'll be a high degree of "chicken and egg" type uncertainty around the specific things that will trigger adoption at scale. As a Community Interest Company serving our early stage creative games development community we recognise the potential advantages of such an ecosystem.

4. More about Tals

The following guidance describes the basic rules defined for the Project Proof Process used in the Tranzfuser pilot:

Project Proof Process – Pre-contract Information

1. Before you participate in the Project Proof Process by agreeing to the Project Proof Process Terms and Conditions[8] you should read this pre-contract information carefully. If there's anything you don't understand please ask UKGTF now.

2. This Project Proof Process (PPP) is intended to be used by a number of individuals working together to create a low-budget prototype video game where commercial success is not assured. It is assumed that the prototype video game requires a blend of their various creative inputs to create a pre-agreed set of features available on a future date that when taken together constitute the prototype game.

8 The Terms and Conditions are reproduced in Appendix 3

3. The PPP has been created by UK Games Talent and Finance CIC (UKGTF), a not-for-profit, Community Interest Company that aims to support the UK's early stage independent games developers. By recording the initial and subsequent transactions on a distributed ledger an automated audit trail and reporting system will be available to users. This technology aids the veracity of this approach and the reports could ultimately be used to determine revenue sharing.

4. The combining of individual inputs by the Project Team (with each personal input and time period of input known as the Agreed Project Contribution) to create the required blend of creative inputs is called the Project.

5. All Agreed Project Contributions are vested into the Project in perpetuity, unless subsequently voted otherwise (see notes 23 & 33).

6. The term Tal is a name for a unit of right allocated an individual or organisation as a result of their contribution the Project. Tals come in 4 classes as shown in the table below.

Tal Class	**Holder**	**Economic participation**	**Votes**
Gold	UKGTF	Zero	Veto/Override
Silver	Creative Founders	1 unit per Tal	1 vote per Tal
Copper	Creative Founder, Team Members	1 unit per Tal	Zero
Sodium	Leavers	Zero	Zero

7. UKGTF holds a Gold Tal that enables it to act as an arbitrator in any disagreements between the individuals.

8. The original group of individuals creating the game together are the Creative Founders and they would typically allocate themselves Silver Tals as these carry both an entitlement to Economic Participation (i.e. entitlement to a share of Available Profits earned from the game created during the Project) and voting rights.

9. Additional Creative Founders may join the Project later in the process and may also be allocated Silver Tals.

10. Other individuals who make a contribution to the Project but who are not involved in decision making and/or whose role may be temporary are called Team Members and they would typically be allocated Copper Tals as these carry an entitlement to Economic Participation but do not carry voting rights.

11. A Project Team may consist solely of Creative Founders or a mix of Creative Founders and Team Members.

12. Creative Founders of a Project Team shall decide how many Tals to issue initially by prior verbal agreement between them. In doing so they should take into account the intended distribution of Economic Participation (see note 18) and voting rights as well as the level at which the Silver Tal Holder Majority should be set (see note 15). The Gold Tal Holder can provide guidance to them at that stage regarding the implications of the points of their agreement and how they will be translated in practice. (e.g. it is

recommended that the Creative Founders initially allocate c.1 million Silver Tals between them so that they can issue relatively smaller amounts of Tals to Team Members, suppliers or other individuals who may make contributions during the project).

13. Once the Creative Founders notify the Gold Tal Holder that they have reached agreement the Gold Tal Holder authorises the establishment of the Distributed Ledger Record (DLR) for the Project at talregistry.com. The record reflects the prior verbal agreement.

14. The Gold Tal holder has set limits on the number of new Silver and Copper Tals that can be issued in any given 12-month period in order to prevent intended or unintended dilution by unconstrained Tal issue. Typically, these limits will be in the order of twice the number of Tals issued at formation of the Project.

15. Proper consideration should be given to the allocation of Silver Tals as these Tals carry voting rights as well as the right to Economic Participation. In particular, consideration should be given to the percentage of Silver Tals required to achieve a Silver Tal Holder majority as this will be used when voting on important matters such as:

- approving the allotment of new Tals which could be to existing Tal Holders, new joiners or third party contributors.
- approving the distribution of Available Profits (see notes 30-33)
- approving variations in the rights of Silver Tals
- determining whether someone is a compliant leaver or a non-compliant leaver and in certain circumstances the level of retained Tals (see note 25)

The following example percentages are intended to give an indication of types of levels you may wish to consider in the case where between 4 and 6 Creative Founders each had an equal number of Silver Tals:

3 out of 4 Creative Founders = 75%
3 out of 5 Creative Founders = 60%
4 out of 5 Creative Founders = 80%
4 out of 6 Creative Founders = 66%
5 out of 6 Creative Founders = 83%

Please note that this is just an example and there is no requirement for all Creative Founders to be allocated equal numbers of Silver Tals.

In the event that Creative Founders do not have equal number of Silver Tals then it is recommended that teams set the level no higher than 100%-X%, where X% is the percentage of Silver Tals held by the largest single Tal holder (unless this takes the level below 50% which is the minimum percentage allowed by the Gold Tal Holder) as this will help reduce the occurrence of deadlock during key votes.

In the event that the number of Creative Founders/Silver Tal Holders changes during the project the it may be necessary to revise the level of the Silver Tal Holder Majority percentage which can be done with the consent of the Gold Tal Holder.

16. The transfer of Tals is prohibited at this time, other than with the approval of the Gold Tal Holder.

17. The DLR should be updated after any changes via the form on talregistry.com. In the event that the change arises from a matter that requires a Tal Holder vote then changes should only be made after the formal voting procedure detailed in the PPP Terms and Conditions has been completed.

18. Both Silver and Copper Tal Holders have the same entitlement to Economic Participation, in that they receive the same proportion of Available Profits for each Tal held. Therefore, as mentioned in note 12, any allocation of these classes of Tal should take account of the intended proportions of Economic Participation.

19. The Gold Tal holder has no entitlement to Economic Participation.

20. Only Silver Tals Holders can vote on matters relating to the Project, but the Gold Tal Holder can override any voting in the event of disputes or conduct that is deemed inappropriate or unfair in sole discretion of the Gold Tal Holder.

21. Copper Tals exist in order to allow the Creative Founders to allocate Economic Participation to Team Members, suppliers or other individuals who may make contributions during the project but who will not participate in voting.

22. Sodium Tal holders have no voting rights or Economic Participation. Sodium Tals should be thought of as placeholder Tals to enable the entire lifecycle of Tals to be recorded and tracked, even after (say) a person has left the project (see notes 24 & 27 below).

23. The Project Proof Process Terms and Conditions provide for defining the context under which individuals leave the Project Team. As expressed in note 5. above a leaver of any type always vests their contribution/intellectual property in the Project in perpetuity.

24. A Non-Compliant Leaver is one who has resigned from the Project Team prior to the substantial delivery of their Agreed Project Contribution or was dismissed from the Project Team in a way that was equivalent to that as justifiable as fair dismissal under Employment Law. Although they aren't an employee this is considered an effective way to judge if an individual's behaviour, actions or performance constitute a Non-Compliant Leaver.

25. A Compliant Leaver is one that doesn't fall under the above definition of a Non-Compliant Leaver or an is individual deemed by the Silver Tal Holders or the Gold Tal holder as a Compliant Leaver.

26. The Silver Tals held by a Compliant Leaver automatically convert to an equivalent number of Copper Tals. Any Copper Tals held by a Compliant Leaver remain unaffected. However, a Silver Tal Majority or the Gold Tal Holder might determine in certain circumstances that up to half of the Copper Tals held post conversion are converted to Sodium Tals on a 1 for 1 basis.

27. All Tals held by a Non-Compliant Leaver automatically convert to Sodium Tals on a 1 for 1 basis.

28. Upon any conversion of Tals the Silver Tal Holders shall update the DLR.

29. When the Project is completed (or ready for early access publication) the Silver Tal Holders will decide on any proportion of income that will be deducted from revenue for disbursement on Project Costs. The remaining proportion will be deemed Available Profits. This will be recorded on the DLR.

30. Available Profits will be considered by the Silver Tal Holders on a monthly basis and if approved by a Silver Tal majority will be distributed between all Silver and Copper Tal Holders equally based on the number of Tals held.

31. For example, if the Available Profits for a month are £5000 and the DLR for the previous month shows that 500 Silver Tals and 500 Copper Tals have been issued the Available Profit per Tal will be 5000/1000 = £5. Thus a person holding 100 Silver Tals will receive £500 and a person holding 100 Copper Tals will receive £500.

32. The Gold Tal holder may at their sole discretion hold sums intended to be spent on future Project Costs (such as the overheads on a subsequent development phase) in trust for the Project Team until the Silver Tal Holders vote on their disbursement. The purpose of this facility is to allow such funds to be held neutrally. Project Costs might include travel and subsistence to conferences, adviser fees, office overheads etc. Subject to agreement between the Silver Tal holders they may decide some other way in which to set aside / top-slice funds from income for future cost underwriting. This might be appropriate where "early-access" schemes of an early playable yield some revenues and the Silver Tal Holders wish to have an agreed way to retain some monies for subsequent development.

33. Subject to approval by the Gold Tal Holder, a Silver Tal Majority may approve the assignment of any contributions or intellectual property belonging to the Project.

34. Different Project Teams may have different requirements for taxation. Some Teams may be content for this arrangement to constitute a formal partnership, others may expressly not wish that. The Office of Tax Simplification has been calling on HMRC for better clarity on the criteria that constitute the moment of legal partnership formation. You may wish to add a clear view on your own situation one way or the other. For those Project Teams not wishing to form a legal partnership it might be appropriate to set out the basis of collaboration as (for example) freelancers collaborating in a one-off supply chain arrangement clearly expressing that the arrangement was not intended to create a partnership. UKGTF's default assumption is that for the time being each individual intends to be treated in their own right as a freelancer for tax purposes.

5. A brief overview of the distributed ledger connection being developed with the Digital Catapult

A legitimate question at this point is "why do you need a distributed ledger?" Clearly the records associated with the types of transaction discussed in this paper could be kept in a shared database or some other kind of automated, open-book accounting. The hypothesis is that a distributed ledger has higher potential to create scale, interoperability, transparency, trust and immutability in a way that could drive ecosystem risk-taking leading to more original IP. The degree of openness of a distributed ledger to all authenticated users is also an attraction. One of our aims is to establish if this hypothesis is correct. Given that no one appears to have addressed this long standing creative industries challenges of trust levels / risk / legal costs by any other means, it seems worth trying to link our new business process to a distributed ledger to learn more. The democratic gains for creators offered by a truly inter-operable, reputation-driven, three dimensional creative ecosystem as described Section 3 will require a higher level of sophistication if they are to be seamless. In the near future it's likely that the key technological components that underpin distributed ledger solutions will become more refined in terms of application specificity and hybrid solutions for challenges such as this will emerge. There's already a number of other concepts based around peer to peer autonomously-rewarding networks that may emerge to serve the registry needs for Project Proofs without a blockchain as such. Getting the "lingua franca" of Tals ready for the distributed systems that emerge is worth pursuing in the meantime.

This paper is not intended to set out the full technical details of the present approach. A demonstration of what happens behind the user interface at talregistry.com in terms of distributed ledger recording is available on request from the Digital Catapult. However, the initial requirements capture is included below for information and we've added some bullet points with a basic technical outline.

The initial requirements capture to create a Project Proof with an underpinning Tal registry connected to a distributed ledger:

- User authentication (simple third party verification via code initially)
- Input form for initial set-up of project ownership (Tal allocation) by users, including key, basic project-specific contract points.
- Input form for adding changes to project set-up over time (further Tal allocations).
- Initial input form triggers creation of digital envelopes for participants.
- Form entries trigger distributed ledger record of transaction (both Tal set-up and Tal changes).
- Personal distributed ledger records copied to digital envelopes.
- Reporting mechanism that allows both individual and project recording

Planned features:

- More comprehensive user authentication (sufficient to allow payment of revenue receipts)
- Opt-in provision to contractual definitions by authenticated users, i.e. principles that substitute for a notional Articles and Shareholders Agreement effectively providing Terms and Conditions defining the project and auto-dispatched for electronic signature
- Provision to define associated contractual deliverables for participants such as contractor work-packages and ultimately link those to trigger Tal issue post-completion
- Provision to cross-reference to funding and investment agreements so that parallel obligations are visible (similar to creating a charge on assets)
- Inter-trading with other compatible Project Proofs (e.g. to experiment with inter-horizon contracts)
- API to allow sales revenue distribution from collaborating platforms
- Accommodation of new Tal classes, including incorporating 3rd party asset rights
- Enhancement of reporting to accommodate these features
- APIs to assets stores, project management systems and even accounting software

And finally in this section, some notes for the technically minded[9], but do be sure to check with the Digital Catapult for the latest updates:

- Ethereum Solidity programming language used to create Ethereum contracts defining Tals and the game project with digital wallets for registered users. Tal contracts use the inheritance available within Solidity to create parents providing the required Tal rules and particularly allowing UKGTF to perform the functions of a Gold Tal holder
- The prototype has initially been deployed via a private blockchain with unrestricted read rights, hosted on AWS and Azure with future releases using the public Ethereum blockchain
- Node.js is used in the creation of a set of secured RESTful APIs allowing access to core contract functionality
- Front end in React.js
- MongoDB is used to store further information not on blockchain to increase API call speed

6. Some final thoughts

Presently we're working at UKGTF to develop the additional functionality of the business process and with the Digital Catapult on some of the planned technical features described in the previous section as well as user-journey capture and enhancement.

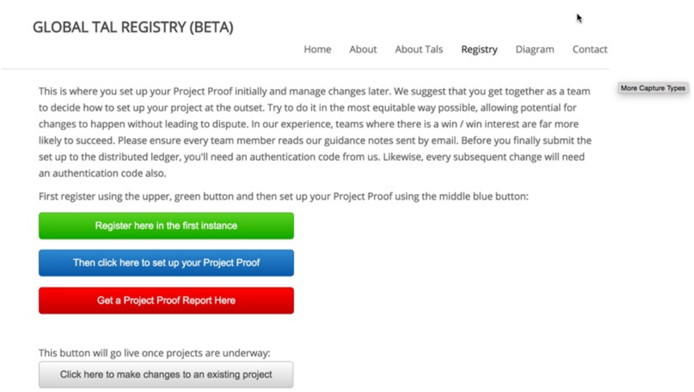
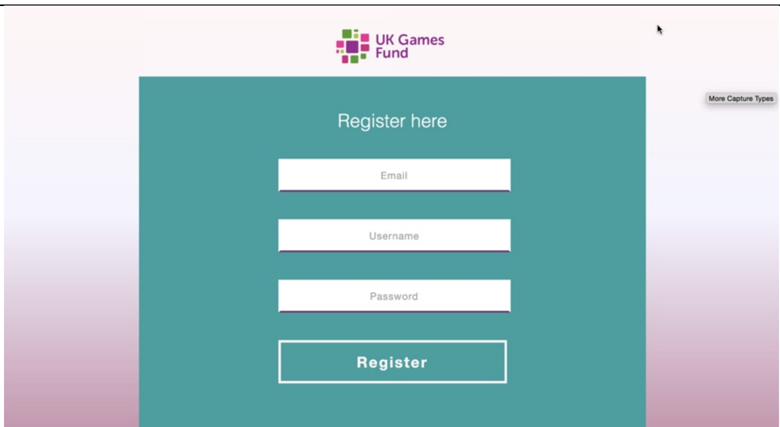
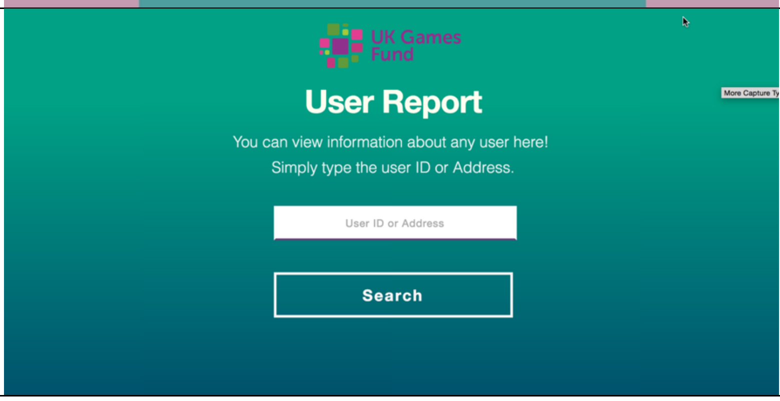
We're also considering other ways beyond blockchain in which sufficient veracity to a distributed open system for a contract registry could be provided.

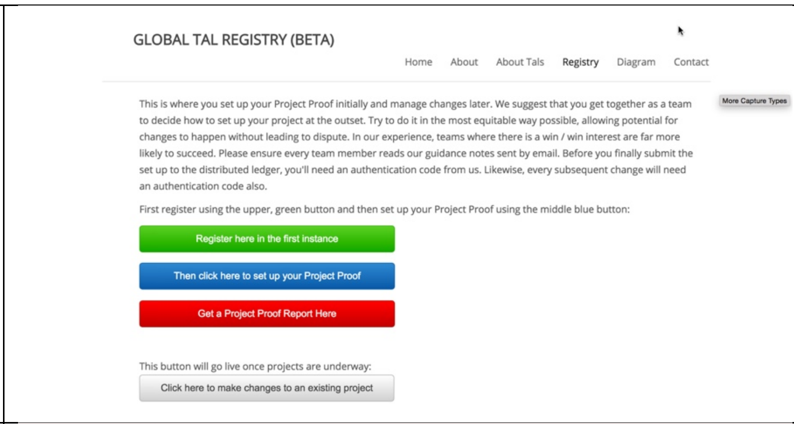
We hope to work with a number of platforms to allow the development of a fully end-to-end solution so that we have case studies of creative projects from inception to sales revenue, with the individual creators and other Tal holders receiving payments according to the Tal ownership profile.

There's a fictionalised case study based around a small creative team using the approach described in this paper set out in Appendix 4.

9 with acknowledgement to Sam Davies at the Digital Catapult who has made all of this technology work and Andy Boscor, Intern, for his UI work

Appendix 1 – Copy of instructions issued to Tranzfuser teams

	Read all the the pages on www.talregistry.com
	Read the Pre- contract guide document we emailed to you.
	Have a team meeting with everyone present to decide how you are going to set up your project.
	Piece together the different sections of the authentication code you've been sent (one section to each team member) by creating a string from the sections as you enter then under each team member surname in the table we've provided. That's your authentication code for the Project Proof set up – you'll be asked for it in a short while so have it to hand.
Go to the Registry page and select the Register Button and register each team member. DO NOT FORGET / LOSE YOUR PASSWORD. ALSO MAKE A NOTE OF YOUR USER ID RETURNED IMMEDIATELY.	
	
After registering and getting your UserID wait a short while and go to the next green button to collect your DL Address. You'll need the address to register the game.	

<table>
<tr>
<td>Return to the registry page of talregistry.com and select the blue button</td>
<td>
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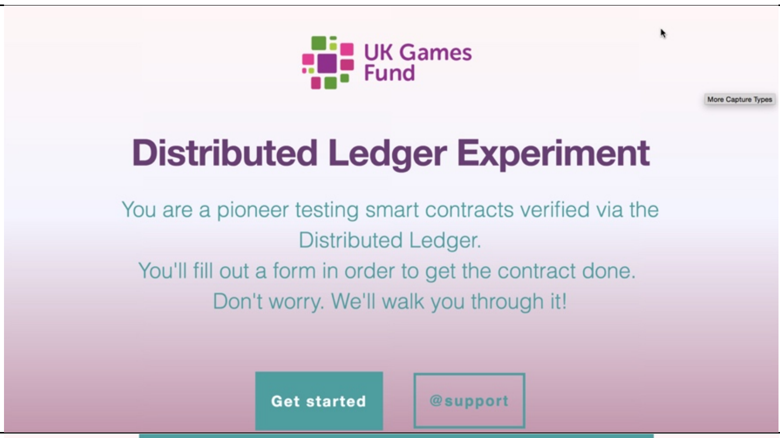
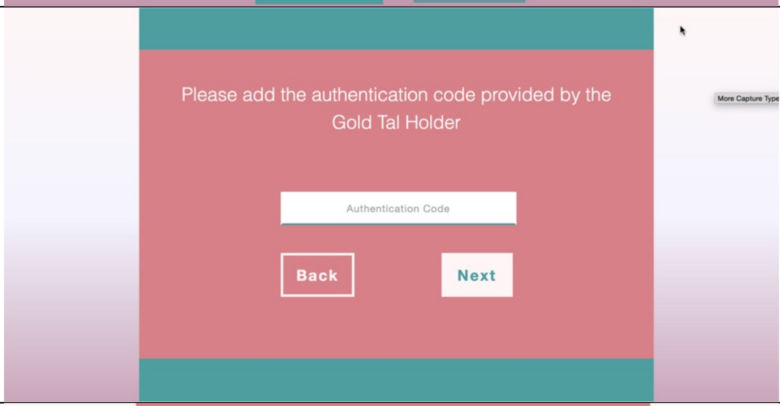
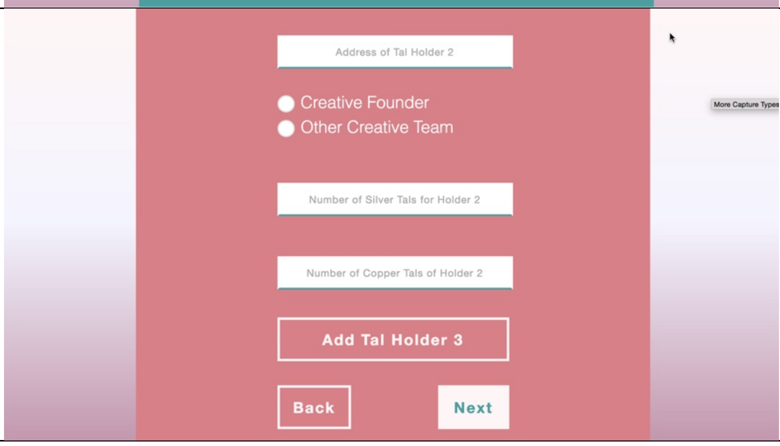
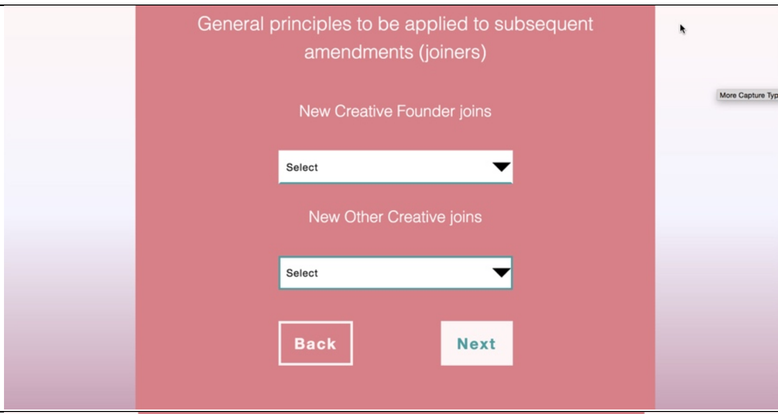
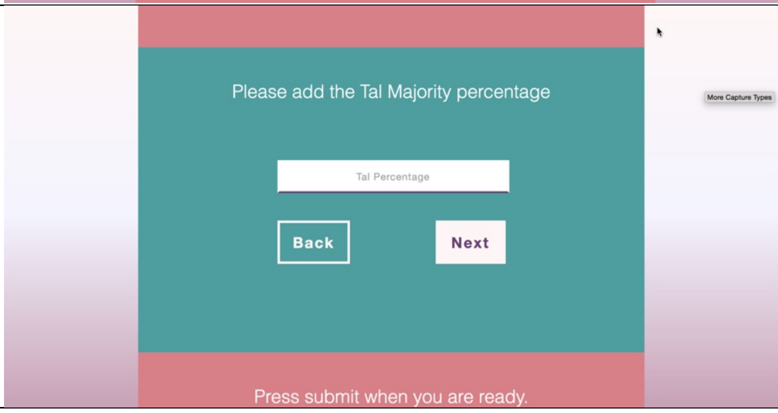
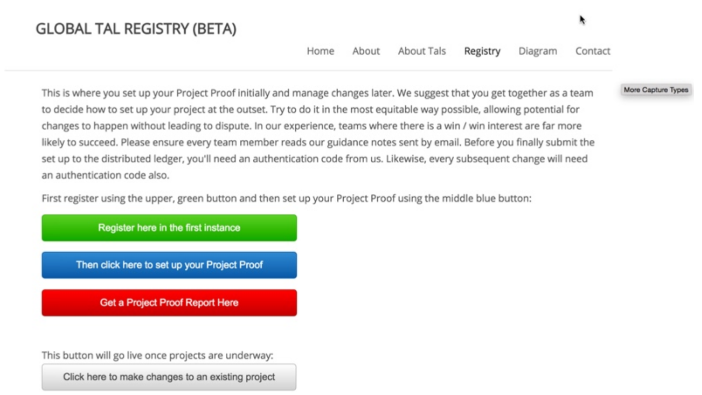
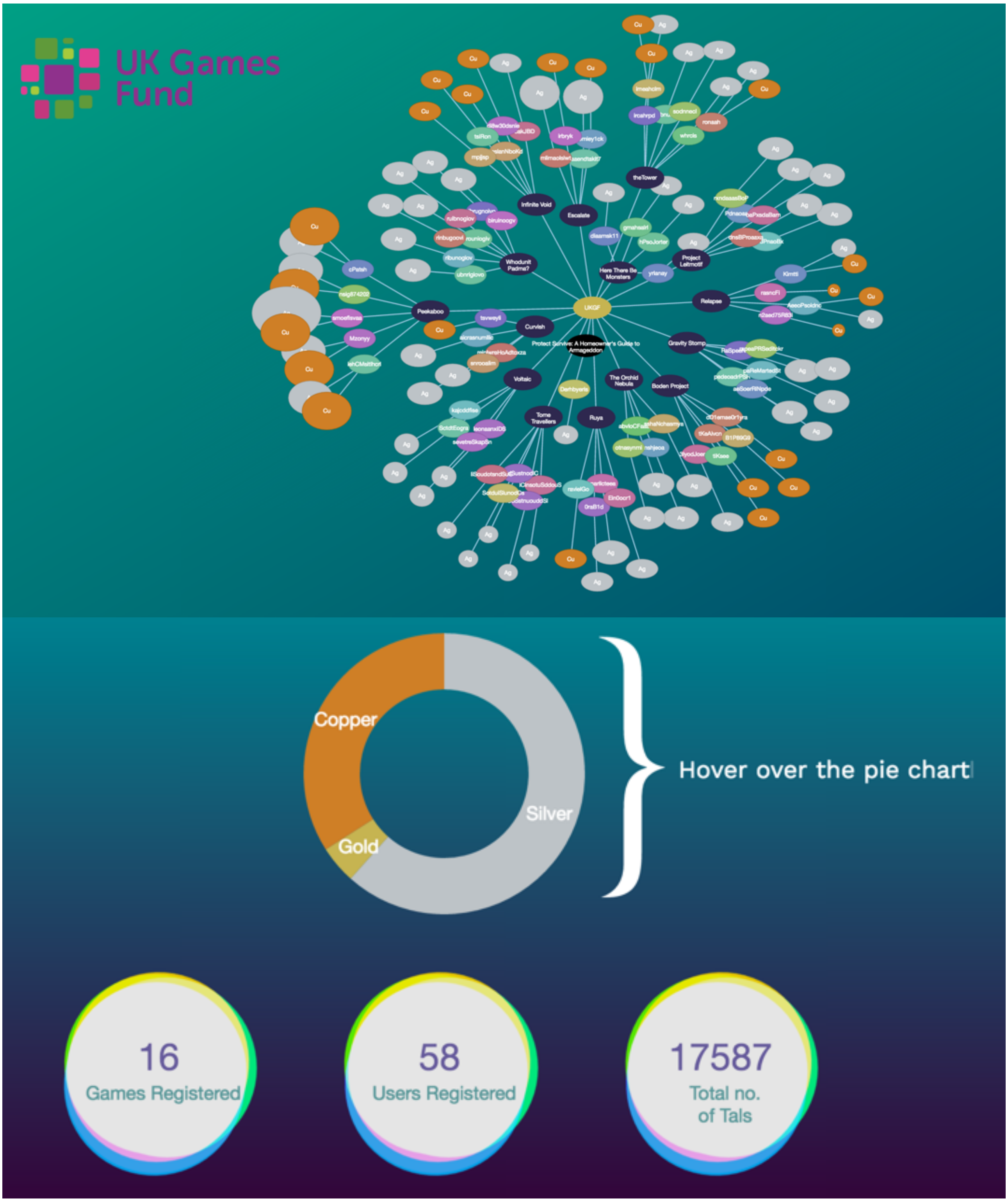
<td>Click to get started and enter the game name</td>
<td>
</td>
</tr>
<tr>
<td>Add the authentication code you pieced together above</td>
<td>
</td>
</tr>
<tr>
<td>You'll see that UKGTF holds the Gold Tal, so click to add Tal Holder 2 and repeat for each team member – Use the DL Address you obtained after registration in the top box here</td>
<td>
</td>
</tr>
</table>

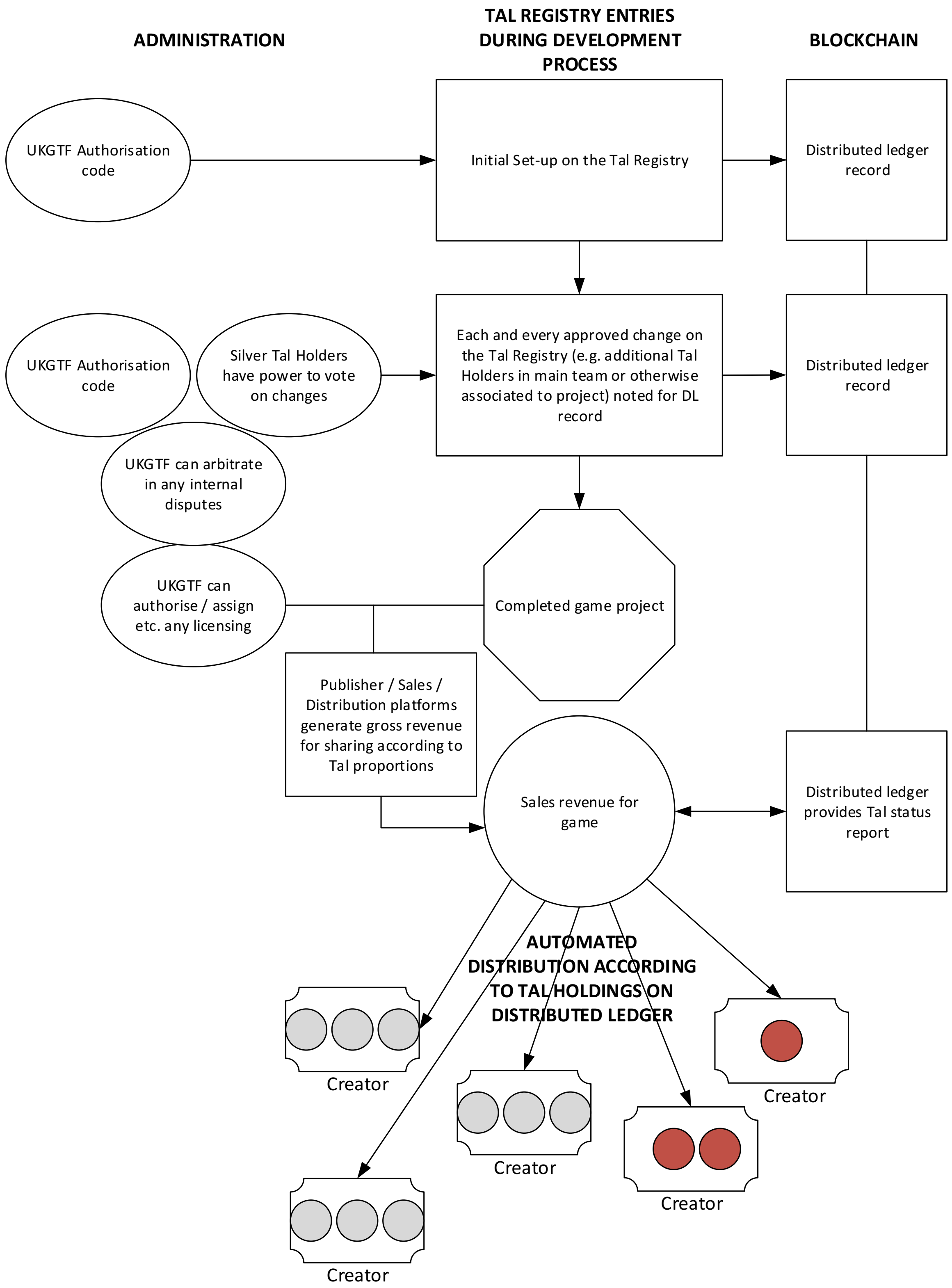
When you've entered all the team members see the joiners screen and select the third option to refer to Gold Tal Holder (this is an advanced concept that we'll be introducing along the way)	
Now add the majority percentage as per the guidance and according to your team size	
	That's it – you can submit the record to the distributed ledger.
You can get a Project Proof Report by clicking the red button on the Tal Registry	
	If someone joins or you want to make a change we'll be introducing a form for that too shortly.

See following page for images of the Tal ecosystem dashboard of the Tranzfuser teams registered on the distributed ledger.



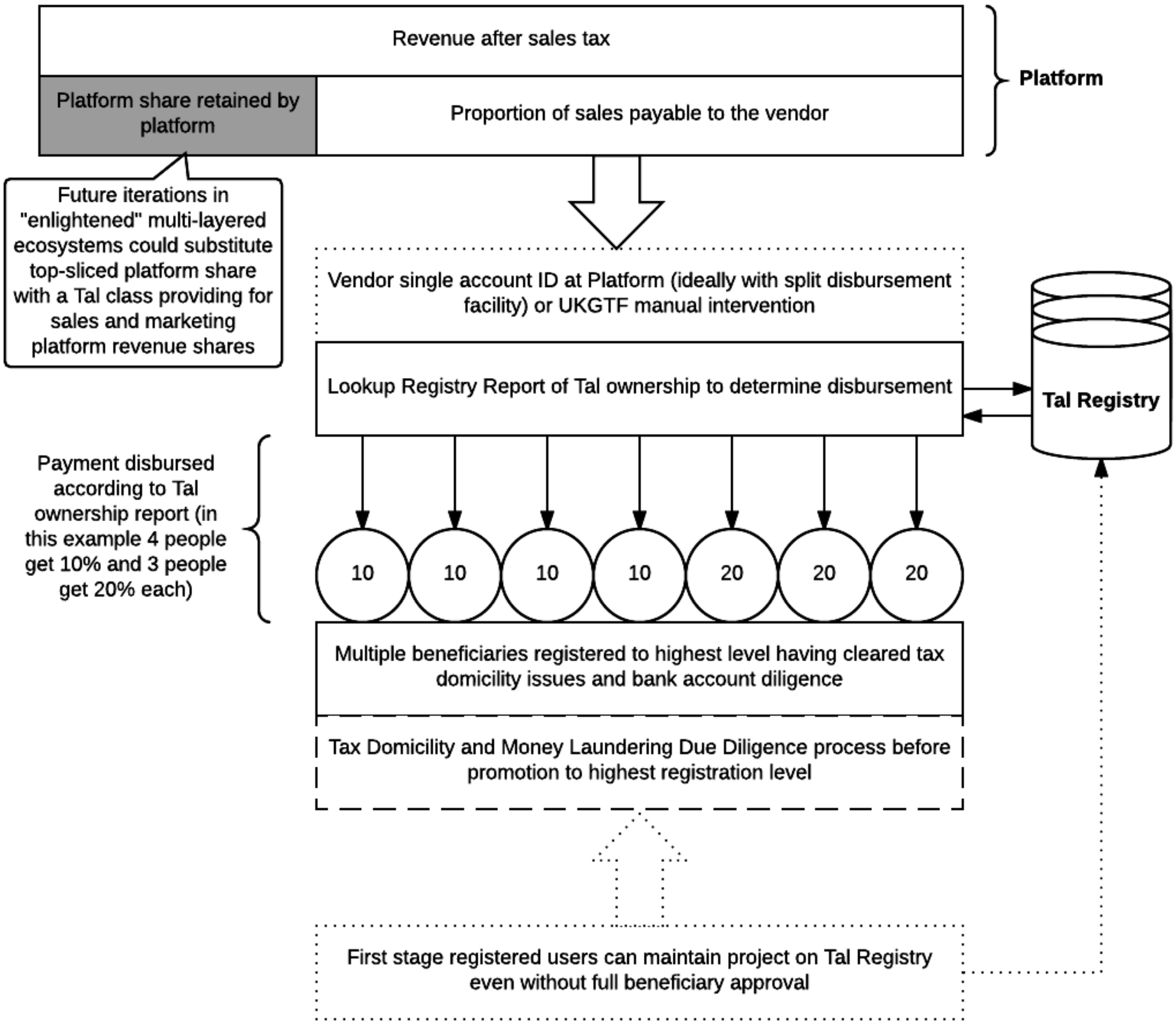
Tal ecosystem dashboard on the distributed ledger

Appendix 2: Overview of Tal Issue in the pilot showing revenue share aspirations



Appendix 2 (continued)

Additional details of payment API requirements



Appendix 3 The formal Terms and Conditions for a Project Proof (work in progress not intended for third party use)

PROJECT PROOF PROCESS

TERMS AND CONDITIONS

version 1.0 - issued on xx/xx/16

1. Introduction

1.1 These terms and conditions shall govern your participation in the Project Proof Process.

1.2 In this these terms and conditions:

(a) headings are used for convenience only and shall not affect the construction or interpretation of these terms and conditions;

(b) words denoting the singular include the plural and vice versa and reference to one gender includes the other gender and neuter and vice versa;

2. Definitions

In these terms and conditions the following words and expressions shall have the following meanings:

"Agreed Project Contribution" means the tasks or roles that a member of the Project Team has committed to the other members of the Project Team to deliver.

"Available Profits" means profits available for distribution once any project costs and/or other amounts that a Silver Tal Holder Majority reasonably decides to retain within the project have been taken into account.

"Bad Leaver" means a person who ceases to be a member of the Project Team as a consequence of:

(a) such person's resignation from the Team prior to delivering substantially all of their Agreed Project Contribution to the reasonable satisfaction of a Silver Tal Holder Majority,

(b) such person's dismissal from the Team for reasons that would allow fair dismissal pursuant to section 98(2) (a) (capability) or 98(2) (b) (conduct) of the Employment Rights Act 1996;

"**Copper Tal Holders**" means the holders from time to time of Copper Tals as recorded on the Distributed Ledger;

"**Copper Tals**" means the Copper Tals issued by the Project from time to time;

"Creative Founder" means a person recorded on the Distributed Ledger as a Creative Founder;

"Distributed Ledger" means the private blockchain operated by The Digital Catapult on which the Project is registered.

"**Economic Tals**" means Silver Tals and Copper Tals;

"**Gold Tal Holder**" means UK Games Talent and Finance C.I.C.;

"**Gold Tal**" means the Gold Tal issued to the Gold Tal Holder by the Project at the Date of Adoption;

"Good Leaver" means a person who ceases to be a member of the Project Team [at any time during the Relevant Period] and who is either (i) not a Bad Leaver or (ii) a person who a Silver Tal Holder Majority or the Gold Tal Holder determines is not a Bad Leaver (a "**Deemed Good Leaver**");

"**Intellectual Property**" means copyrights, trade and service marks, including the trade marks, trade names, rights in logos and get-up, inventions, confidential information, trade secrets and know-how, registered designs, design rights, patents, utility models, semi-conductor topographies, all rights of whatsoever nature in computer software and data, all rights of privacy and all intangible rights and privileges of a nature similar or allied to any of the foregoing, in every case in any part of the world and whether or not registered; and including all granted registrations and all applications for registration in respect of any of the same;"**Project**" means the video game prototype project recorded on the Distributed Ledger.

"Project Email Address" means the email address recorded on the Distributed Ledger for notices related the project;

"Project Team" means the Creative Founders and Team Members of the Project from time to time;

"Revenue Period" means any period of one calendar month during which there are Available Profits.

"**Revenue Share**" has the meaning given in Clause 4.1;

"**Silver Tal Holders**" means the holders from time to time of the Silver Tals as recorded on the Distributed Ledger;

"Silver Tal Holder Majority" means the holders of at least X percent of issued Silver Tals from time to time, where X is the figure recorded on the Distributed Ledger in relation to the Project from time to time;

"**Silver Tals**" means the Silver Tals issued by the Project from time to time;

"**Sodium Tals**" means the Sodium Tals issued by the Project from time to time;

"**Sodium Tal Holders**" means the holders from time to time of the Sodium Tals as recorded on the Distributed Ledger;

"Tal Conversion Date" means the date that the Tals held by a Good Leaver or a Bad Leaver are converted into a different class of Tal pursuant to Clause 10;

"**Tal Holder**" means any holder of any Tals;

"**Tals**" means the Sodium Tals, Copper Tals, Silver Tals and Gold Tals issued by the Project from time to time;

"Team Member" means a person recorded on the Distributed Ledger as a Team Member;

3. Tals

3.1 In these terms and conditions, unless the context requires otherwise, references to Tals of a particular class shall include all Tals of that class that have been issued in connection with the Project.

3.2 Tals of a particular class shall rank pari passu in all respects, except only as to the date from which those Tals rank for Revenue Share.

4. Revenue Share

4.1 Available Profits which a Silver Tal Holder Majority may determine to distribute in respect of any Revenue Period (the "Revenue Share") will be distributed among the holders of the Economic Tals (pari passu as if the Economic Tals constituted one class of Tal) pro rata to their respective holdings of Economic Tals, save where an Economic Tal was issued during the Revenue Period where each such Economic Tal shall receive a reduced pro rata allocation of the Revenue Share based on the number of Calendar days between the date of issue of the Economic Tal and the last day of the Revenue Period.

4.2 All distributions of the Revenue Share shall be paid in cash.

5. Votes & Electronic Resolutions

5.1 Decisions relating to matters that require a vote by Tal Holders shall be presented in the form of a proposed electronic resolution which shall contain sufficient information to allow a recipient to make an informed decision and shall be notified to eligible recipients pursuant to Clause 11.

5.2 A proposed electronic resolution shall remain open for voting for at least seven calendar days from the date that the notice of such a proposed electronic resolution was deemed to be served pursuant to Clause 11 unless (i) votes from all eligible Tal Holders have been received and the Gold Tal Holder consents to an earlier close or (ii) the Gold Tal Holder in its sole discretion decides that voting should remain open for a longer period.

5.3 The Silver Tals shall confer on each holder of Silver Tals the right to receive and vote on proposed electronic resolutions of the Project.

5.4 The Copper Tals (if any) shall not entitle the holders of them to receive or vote on, or otherwise constitute an eligible member for the purposes of, proposed electronic resolutions of the Project.

5.5 Where Tals confer a right to vote on a proposed electronic resolution, each holder shall have one vote for each Tal held by him.

5.6 The Gold Tals Holder has the right to receive and veto all proposed electronic resolutions of the Project.

6. Rights of the Gold Tal Holder

6.1 The Gold Tal shall confer on the Gold Tal Holder the rights detailed in these terms and conditions as varied from time to time at the sole discretion of the Gold Tal Holder.

7. Variation of rights

7.1 The special rights attached to the Gold Tal, the Copper Tals and the Sodium Tals may only be varied or abrogated by the Gold Tal Holder.

7.2 The special rights attached to the Silver Tals may only be varied or abrogated (i) by the Gold Tal Holder or (ii) with the consent of the Gold Tal Holder and a Silver Tal Holder Majority.

7.3 The percentage level for the Silver Tal Holder Majority may be amended with the consent of The Gold Tal Holder and a Silver Tal Holder Majority.

8. Allotment of new Tals

8.1 Silver Tal Holders are authorised to issue Economic Tals to any persons, at any times and subject to any terms and conditions as the Silver Tal Holders think proper, provided that:

(1) Consent from a Silver Tal Holder Majority has been obtained.

(2) this authority shall be limited to a maximum number of Tals in any twelve month period which will be determined by the Gold Tal Holder from time to time;

(2) the Gold Tal Holder has not revoked this authority;

9. Transfers of Tals

9.1 Tals may not be transferred unless otherwise determined by the Gold Tal Holder.

10. Departing Creative Founders or Team Members

10.1 All Silver Tals held by a Good Leaver shall automatically convert into Copper Tals on the basis of one Copper Tal for each Silver Tal and all Copper Tals held by a Good Leaver shall remain as Copper Tals.

10.2 A Silver Tal Majority or the Gold Tal Holder may determine that up to 50 percent of the Copper Tals held by a Deemed Good Leaver following the conversion pursuant to Clause 10.1 shall be converted into Sodium Tals.

10.3 All Tals Held by a Bad Leaver shall automatically convert to Sodium Tals on the basis of one Sodium Tal for each Economic Tal held.

10.4 Upon any conversion of Tals from one class to another under this Clause 10, the Silver Tal Holders shall be entitled on or after the Tal Conversion Date to update the Distributed Ledger the show the correct number and classes of Tals now held by each Good Leaver or Bad Leaver.

11. Notices

11.1 Any notice given or document sent or supplied to or by any person under these terms and conditions, may only be given, sent or supplied by email to the email address notified to the Project by each person for that purpose.

11.2 Any notice or other document sent by email shall deem to have been served and be effective on receipt or 48 hours after the time it was sent, whichever occurs first.

12. Intellectual Property

12.1 Any contribution (including any Agreed Project Contribution), discovery, invention, secret process or improvement in procedure made or discovered by any member of the Project Team while in the service of the Project shall belong to and be the absolute property of the Project or such Company as a Silver Tal Holder Majority, with consent from the Gold Tal Holder, nominates for the purpose.

12.2 Intellectual Property rights and other property of the Project may only be transferred with the consent of a Silver Tal Holder Majority and the Gold Tal Holder

12.3 For the avoidance of doubt, these terms and conditions shall not operate as a transfer instrument and any transfer of Intellectual Property rights or other property of the Project shall be effected under a separate agreement.

13. Data Protection

13.1 Each of the Tal Holders consent to the processing of their personal data by the Project, the Silver Tal Holders and the Gold Tal Holder (each a "Recipient") for the purpose of due diligence exercises, compliance with applicable laws, regulations and procedures and the exchange of information among themselves. A Recipient may process the personal data either electronically or manually. The personal data which may be processed under this Clause shall include any information which may have a bearing on the prudence or commercial merits of investing in the

Project, or disposing of any Tals. Other than as required by law, court order or other regulatory authority, that personal data may not be disclosed by a Recipient or any other person except to SIlver Tal Holders or the Gold Tal holder in the Project and to employees, directors and professional advisers of that Recipient or the Project. Each of the Tal Holders consent to the transfer of relevant personal data to persons acting on behalf of the Recipient and to the offices of any Recipient both within and outside the European Economic Area for the purposes stated above, where it is necessary or desirable to do so.

14. Suspension of access

14.1 The Gold Tal Holder may at any time suspend or prohibit access to the Distributed Ledger without notice or explanation.

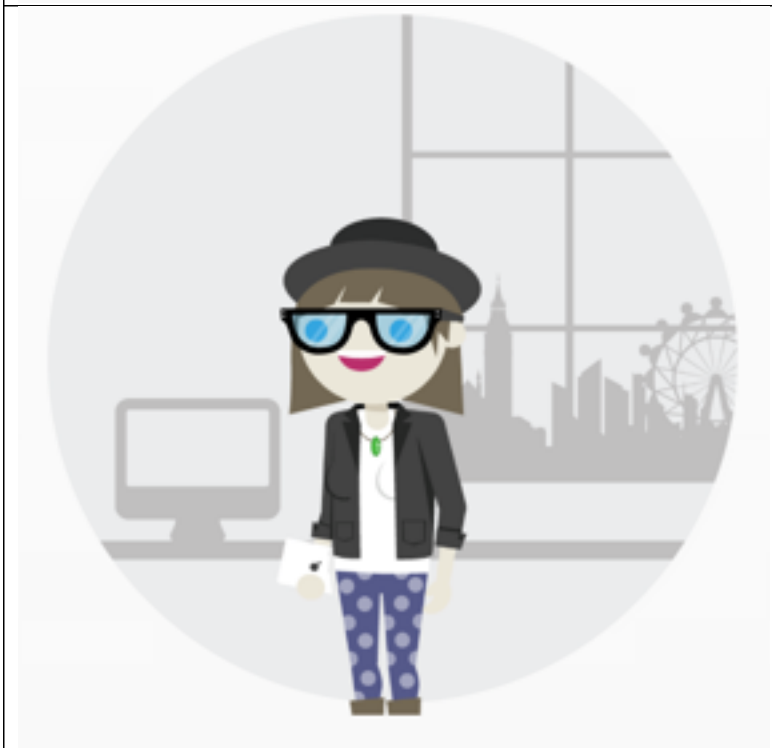
15. Law and jurisdiction

15.1 These terms and conditions shall be governed by and construed in accordance with English law.

Appendix 4 – A fictionalised case study based on real experience

Meet an exemplar team……..

	**Emma** Emma’s had a great idea for a game. She’s a digital arts graduate with a couple of year’s work experience in a small games company. Her employers are going through a slack period and they’re allowing Emma to have some time off to work on her own project. Emma’s not getting paid, but she did earn a small bonus recently that gives her some money to cover living expenses and she’s also done some contract work with Ben. She likes the Tal Registry concept as it avoids rushing into setting up a company for this project. They’re going to apply to the UK Games Fund but continue development meantime.
	**Ben** Ben’s a start-up junkie who’s already had some success but no big breakthroughs. He’s a software engineer with limited games experience and he’s able to work without drawing a salary. He also organised a bit of UI contract work for one of his start ups that Emma delivered with him to provide some funding for them to pool for contracting out parts of this project.

	**Luke** Has been there, done it and got the tee shirt. He's worked on some big name titles at well-known studios heading up programming teams. He's been itching to do a start-up for a while. He's been doing some freelance contracting to earn a living and loves the idea that Emma's come up with.
	**Olivia** Olivia is a designer. She's worked in various media companies, ending up as lead designer on a PC / console games project in a mid-size studio. She's got a great reputation from the success of a name title and it's taken some persuading to get her to consider this opportunity. She's taken up with the team because she likes the idea and she's thinks that working in a small team for a change would be fun.

The team decide that it's too early to set up a company so the UK Games Fund's new model for IP shares called Tals, backed by the Digital Catapult's technology is just the thing for them. They're a bit short on art resource so they agree to use Lemmy to do some contract work.

	**Lemmy** Lemmy's a friend of Luke from one of the places they worked together previously. Luke and Lemmy have worked together on contracting projects and also had a couple of unsuccessful attempts at developing their own games IP.

The team read the website, pre-contract information and terms and conditions. They have a meeting to decide how to set up the project. This is what they decide through discussion and negotiation:

Name	Tals Issued	Rationale
Emma	200,000 Silver Tals	Emma is one of the Creative Founders. She's bringing the idea, a small amount of money and considerable concept art. She wants to have a vote in the way the project is managed. She's also covering her own living costs.
Ben	200,000 Silver Tals	Ben is covering his own costs for now and allowing the money he and Emma earned to be used to cover other costs.
Luke	200,000 Copper Tals	Luke is working on multiple projects and wants to make sure he benefits equally from a financial perspective but he doesn't have the time or inclination to get involved in day to day project management. His contribution will be

		measured in providing a working executable code set rather than the days he works. The team have agreed a fixed price for that at significantly less than market rate which will be paid to three milestones from the pool. Luke’s vital to the project so he has an equal share to the Creative Founders but no voting rights.
Olivia	200,000 Silver Tals	Olivia is insistent on having some control as a Creative Founder. She doesn’t want the game to stray from her design vision. As she could easily get a job elsewhere she’s drawing the equivalent of a reasonable rate from Emma and Ben’s project pool (and providing receipted invoices).
Lemmy	100,000 Copper Tals	Lemmy will draw below the market rate from the project pool for his bit of contract work and the team has decided to give him some Copper Tals to incentivise him to give over the odds.
UKGTF	1 Gold Tal	UK Games Talent and Finance CIC has a Gold Tal so that it can arbitrate in any dispute. Even though it isn’t funding the team yet they’re using the Tal Registry so that they’re grant fund ready if they get the chance – and also they want a cost-effective way for there to be an arbitrator

So the starting set up that the team enter onto the Tal Registry is:

Name	Gold	Silver	Copper
Emma		200,000	
Ben		200,000	
Luke			200,000
Olivia		200,000	
Lemmy			100,000
UKGTF	1		
Total Tals at set up	1	600,000	300,000

The team agree that 66% constitutes a majority and enter that on the Tal Register. That essentially means that any two out of the three of Emma, Ben and Olivia can make significant decisions regarding those who leave or join the project and what happens in the future with the IP. In all cases decisions can be overruled by UKGTF as the Gold Tal holder. The team also agreed to retain 10% of any income in an open-book account to begin to top up the initial pool as a reserve to support ongoing development.

Looking ahead into the future what happens to this team is:

Olivia is head- hunted away early on with an offer she couldn't refuse. She accepts that makes her a Bad Leaver having not delivered the creative contribution she agreed. If she hadn't agreed, the remaining two Silver Tal Holders could have voted to exercise their majority or if there was an impasse UKGTF could have intervened. Olivia's 200,000 Silver Tals were converted to worthless and powerless Sodium Tals and that was recorded on the Tal Registry.

Lemmy stepped up to take a full design role. A further 100,000 Copper Tals were issued to equalise his economic participation. It was also decided that Luke was closer to the ethos of the project and his contract work levels had subsided and he waived his final milestone payment. His 200,000 Copper Tals were converted to Sodium Tals and 200,000 more Silver Tals were issued to him. All of these changes were recorded on the Tal registry.

At that point the team secured a £25,000 grant from the UK Games Fund.

The team continued unchanged and got an early version of the game released which began to generate some revenue.

In the first three months accounting period the game generated a modest revenue of £4,500. The API with the sales platform automatically showed the following:

Name	Gold	Silver	Copper	Sodium
Emma		200,000		
Ben		200,000		
Luke		200,000		200,000
Olivia				200,000
Lemmy			200,000	
UKGTF	1			
Total Tals	1	600,000	200,000	400,000

Tals with economic value = 800,000 = c £0.0050625 per Tal (after 10% deduction)		600,000	200,000	

The automated revenue distribution from the £4,500 paid the following revenues:

Name	**Amount**
Emma	£1012.50
Ben	£1012.50
Luke	£1012.50
Olivia	Nil
Lemmy	£1012.50
Reserves	£450
UKGTF	Nil
Total	£4,500

At the next phase of development (creating more levels and content for a steadily growing audience) Luke had a big contracting job offered which he couldn't turn down. He stepped aside and his programming work was contracted out at full cost. However, Emma and Ben recognised this and saw Luke as a Good Leaver as Luke had also agreed to help keep an eye on things with the contractor. They agreed that his Silver Tals could be converted to Copper Tals on a 1 for 2 basis (with the remainder becoming Sodium Tals). Luke agreed that this was a fair recognition of the work he'd sunk into the project. No further Tals were issued to the new contractor as it was full work for hire at market rates. Lemmy stepped up to have voting rights so his Copper Tals were converted to Sodium and 200,000 Silver Tals issued. All these changes were recorded on the Tal Registry.

A subsequent revenue period yielded £25,000 as the new content drove sales.

Name	**Gold**	**Silver**	**Copper**	**Sodium**
Emma		200,000		
Ben		200,000		
Luke			100,000	300,000
Olivia				200,000
Lemmy		200,000		200,000
UKGTF	1			
Contractor				
Total Tals	1	600,000	100,000	700,000
Tals with economic value = 700,000 = c £0.03214286 per Tal (after 10% deduction)		600,000	100,000	

The revenue distributions were:

Name	**Amount**
Emma	£6,428.57
Ben	£6,428.57
Luke	£3,214.29
Olivia	Nil
Lemmy	£6,428.57
Reserves	£2,500
Contractor	Nil
UKGTF	Nil
Total	£25,000

Once the critical mass around integrity ratings grows through a project proof ecosystem it's worth noting that Olivia's rating would have declined and Luke's remained stable or increased based on scores entered by the Silver Tal Holders at each respective transaction.