A provable citizen "record of achievement", educational funding and inheritable asset.

How smart contracts and DLT can help to maximise a child's future from birth, throughout life and create a real-world and useful asset.

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[Draft 4]

Draft notes:
- Include a use case of a politician noting down events and achievements good, bad and fiscal so they can show their career "public institutional memory"

[1. Nurseries](#)

[A nursery is charged with caring for the safety of a child, introducing them to academic surroundings, the concept of an academic day and some basic skills like Numeracy, literacy etc](#)

[2. Private tutors](#)

Author statement

The purpose of this document is to present a theory, a concept of how a system could be created.

Abstract

In this white paper, I intend to outline an idea to fund, track and prove a person's education and achievements throughout their lifetime, such a mechanism would have massively beneficial primary attributes to an individual and some surprising secondary attributes to individuals, parents and the educational system in general.

I intend to show how educational accreditation of achievement is often lost in unprovable filing systems, are of no real value to the achiever (the citizen) and can be lied about at will.

The suggested approach could also provide a method of paying for a citizen's education, future and prosperity. And resulting in an asset of both financial and academic in nature.

Protecting identity whilst remaining resistant to subversion, hijacking and other acts of poor intent.

I also intend to illustrate how such a mechanism could aid in the early detection of conditions such as autism, behavioural disabilities, higher-level talent etc

Why is this needed

Educational stagnation

In the 1900s, a non-human powered vehicle was a horse-drawn carriage; in today's society, it's motor vehicles that can drive themselves, packed full of technology, barely recognisable from its ancestral counterpart.

The same can be said for personal communications, the latest mobile phone technology bears little resemblance to the antique rotary phones of old.

Such comparisons and evolutionary leaps can be drawn of most industries, topics and methods.

The classroom, conversely, has changed very little in 100 years and, although methods, reviews and examinations have changed many times, attitudes and certifications have remained the same.

A citizen's achievements is a throw-away piece of paper, an accolade held primarily in the filing systems of the awarding bodies.

Certifications, examination results, awards, praises and even degrees and doctorates remain difficult to confirm save for a piece of paper awarded to the achiever.

Real-world achievements and accolades, such as written word, pieces of art, exercises of mind etc are going unrecognised and their attribution is being falsely made.

Parental path requires inaction

From the moment a child is born, the educational system demands that a parent wait, understandably. But when a child does start their educational journey, they do so in relative isolation from their parents.

It would be impossible to report on the achievements, accolades and merits a child makes during a school day. Their termnal, bi termnal and seasonal reports can only be succinct and general in nature; lost in a sea of averaging as a result of the many student classroom models.

That being said, there are many, seemingly, vital data points that are not being captured, reported and attended to at all. Ostensible putting the child's progress, safety and future at risk.

An inexhaustible list of other valuable data-points to collect might be

- Food and nutrition
- Sleep
- Exercise
- Perceived behaviour
- Perceived happiness
- Acts of kindness, malice, etc
- Incidents
- Ablutions
- Behavioural corrections
- Illness
- Absence/attendance
- Travel
- Whereabouts
- Accreditations
- Custody

No single record

Every time a person or child moves between educational institutions and activities. The record of achievement is started anew. It is not common practice to share such records, they are by no means added to and are, therefore, difficult - if not impossible - to aggregate and useless as an asset to the child.

Child individuality lost

Educators, coaches and mentors that care and provide tutoring to many children at the same time are, understandably, restricted to using generics and greater good methods to teach, care for and track children. This makes it difficult to cater to individuals in any way.

Creativity, excellence and aptitudes can be missed and, even when detected, can rarely be nurtured effectively.

Educational guidelines

It is understood that there exists, no firm rules as to how a child should be educated. Instead, there are guidelines that an educator can choose to follow, or not.

Real-world achievements and accolades

Previously, a person's neighbourhood was limited to the street in which they live, their social and academic circles limited to a small community.

Today, technologies are removing those boundaries, the next Einstein-like brain could well be in a backwater town in a previously inaccessible area. Similarly, a truly exceptional mind could be going largely missed due to poverty, ignorance or other limiting factors.

Many times, in history, great works have gone missed during an individual's lifetime, and then can often be falsely attributed to the wrong individuals.

An individual would have no real way of conclusively proving themselves as originators of works should they need to.

Note: It is worth noting that the word "Achievement" in this white paper can apply to any or all of the following;

- Lineal steps of achievement in courses, learning activities etc
- Events
- Created works
- Intellectual achievement or creations
- Physical creations or creations (that can be represented in digital)
- Accreditations
- Items of merit
- Praise
- Nutritional and fitness goals
- Events in health

    etc

The suggested solution

Citizen asset

A safe, provable, decentralised ledger of achievement that can only reflect the achievements of a subject and allowing a mechanism to prove an individual is said subject.

Noteworthy secondary benefits

- Inheritable asset (financial) - via proof of life mechanism
- Asset (proof in academia)
- Educational funding mechanism
- Universal educational standards
- Educational rules
- Lesson plan marketplace
- Accredited actors
- Benefactorial contribution

Distributed ledger

A little about Distributed ledger and some of the relevant functions available

Smart contracts

DLT (distributed ledger technology, has afforded us with a mechanism to execute contracts in a digital fashion with little or no human interaction. Such items are moved from one state to another in a transactional manner, executing as they do, a procedure contained within itself. By virtue of this mechanism, it is possible to follow the entire journey of the smart contract, verifying it as we do.
This can be compared in simple terms, as a sort of If-this-then-that function with its own, incotrifutable, audit trail.

A smart contract can be owned by a wallet, multiple wallets or by no wallets at all. Depending on the instructions stored within itself

Wallet, payment and savings mechanism

Another mechanism afforded to us by virtue of DLT is wallet and digital money storage.
A smart contract is interacted with by accounts known as wallets.
A smart contract is, itself, a wallet.
A wallet is a location to store currency.
Currency can be paid into a smart contract, or to a wallet that can be controlled by a smart contract and paid out from a smart contract.

Proof of life inheritance

Proof of life (not to be confused with a DLT 'proof') is a mechanism that allows ownership of a smart contract or a wallet attached to a smart contract to be passed over to another user should the original owner (in our case, a parent) fail to prove their life in an adequate fashion.

Suggested approach

Creation of a smart contract, I am calling the "Record of Achievement Smart Contract" (RoaSc)

The contract would act as an intermediary contract that allows actors (witnesses) to submit evidence of a child's progress in a meaningful way.

Evidence can be attributed to an established lesson or course plan.

Evidence can be of any nature, [see list of possible data points in the "Parental path requires inaction" section of this document]

RoaSc creation and interaction

In the first instance, several tools would be created that could interact with the RoaSc in a meaningful, simple way.

Interfaces, websites and applications that allow anyone to interact with the RoaSc in their own particular niches or industry.

There would exist a master contract that is responsible for the creation and setup of RoaSc contracts. A small gas fee would be required to run it, and any remaining currency could be used to further development/profit etc.

I.e. nursery classroom management apps, private instruction or accreditation etc

Suggested interfaces:

1. Block browser - A user could use a browser that allows them to see the transactional timeline in a meaningful way and for any contracts they are involved with
2. Witness Browser/app - an app that allows user to submit testimony to any contract to which they are connected
3. The subject, or owner, of the RoaSc could cryptographically sign messages proving that they are the subject or owner of the RoaSc

As intimated previously in this white paper. We are suggesting that, upon a child's birth, a parent would create a RoaSc from their personal wallet. From then on, the RoaSc would recognise them as the coordinator/owner of the contract.

Also, an individual could create a RoaSc for themselves to begin a proveable history of achievements

A rough instructional road map might go like this

- Coordinator creates a wallet.
  This wallet would, hitherto, be used to send instructions to the RoaSc
- Coordinator uses a wallet to create a RoaSc, sending a small gas fee in the request
- Coordinator can optionally create a wallet for a child and instruct the RoaSc to accept the child's wallet as the subject
- Coordinator (or any authorised benefactor) can optionally start making regular payments to the RoaSc for the child's future
- Participating witnesses (educational bodies etc) each create a wallet
- Coordinator instructs RoaSc to accept witness and add it to their list of authorised contributors
- Witness uses their wallet to submit evidence to RoaSc
- Coordinator rents can instruct RoaSc to send funds to a witness, only, if they have submitted evidence to the contract
- RoaSc uses its own, internal, logic to accept or deny evidence provided
- Child uses their wallet to cryptographically sign a message proving that they are the subject of the RoaSc
- Coordinator, given certain parameters provided at creation time, can hand over ownership to the child at any point by sending instructions to RoaSc
- Coordinator can send a "proof of life" instruction to RoaSc
- Coordinator can send a transfer to contract instruction to RoaSc
- RoaSc can enact its inheritance clause on a certain date

Evidence the RoaSc could track?

1) Achievements academic in nature

As evidence submitted to the RoaSc can be attributed to bona fide lesson and course plans, there becomes a need for lesson plans to be created, checked and accepted.

Such plans, however, do not necessarily have to be of an academic nature.

A lesson can consist of anything from Native language, numeracy and literacy to instruments, skilled activities and even hobbies.

A parent, wishing to teach their children to play the piano - for instance - can instruct their RoaSc to accept a private piano teacher as a contributing witness.

The piano teacher, following a universally accepted or accredited lesson plan, can contribute evidence based on their own credentials.

2) Real-world achievements, works and accolades

In today's technological age, it is possible to create a digital representation of a piece of art, written work, even physical items like houses, cars etc

If an asset can be digitised, it can be entered into an RoaSc as an achievement

My RoaSc, for example, could contain an achievement of this white paper.

I could then prove provenance as the author and creator of the concept.

Personally identifiable and confidential information

All information, by virtue of Distributed ledger technology, is encrypted.

Information submitted would be done so against a wallet address, in order to prove that an individual is a subject linked to the asset, they would sign a message in a way that only they can.

Until that point, no connection is ever made with an individual unless publicly released by the subject.

Until a suitable age, all information would be private in nature and released to individuals by the owner of the RoaSc specifically.

The age of consent as a milestone, or an age in which it is generally accepted and understood that a child understands and is responsible for the events and achievements store within an RoaSc.

As DLT is a 'push' technology, there would be absolutely no need to store any personally identifiable information as all in a RoaSc

Third-party systems utilising the RoaSc would do so in a testimonial sense and those systems would hold and be responsible for PID (personally identifiable Data)

For example, a nursery would register a child on their own system, that system would store name, DOB, parent contact details etc, and the child's RoaSc address.

Actors

● Subject (child)

- Coordinator/Owner (parent)
- Witnesses

  Tutors, nannies, teachers, nurseries, schools, clubs, accreditation bodies

- Authors

  Bodies authoring lesson plans

- Benefactors

  Family members or charitable entities wishing to contribute to a child's future. Benefactors can contribute to an RoaSc based on rules specified upon creation.

Contributing witness accreditation?

Anyone can create and be the subject of a RoaSc.

Any persons following a lesson plan and undertaking tests, examinations and assessments with an accredited witness, can progress to any status required.

Any person creating a digitally representable asset can testify of its creation.

Lesson plans, plan marketplace and accreditation

As evidence submitted to the RoaSc can be attributed to bona fide lesson and course plans, there becomes a need for lesson plans to be created, checked and accepted.

A lesson can consist of anything from Native language, numeracy and literacy to instruments, skilled activities and even hobbies.

To become accredited, an individual can create and fund an RoaSc themselves, and then undergo plans and courses.

Smart contract as a funding and savings mechanism

By virtue of Distributed Ledger Technology, and in order to interact with DLT based smart contracts a user must own a compatible wallet.
A smart contract can also control wallets in the same architecture.

This means that a user can send currency to the RoaSc that can be controlled by the contract.
The contract can then fund events in the child's life, college courses, improvement activities etc

Any remaining funds in the smart contract can be inherited by the child at predetermined stages of their lives or as a result of a failed "proof of life"
It is also worth noting that any benefactor can also contribute to the child's wallet, family members, organisations, friends, etc

More about Proof of life inheritance

At creation time the creator of an RoaSc could specify a period of time in which Proof of life should be made and a proof-of-life policy.

Proof-of-life policy can be changed at any point by the owner.

If that period of time has passed without interaction from the owner, then ownership of the contract and it's wallet can be moved to the subject or another nominated account, depending on the Proof-of-life policy.

A proof of life policy might be;

Example 1 ...

If an owner does not interact with the RoaSc within 1 month, ownership passes straight to the child

Example 2 ...

b) If the owner does not interact with the RoaSc within 6 months, ownership passes to the next of kin specified

Machine learning, Out-of-the-ordinary and autistic detection

It is possible to apply machine learning and AI algorithms to a RoaSc's transactional history.
Such technologies could potentially identify and notify rapid or out-of-the-ordinary changes in a subject's record. Data points could contribute to an automated suspicion.

Such data points could easily be used to identify characteristics on the autistic spectrum, learning difficulties but also above average talent and abilities.

Note: These examples are quite contrived, but they are meant to demonstrate that, given certain data points, and diagnostic algorithms, conclusions **could** be reasonably deduced.

Example 1 …

Timmy is a happy child, then on the 11th Oct, his perceived mood switched to sad and has not yet consistently returned to happy.
Automated suspicion: Timmy is not happy with a change in his circumstances that happened on or around the 11th Oct.

Example 2 …

Sandra is happy most of the time, then at 1200 on a Wednesday and after she ate rice pudding (after lunch), her perceived behaviour changes from compliant to aggressive.

Automated Suspicion: Sandra might have a slight intolerance to rice pudding and that it manifests in aggression.

Example 3 …

Pauline is a compliant young girl, after every lunch that consists of bread or pizza, she becomes distant and sluggish.
Automated suspicion: Pauline may have an intolerance to gluten

Example 4 …

Each morning, Angelina is distant and does not engage, she has always seemed happy and compliant, but since the 24th of this month, she has seemed distant and withdrawn. Teacher noted in uncharacteristic understanding of a topic adult in nature
Automated suspicion: Angelina is being abused.

Example 5 ...

Mrs Smith, a teacher at busy bees nursery is entering, on average, 33% less data points than her counterparts

Automated suspicion: Mrs Smith is not doing as she should

Example 5 ...

Use cases

Use case 1. Nurseries

A nursery is charged with caring for the safety of a child, introducing them to academic surroundings, the concept of an academic day and some basic skills like Numeracy, literacy etc

A parent will drop their child off but are essentially cut off from them.

With RoaSc,
A parent can;
- assign a nursery as a witness to a child's RoaSc
- The nursery is then able to interact with the child's RoaSc, storing key points
  a. Reading and literacy key points
  b. Nutrition
  c. Sleep
  d. Location
  e. Ablutions
  f. Attendance
  g. Incidents
  h. Etc
- the parent is then able to keep abreast of the child's progress and well being throughout the day
- The parent is able to pay the nursery for the child's attendance rights via the RoaSc

A Nursery can;
- Engage their children's parents in a unique and meaningful way
- Get paid for any and all relating services
- Track the wellbeing and general behaviour of their children
- Leverage certified child progress and lesson plans
- Vet and certify their staff

A Nursery Teacher can;
- Track a child's progress to maintain their progress
- Interact with nurseries and parents seamlessly

Use case 2. Schools

A school is charged with progressing a student through a predefined academic syllabus, a student is regularly tested and graded. A students progress is stored in an internal filing system and reported periodically in a progress report.

Progress reports are often generic with listed grades.

With RoaSc,

A parent can;
- assign a school as a witness to a student's RoaSc
- The school is then able to interact with the student's RoaSc, storing key points
    a. Examination and test results
    b. Fitness
    c. Extra curriculum achievements
    d. Creative achievements
    e. Perceived behaviour
    f. Perceived mood
    g. Attendance
- the parent is then able to keep abreast of the students's progress and well being throughout the day
- The parent is able to pay the nursery for the child's attendance rights via the RoaSc

A Nursery can;
- Engage their children's parents in a unique and meaningful way
- Get paid for any and all relating services
- Track the wellbeing and general behaviour of their children
- Leverage certified child progress and lesson plans
- Vet and certify their staff

A Nursery Teacher can;
- Track a child's progress to maintain their progress
- Interact with nurseries and parents seamlessly

A student can;
- View their own progress
- See behavioural insights
- Challenge themselves

Caveats and obstacles not yet considered

- Byzantine fault tolerance
  Selection of

- Taxation and other theft resistance
  No research or opinion has been undertaken or created on this subject

- Accreditation chicken and egg

  And launch time, a number of accreditation agencies would be required to get on board quickly in order to be able to award accreditations early on

- Bad actor mitigation
  Much of this could be achieved by virtue of the DLT system chosen
  However, this should be considered at design time

- Gas cost
  A master contract would be created that is responsible for deploying, setting up and assigning RoaSc's this master contract could require a fixed fee from the sender in order to pay for the initial gas cost.

  Then on, the owner would accept responsibility for gas costs in order to operate it.

  Gas costs would be minimal!

- Performance issues
  There would not be much need for performance per sei. Achievements could take days to enter into a selected DLT with no ill effects

- Emancipation
  As a matter of this white paper, I have not addressed the issue of emancipation, this could be controlled by the owner of the RoaSc in a different manner. I would not allow any interference, whatsoever, of any governmental or authoritative agency.

- Update and ongoing development
  Unlike many immutable smart contracts, transfer of functionality could be passed to newer iterations of the contracts if desired.
  A master contract would be used to deploy new contracts. This contract would automatically deploy new versions of the RoaSc.

Glossary of terms

DLT	Distributed ledger technology, also known as distributed database. Also known as blockchain
Smart contact	A type of smart block on a DLT that allows a programmatic function to be executed
Gas	A small fee is required to make DLT smart contracts work.