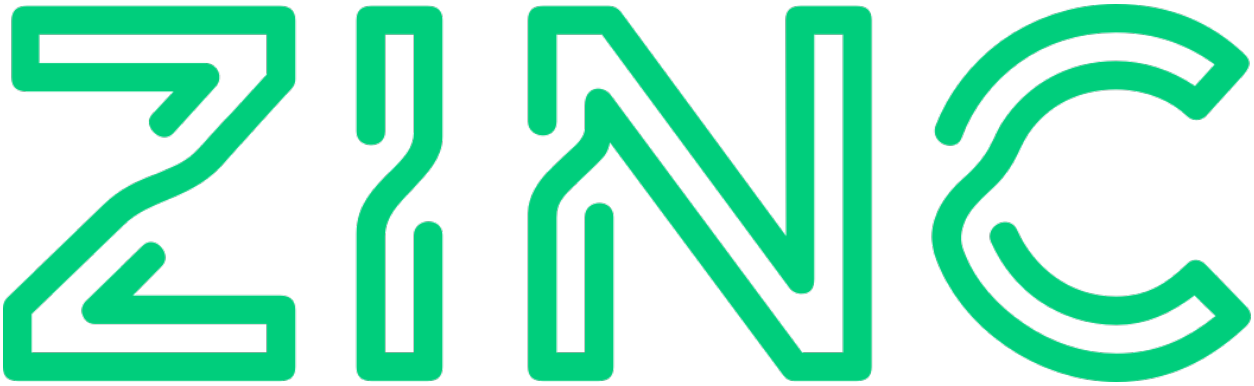

Version 2.0 – Q1 2018

By Luke Shipley & Peter Brooke

WHITEPAPER

Contents:

1. Introduction

This is a follow-up paper to our original Whitepaper, which details the way in which we plan to collect data with our skills assessment dApp. This paper will go into detail on the broader network architecture and how we're using the blockchains trust mediation, anonymity and tokens to solve the problems in recruitment.
We have an upcoming Coinception token sale. The general sale begins on January 30th.
We've published a non-technical 'Black paper' with more business focused information. If you wish to find out more, join us on Telegram. Don't hesitate to get in touch directly via hello@zinc.work.

1.1 Definitions:

In order to have a mutual understanding of the product offering we define the following concepts by these definitions:

"Zinc Token": the token used as payment for services provided by Zinc.
"Coinception": a token sale structure, an event in which ZINC tokens will be sold.
"Employer": a company that is trying to hire a Worker, either directly or via a Recruiter.
"Reference": a reference is a recommendation from a person ('Referee') who can vouch for your qualifications and ability to perform a job. A reference for an experienced worker is typically written by a former employer/colleague/client: someone who can verify long term performance in a role.
"Referee": a person who is willing to testify in writing about the character or ability of an applicant for a job.
"Recruiter": a company or intermediary engaged in trying to find a job for a Worker.
"Worker": a person who is looking for career, skill and performance verification for roles they have held in their current or previous jobs. Typically they are seeking verification and / or endorsement of their identity, character, performance and reliability. In this document, a Worker is also referred to as a candidate or job seeker.

1.2 Mission Statement

> *"To re-establish Workers as the rightful owner & controller of their career data. To become the industry standard for proof of employment history & performance across careers and beyond. Utilising Web 3.0 to create an identity claim compatible with ERC725 (16). Transforming Zinc into the world's first careers ledger & anonymous hiring ecosystem."*

2. Abstract

Recruitment is in crisis. The problem is not a decline in business - it's a £400 billion market, but one of trust. Recruiters have abused their privileged position for too long, using data phishing tactics, mis-selling and outright lying, all in the name of profit. These problems are exacerbated in tech recruitment where there is a huge skills shortage. A large number of recruiters are fighting for the attention of an small pool of talent. The marketplaces that recruiters and workers interact (Linkedin, Indeed) are built to profit from workers data. Even safe havens - free coding forums like StackOverflow make huge profits from job ads & search tools to sell workers' data.

DATA ABUSE

The data abuse that technical workers have been subject to has destroyed trust in recruitment. It's the result of years of recruiter spam and misuse of personal data like unsolicited calls from agencies. This has influenced workers to be cautious about sharing data without an incentive. Technical workers have given up on job platforms because of this data abuse and referencing is one example. In 2010, 75% of employers would Reference Workers for technical jobs, but today only 25% of employers take References [5]. Eight years ago people would openly add references to their CV or share referee contact data up front. Frustration is at an all-time high and the knock-on effect is a decline in the use of centralised platforms for all - recruiters included.

PREJUDICE

Prejudice is the biggest reason why we fail to hire the best people for our teams today. This problem goes much deeper than the obvious race, gender and age prejudices [9]. As humans we hold many unconscious preconceptions that misguide our decision making. This has led to the introduction of techniques for blind hiring, in which an external team makes decisions on hiring for another team where the Worker will be placed. Or doing away with CV's all together because we can't ignore all the biases they bring [31].

CENTRALISATION

A typical centralised platform's primary objective is to generate the greatest profit it can from the user data it holds. This is the typical centralised monopoly problem but arguably it's worse in hiring than any other. The model of companies like LinkedIn is not only to profit from users data but their time too. The Google's and Facebook's of the world monetise users data, but they don't monetise messaging like LinkedIn. LinkedIn makes $530 million annual premium subscriptions to send direct inmail messages. Indeed charges £2 to reveal an email address of anyone on their job board. This model simply will not work in the world of Web3.0 and GDPR regulations.
We strongly believe that money is landing in the wrong hands and users should benefit financially from their own data.

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3. Zinc Solution

We've highlighted some of the issues that Workers encounter with the current hiring system. In this section we'll set out our vision of the way forward, towards a better and fairer application process. Blockchain brings us: peer to peer trust mediation, anonymity, smart contracts and tokens. These are the answers to the problems.

We've developed a solution to allow users protection and ownership of their data. Providing an ecosystem in which career data can be relied upon and rewards can be given to the rightful party - the worker. By using a controlled reference process to collect skills data we can ensure that the information is more reliable than the current solutions available.

Zinc's vision is an ecosystem in which workers can easily own, manage and monetise their proven skills and experience data. Zinc will be a decentralised careers network, bringing references and proven skills into a CV. For the first time ever, workers can own their work history and skills data and monetise it through ZINC tokens. Our unique solution to the problems in hiring will be the framework for a anonymous, tokenized careers ecosystem.

3.1 Data Abuse Context

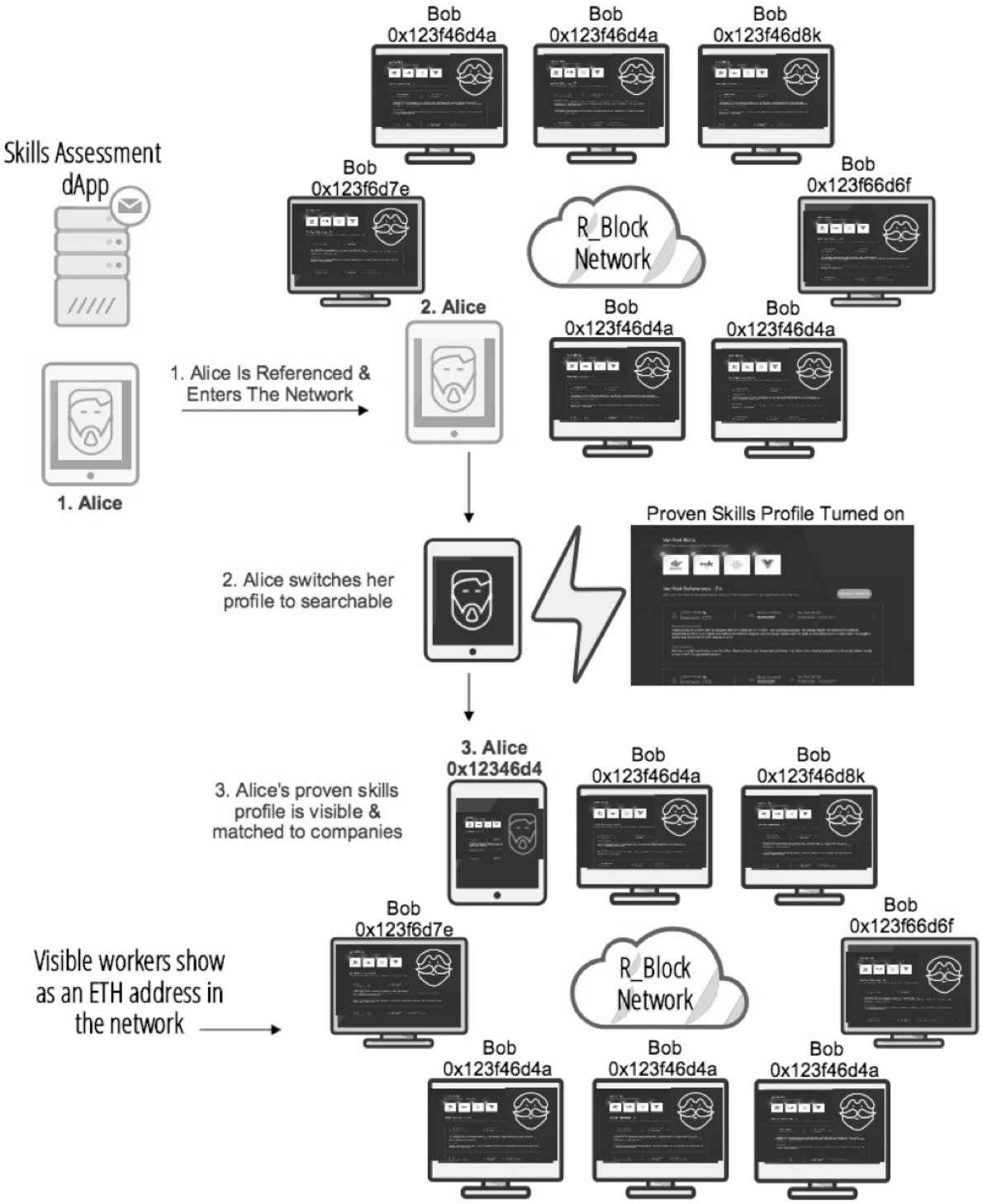
In the technical job market, candidates are in high demand - driving wages and competition up. The money has attracted little innovation but has made the marketplace crowded in the war for talent. This has led to an unhealthy concoction of people fighting for the time and attention of technical Workers. Experienced technical Workers have given up on job boards and are cautious about having contact data available online. Since it will result in endless pitches from recruiters. Workers have no control over when their data is available online since it's owned by the centralised platforms such as LinkedIn/Indeed. Furthermore, they have no incentive or reward to take the time to listen to all the job pitches. This is why platforms like Hired.com who try and re-address this balance have been an explosive success.

3.1.1 Data Abuse Solution - Trust Mediation

Zinc have developed an ecosystem in which users can collect their skills and experience data through references without revealing any contact data. Once you have an Zinc profile, you can control when your profile is visible, removing any ability for unsolicited approaches.

In diagram 3.1.2 below you can see 'Anonymous Alice' (represented in green) entering the network, with her profile hidden. She has an Zinc profile with proven skills & experience data but it's not visible to anyone but Alice. Anonymous Alice needs a cryptographic key to unlock her profile if she wants to become searchable, otherwise it simply remains a hash in the blockchain, anonymous to all but the owner. The 'Black Bob's' represent visible profiles.

Figure 3.1.2


Bob
0x123f46d4a
Bob
0x123f46d4a
Bob
0x123f46d8k
Skills Assessment
dApp
Bob
0x123f6d7e
R_Block
Network
Bob
0x123f66d6f
2. Alice
Bob
0x123f46d4a
Bob
0x123f46d4a
1. Alice Is Referenced &
Enters The Network
1. Alice
Proven Skills Profile Turned on
2. Alice switches her
profile to searchable
3. Alice
0x12346d4
Bob
0x123f46d4a
Bob
0x123f46d8k
3. Alice's proven skills
profile is visible &
matched to companies
Bob
0x123f6d7e
R_Block
Network
Bob
0x123f66d6f
Visible workers show
as an ETH address in
the network
Bob
0x123f46d4a
Bob
0x123f46d4a
Bob
0x123f46d4a

3.2 Prejudice Context

Prejudice in hiring is widespread and deeply ingrained. The obvious is the unacceptable prejudices that we're all aware of in gender, race and age. In the context of technical hiring, we often see prejudice against older workers and overseas workers when relocating. We used to see prejudice against female workers in tech but this has gone full circle as companies try to reach diversity quotas. These prejudices are encouraged when posting job ads on LinkedIn, Facebook or Google [29]. The centralised business model where a particular, gender, age-group or location can be ostracised is the one we aim to disrupt. Existing hiring platforms are monetising their data stranglehold on the jobs market.

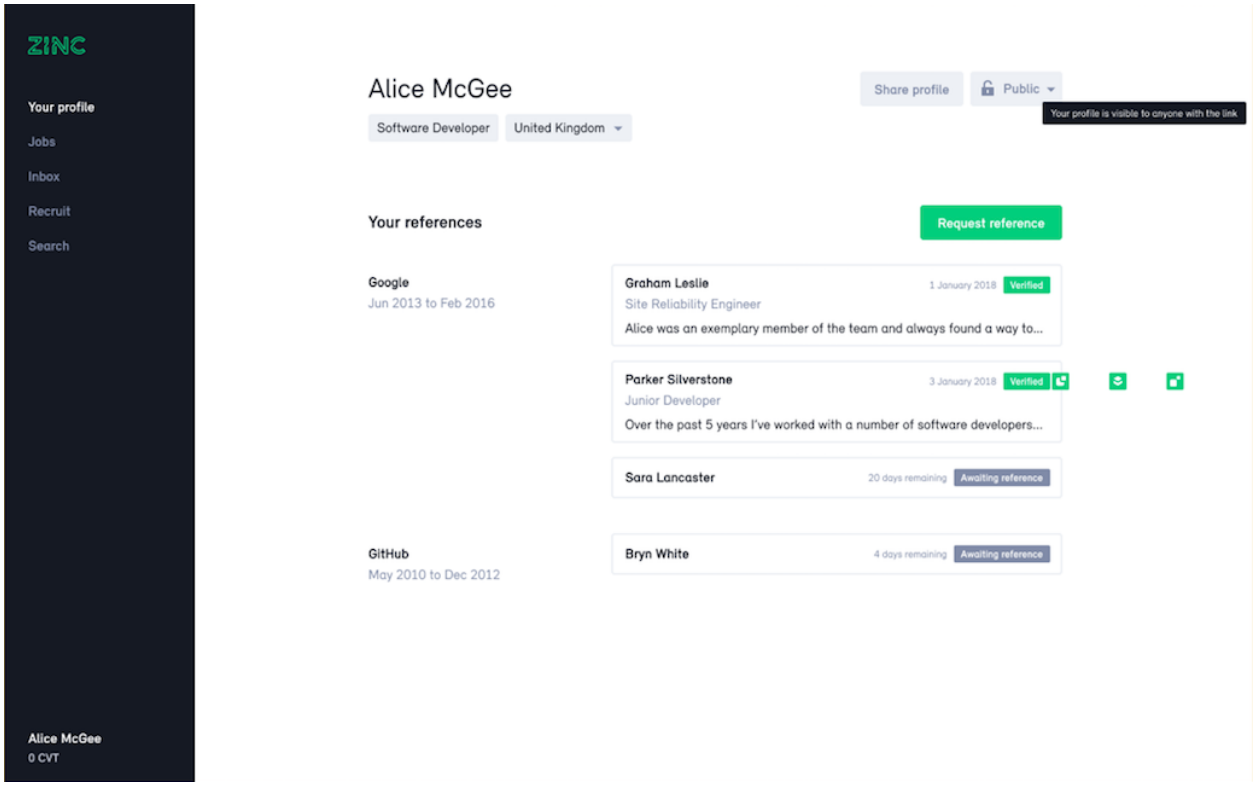
Hiring bias problems are in fact more sophisticated and deeply ingrained that most are aware. The reality is that often hiring decisions are based on our preconceptions more so than competency. Google has conducted research into this problem and promoted a solution - Blind hiring [30]. The reality is that we are unable to look at a CV without being shrouded with prejudices. We're more likely to hire people similar to ourselves or we can draw connections to. For instance If you look at a CV and see a technology you know you're more likely to favour that candidate. Familiarity creates a subconscious bias and since we're unable to ignore these associations, the solution is to remove this information.

3.2.1 Prejudice Solution - Anonimity

We do not think that entirely blind hiring is the solution, although there is a good case for it. We want to hide the information that can mislead us long enough to make unbiased judgement. Judgement should be based on skills and experience rather than the associations we hold with the names on a CV.

The anonymity that the Blockchain offers provides an interesting solution to these problems. You can login to Zinc with your Ethereum account public address (with extensions like Metamask) and this is the only information required to use the platform thus providing complete anonymity to the account owner.
In the diagram above 3.1.2 you can see Alice go from being referenced and her Zinc profile not being visible to anyone (stage 1) to switching her profile on with her private key (stage 2). She then gets intelligently matched to companies as an anonymised profile - only displaying her proven skills and references(stage 3).
Companies who have selected the skills they are looking for will be notified when a new user becomes visible. They will then have the option to contact the Worker by paying a fee to send them a message. The fee, made in ZINC tokens, will only be taken from the companies account if the Worker responds and shares their contact details (like the Earn.com model). See a more detailed representation of an anonymised profile, with proven skills in figure 3.2.2 below.

3.2.2



3.3 Centralisation Context

There are plenty of papers detailing the problems of centralisation. In the context of hiring, much of the same applies. Their primary motive being profit. For instance, LinkedIn (Microsoft owned) makes over $3 billion revenue per year. Of that, they've made more than $1.7 billion in job listings and collect $530 million annually for subscriptions that allow the sending of direct messages. The value LinkedIn provide is being able to share careers data. That's right - LinkedIn use your own data to earn profits of over $800 million per year. Indeed, which is a pure job platform with no social offering was on track to make $1 billion in revenue in 2017 [31].
Most of the innovation within recruitment has been in platforms that try to disintermediate middle-men such as agency recruiters. Whilst there is a lot wrong with recruiters, we do see value in their services. In fact the problem is the centralised platforms who have a simple but flawed business model - collect data and profit from it. Zinc will disintermediate centralised platforms.

3.3.1 Centralisation Solution - Tokens

We have created a network in which users have complete control over their data. We're using an IPFS data store synced with a Ethereum network. Users will be able to access their profile with a private key, then choose for it to be visible within the network or not. They may also choose to turn their profile into a live URL to share outside of the network.

3.4 Conclusion

By offering a decentralised data storage structure, the Worker remains the owner of their data. Workers can profit from recruiters interest in their profile and by sharing their information. By omitting key data points, attention is shifted from a biased candidate selection to the focus on how skilled and experienced the Worker really is. The testimonial from previous colleagues supplies a peer-to-peer confirmation of this skillset.

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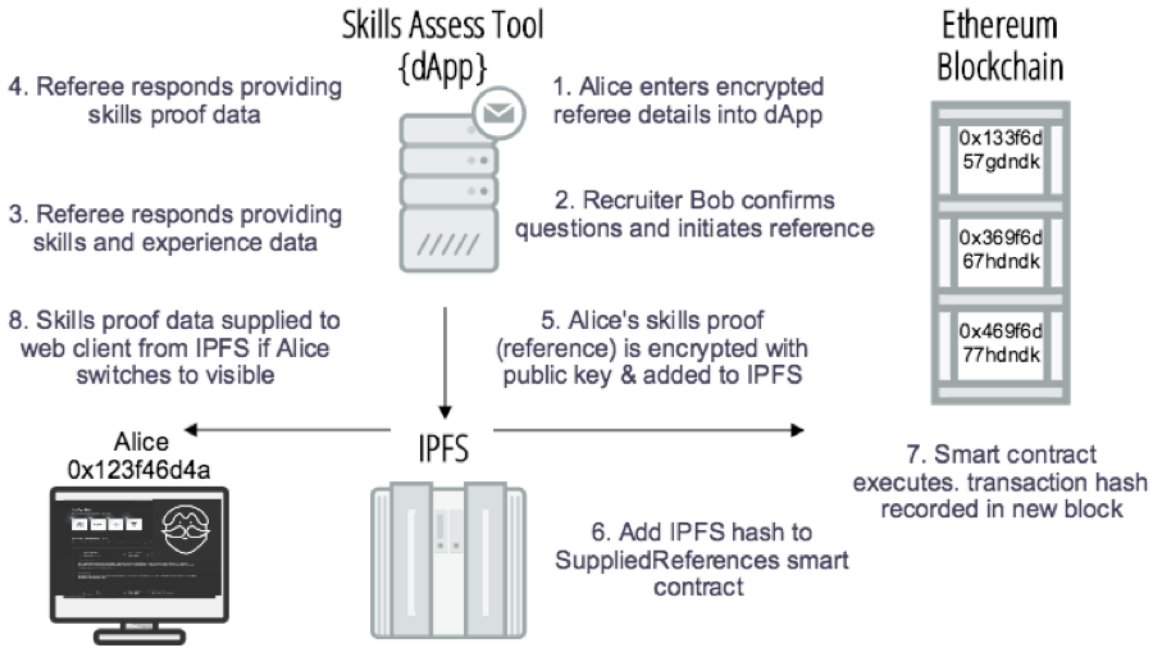
4. Ecosystem & Architecture

The integrity of the Worker and Referee data is paramount to the success of the network. We need to ensure the data can be relied upon, so we have identified a unique opportunity to revitalise referencing and use it as a tool to collect reliable information. Law state that if a Worker wants to see a collected Reference, they have the right to do so [6]. But 95% of surveyed workers said they have never requested to see their own reference. Zinc is providing job seekers the chance to easily exercise this under-utilised right.

4.1 Architecture

The application is being built on the Ethereum blockchain [1]. Zinc will run on a consortium blockchain [19]. The Worker will be able to securely store their skills data/CV within an IPFS store. The Worker can choose to decrypt with their key or choose to be visible within the Zinc web client network. Zinc adds Reference data to an IPFS network and sends to the Worker an IPFS reference hash that is encrypted using the Workers unique key. Zinc also stores a copy of the IPFS hash for administration and control purposes encrypted with an Zinc admin key. The Employer and Worker public/private keys will be managed by the platform and remain valid unless the worker chooses to remove the information. The Worker will have complete control over their reference data/CV and who has access to it.

4.2 Skills Data Collection & Technical Overview



The diagram above shows the fundamental way in which a Worker, Recruiter and Employer interact with Zinc. Each interaction is described in more detail below.

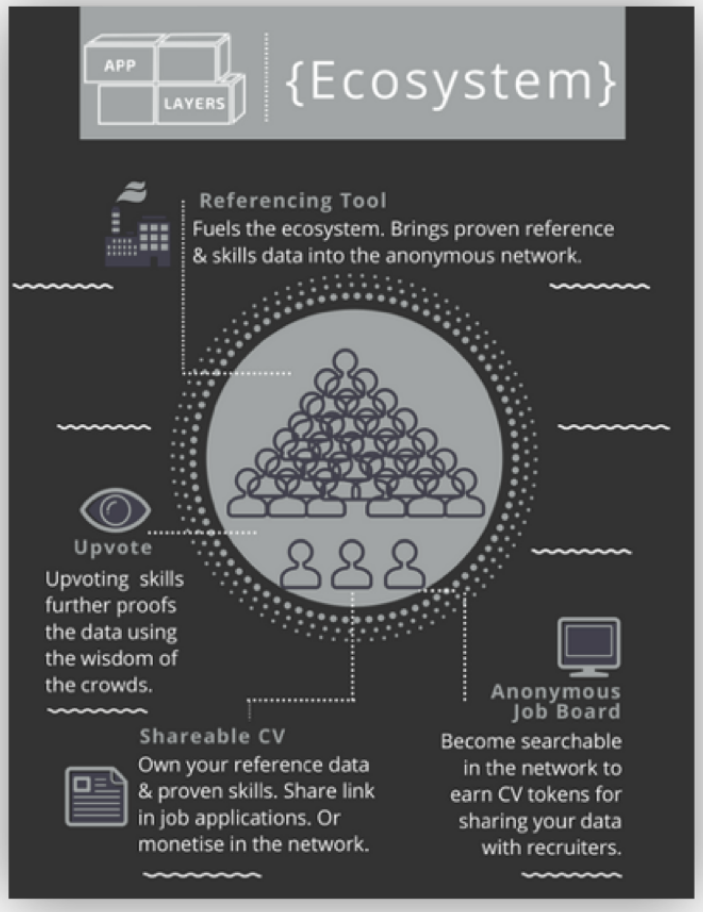
1. The Worker 'initiates referencing'.
2. Zinc sends a message to the Recruiter formally requesting the reference agreement to begin.
3. The Recruiter confirms the start of the Reference, optionally adds a number of bespoke questions to the request and returns a message back to Zinc:
4. The following fields are saved to record the Reference request:

- Recruiter **ID** (which Recruiter is requesting the reference?)
- Worker's **ID** (what is the Worker ID?)
- Company **ID** (which company are they are requesting the reference for?)
- Referee **ID** (which Referee are they requesting the Reference from?)
- Bespoke Questions - specific questions the recruiter needs to ask the Worker
- Reference# (encrypted hash of the Reference with suggested reference questions - empty if not yet supplied.

5. Zinc sends an email to the Referee requesting a Reference.
6. Referee sends back Reference to Zinc.
7. Zinc encrypts the Reference with an Zinc public key and persists the Reference data to IPFS.
8. A record of the hash created when adding the reference to IPFS is stored in a 'SuppliedReferences' smart contract against the Referee and Worker ID.
9. The resulting hash is stored in the 'References' smart contract 'Reference#' field of the appropriate record. The party requesting the reference receives it via email, the worker can see the information on their profile.

This approach will allow flexibility in creating secure Reference data stored on a private decentralised IPFS network and that can only be read by a party with the correct private key.

4.2.1



4.3 Identity Proof - Use Case

Once the network has matured it represents a powerful chain of information. Each Worker's unique network of contacts, jobs and employers provide a unique identity fingerprint. This is very difficult, if not impossible, to impersonate. Every colleague who knows a Worker is a unique point of identity verification. By combining multiple colleagues across multiple organisations, a unique network of identity 'verifiers' emerges.

When person X enters a voting booth they're asked for a form of identity like a driving licence. A low level of identity verification is needed here to confirm the face of person X matches a picture of a person X on a document (driving licence/passport). The purpose of this check is simply to confirm age, not to understand how credible their character is.

If person X is renting a house, a higher level of identity claim is required. You need to submit more comprehensive information such as bank statements, a deposit and a reference. A person's reliability, cashflow and identity credibility over a longer period is needed. This is one example of how organisations can use Zinc to perform a robust identity check on character credibility.

Zinc intends to use the emergent identification properties of employment history to supplement other methods of identification verification (such as biometric, societal, and digital) and become a core source of identification proof.

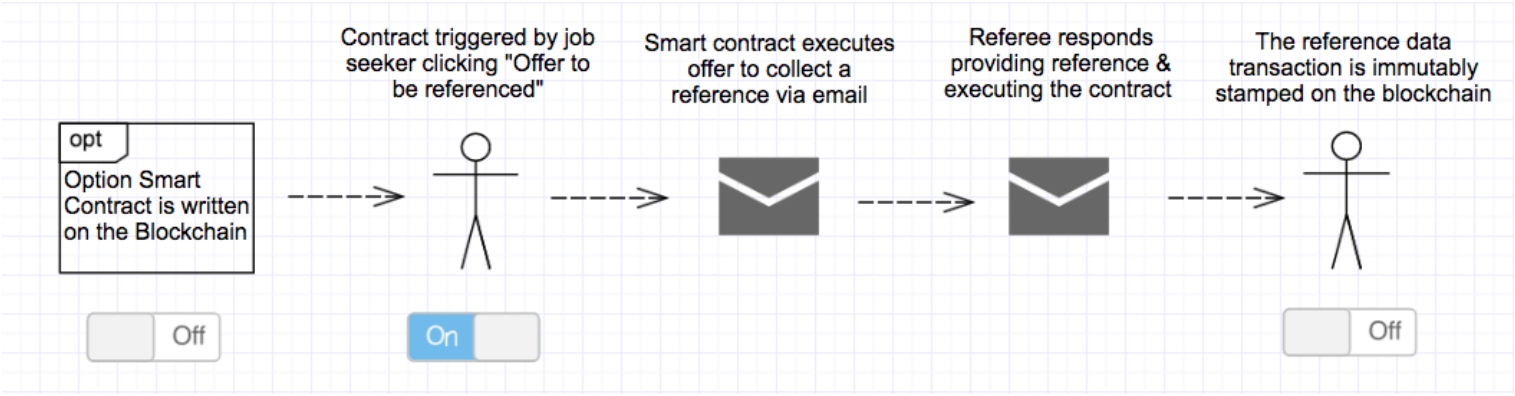
We're working with Decentralised identification companies such as BlockStack, IOTA and Civic as part of the Decentralised Identity Foundation. We're working towards standards like ERC725 [24] & 735 [25] which rely on a variety of methods to authenticate self-sovereign managed claims. Zinc's ambition is to become a source of identification for multiple identity verification systems.

---

5. Smart Contracts

The smart contract is written and stored on the Ethereum based blockchain, and is used to record the IPFS hash of the encrypted reference data being exchanged.

1. The contract is initiated by the job seeker by selecting "Offer to be referenced". This party provides a CV token for the contract to be started.
2. The contract fires a message out to the company or recruiter. They execute on their side by replying "collect reference" which sends a message to the chosen referee.
3. The referee executes by completing the reference form and responding. The transaction is complete.
4. The encrypted IPFS hash of the Reference data from the Referee is stored in the contract and an encrypted IPFS document is stored on an IPFS network.



If the reference isn't collected, the contract doesn't execute and the tokens are returned. There will be a two day time limit on transactions to ensure the process is efficient and a good experience for all parties. Once a reference has been provided, the job seeker owns the information and can utilise it as they wish.

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6. POA Consensus

Zinc is building a Ethereum consortium network with POA consensus, in order to benefit from the lower network costs, latency and solve scalability concerns.

Using the Ethereum Clique [21] proof of authority mechanism, the community can select authority nodes that can authorise transactions. These will be selected by people who contribute most to the community and build out a portfolio of references first. To add a new authority node, all the current authority nodes must agree. You can set a maximum number of blocks that an authority node can mine `(floor(signer_count / 2) + 1)` to act as a security measure. This way, the network keeps its decentralised nature and no node has too much authority [7]. To negate attackers infiltrating the network, only the out-of-the-box Zinc multisig contract templates can be executed.

The network validators will be incentivised by being given a stake in the platform, and they will then' self-govern' the platform. If there are any disputes e.g. over a transaction, identity or dubious transactions, the validators will come up with a resolution. The validators will have to maintain a level of performance by minting a certain number of transactions in a certain time. They will also be audited by the Zinc foundation to ensure high security levels of all the nodes.
The POA consensus offers more security compared to POS and more power than POW. We can create a new POA network utilising Geth and Puppeth [22] and we can use Nixos [23] to automatically update it.

```
geth --nodiscover --datadir ~/.ethereum/Zinc_consortium --unlock 0x5d******* --mine --rpcaddr 128.0.0.1 --rpcapi eth, net, web3, personal
```

---

7. ZINC & Crowdsale

Zinc is a catalyst compound used to bring to elements together. The Zinc token ticker is ZINC, the contract address to find the token is: 0x4aac461c86abfa71e9d00d9a2cde8d74e4e1aeea. The crowdsale token contract can be found at this address: 0x77377bcd4c84da61bb333491e2dde1fbb33f942a.

7.1 Buying ZINC

The ZINC Token is an ERC20 [26] token and compatible with ERC20 wallets. Participants in Zinc's Coinception sale obtain ZINC tokens by sending Ethereum to respective ETH addresses. After the token sale closes, the token purchasers will receive withdrawable ZINC tokens.

7.2 ZINC token specs

Based on our Tokenomics estimations we believe that we can have a working CV ecosystem and adequate funds for a successful project if we raise the capital in the following way:

7.2.1 ZINC token Facts

- 24m ZINC tokens in total
- $6.89 million hard cap in first sale (Coinception 1)
- 1 token = $0.78-0.98
- 3 capital releases based on defined milestones

7.2.2 ZINC token Distribution

- 60% of tokens on sale
- 15% Team & Advisors
- 19% Zinc foundation
- 6% Bounties & incentives

Bounties & incentives will be used for our PR & media outlet including translation work and incentives for influencers that we want associated with our product. The Zinc foundation comprises our early adopters who will give our platform the initial user base to get critical mass. We'll reserve 15% of our capital for the team and our advisors. Both our foundation members as well as our advisors and team members ZINC will be released gradually over a period of 2 years.

Zinc will use three milestone based releases of the raised capital. Any initial investor will receive up to 70% of its investment back if we do not succeed in reaching our milestones. The first milestone will be reached when we raise our soft-cap funding. After the token sale 30% of the total capital raised will be released to the company. The rest of the raised capital will be stored in the DAO until the next milestone is reached. See the timeline as follows:

Milestone	Release of capital
Soft-cap initial coin offering	30%
Network going live	40%
10,000 active users	30%

We use quantifiable metrics for our milestones in order to hard code these events into our smart contract. This way the investors are sure that we have need to deliver the project as we described. We are holding a private pre-sale, partnering with a select number of firms who value the utility of the token. They have a lock-in period the same as the team. They'll bring Workers into Zinc's network through referencing the Workers they're assessing. The pre-sale has already started and we have signed up some exciting partners that we will be announcing in January 2018. Telegram communication is the best way to stay up-to-date with our latest news. The general sale will take place on January 30th lasting for 21 days until February 20th, or until we sell out, whichever event happens first. We are creating 24m ZINC tokens and selling 30% of the total distribution (7.2m ZINC tokens) in our first sale event called "Coinception 1" =. The Coinception 1 general sale consists of three tiers.

~ Whitelist (30% Discount) = $0.91 per ZINC

~ Band 1 (25% Discount) = $0.98 per ZINC

~ Full Price (No Discount) = $1.30 per ZINC

We're selling 2m ZINC tokens in the Pre-Sale, Whitelist and General Sale then lastly 1.2m full-price ZINC. We're taking whitelist submissions on a first come first serve basis, until fully subscribed.
We have a hard cap of $6.89m and we will announce the ETH address upon sale opening.

7.3 Tokenomics

In the independent study by Attest, 72% our target market said they would pay between £20-£100 for Zinc's shareable Reference CV service. We're partnering with large tech hirers in our private pre-sale who will supply us with the needed user base. The estimated number of Workers these parties will bring into the network comes out to an average of 12,000 reference transactions in year one. When we hit our hard cap we will have 24m active general-sale ZINC tokens in supply. We hope as many as possible reach users with a genuine interest in the utility of the token. As references take place the network assets grow and the supply of ZINC diminishes. Based on the 1.8m people in our immediate target market we anticipate 10% of ZINC to filter users with a genuine interest in

the utility of the token. This equates to 30% of released demand being met and milestone 2 being triggered. With 30% of our tokens used for utility we predict a snowball effect where the number of users will gain critical mass in the industry.

7.4 ZINC token Utilities

To use the Zinc platform functionality requires the Worker or Recruiter to spend ZINC tokens. ZINC tokens can be bought in the Coinception sale and will be tradable on exchanges from 2018. Tokens are earned by sharing data in the network. This is how we stimulate a circular network effect.

The 3 utilities:

1. In order to collect your work experience data & skills proof, you must be referenced. We ID check referees, this way we ensure data integrity so we're more reliable than than competitors. A company assessing a Worker will pay for the reference with ZINC. A percentage of this fee can be earned by the referee for providing factual and detailed reference data. For instance a detailed reference with real work examples will score highly. A brief reference with opinions and no substance will score poorly.
As an example, a recruiter might wish to buy Zinc's ZINC tokens and distribute them to all the candidates they are interested in. Using Zinc allows the recruiter to find out competency before spending time interviewing them. All via a single click instead of spending time and money interviewing or testing them.

Once a reference transaction is recorded, validators will vote either to dismiss the transaction as fraudulent or decide the size of the reward for the referee. A referee can earn up to 50% of the transaction fee for a reference that gets the top modal score 5/5. Scores are initially cast in secret, token balances are locked, and upon revealing the vote, the balance is released using the following equation:

$$\mathrm{Comp}^{\mathrm{CV}}\,(\mathrm{Sum\ Votes})\,/\,\mathrm{No.}^{\mathrm{val}} = \mathrm{X}^{\mathrm{cv's}} \cdot \mathrm{Val}^{\mathrm{fee}} = \mathrm{RefRew}$$

Zinc Tokens | Comp - Company's reference fee | Val - Network Validators | Fee - network validators processing fee | RefRew - Referee's reward for sharing information.

2. When a worker enters the network, they exist in the network purely as an ETH address. If they choose to be searchable, they're intelligently matched with companies, based on their proven skills. If a company wishes to message that worker they pay a fee in ZINC. The fee is held in a smart contract and if the worker is interested they can respond and reveal their full profile. Like the earn.com model, or a LinkedIn inMail message fee that goes directly to the worker. We'll do this by building a general-purpose interoperable wallet, you can hold your Zinc profile in, the currency for exchange of data is ZINC. You will be able to hold other non-sensitive data forms like social profiles in here too.

3. If you wish to use your Zinc profile as a CV and share it outside of the network you can turn your profile into a public URL. There is a subscription fee in ZINC, this is where Zinc takes a fee. Zinc is a solution for taking back ownership of your work experience data and monetising it. We are partnering with recruitment companies to help them comply with GDPR, assess workers (referencing dApp) or find prospective candidates.

8. Roadmap

| - Mar 2017	Market research via Zinc.co site and 3rd parties is collected to validate idea. Testing begins.
| - Sep 2017	Zinc comes out of stealth mode and announces the forthcoming token sale.
| - Nov 2017	Zinc releases its white and black papers.
| - Dec 2017	Coinception token sale is announced
| - Jan 2018	Private pre sale closes and general token begins Jan 30th
| - Feb 2018	The identity verification 3rd party clients are integrated with the platform.
| - Mar 2018	Add CV functionality on user profiles enabling users to design and distribute their profile as a CV.
| - Apr 2018	Web App launch and full marketing campaign begins.
| - Jun 2018	Search functionality added. Workers who wish to be searchable to employers can seek jobs on Zinc
| - Jul 2018	Integration functionality for 3rd party platforms.
| - Sep 2018	Ranking algorithm API is launched, scoring references for credibility and allowing upvotes and downvotes.

9. Team

Our team page breakdown can be found in the blackpaper: https://zinc.work/blackpaper.html

Summary:

- Opportunity to build a decentralised recruitment ecosystem.
- Chance to become worlds first mainstream blockchain identity use case.
- Save time and money for recruiters & employers.
- Referencing & proof of work tool for careers and beyond.
- A unique blockchain implementation to revitalize referencing.
- First to market with career performance blockchain solution.

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