

Resilience Network Project White paper v 0.3a

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### **Abstract**

The ideas presented in this paper developed in response to help resolve some of the problems which will result from technological unemployment. We believe that as machines become more intelligent and work currently done by human beings become automated there will be a sharp increase in the unemployment rate as humans are laid off to be replaced by intelligent machines. We believe that intelligent machines can be leveraged to provide a basic dividend to a decentralized pseudo-anonymous group of owners as a means of providing an axillary safety-net which cannot be shut down by any government or corporation.

### **Introduction**

*“Current economic theory simply does not consider the possibility that robot labor might replace human labor as the primary source of economic growth. Only the science fiction community has taken this idea seriously.” (Albus, Path to a better world: A plan for prosperity, opportunity, and economic justice, 2011)*

The youth unemployment rate in European countries has been estimated to be as high as 62% (Thompson, 2013) and if the current trend continues the birthrate will always out pace the job creation

rate it can be expected that youth unemployment will continue to rise to higher levels. The generation of youth today face an opportunity crisis caused in part by the high cost of education, the debt load, and technological unemployment. The problem we wish to solve is technologically enhanced unemployment which works around the current paradigm of convincing human beings to attempt to compete with robots, machines, and intelligent machines in the workplace for employment. The new paradigm as part of the solution we are presenting is a world where the incorruptible intelligent machines take care of the human being rather than compete against.

### **The solution categories are political and technological**

There are generally two categories from which solutions to high unemployment are formed and chosen. The political category and the technological category. Each category of solution has its pros and cons and we do not wish to diminish any alternative solution which has a measurably positive impact on solving the problem. What we are promoting is a technological safety-net to supplement or in other words provide auxiliary power to the traditional political safety-net. If the one fails then there is technologically based resiliency and redundancy.

### **Political solutions**

Political solutions typically involve social programs which are primarily funded through taxes. These taxes at the current time are a burden which is spread out among the middle class as well as the rich but as unemployment rises the middle class predictably will shrink and the tax burden will continuously fall more heavily on those which society deems rich. These political solutions rely on a mathematical trend which at this point is not happening. In order for something such as the Affordable

HealthCare act to work it has to have funding far into the future but what if there aren't enough jobs in the future to fund this idea or many of the others? Are taxes really the only way we can think of to solve this problem and why are we limiting ourselves to relying on the government to solve it when the solution can come from technology itself?

In order for to rely on the centralized government to solve this problem we have to accept risks such as dependency centralized authorities such as politicians who can change their mind and the laws at any time and cut millions of people off, and additionally people who are rich do not necessarily want to pay for people who are poor. The government will be required to use force to try to make the rich pay for the poor which ultimately can result in a budget deadlock. This political approach shows no sign of success and long term it is not sustainable because the workforce and tax base will shrink causing fewer people to pay higher taxes. A final concern of note with this solution is the lack of privacy, where certain people receive social program benefits while others do not it creates unnecessary division. The political solutions inherit all of the problems associated with centralization such as a single point of failure, lack of privacy, dependency on centralized authority, and narrow political focuses such as on the problem of unemployment

**Some of the benefits of the technological solutions include**

- ✓ **Leverages AI**
- ✓ **Leverages the Internet of Things**
- ✓ **Leverages and embraces the technological singularity**
- ✓ **Virtual / Not limited by borders or jurisdictions**

- ✓ **Autonomous / Does not need central human authorities to run itself**
- ✓ **Decentralized / Distributed & Peer to Peer**
- ✓ **Trust-less / Minimal trust**
- ✓ **Directly democratic**
- ✓ **Potentially incorruptible**
- ✓ **Private / Pseudo-anonymous**

The technological solution has all of these pros. The benefit of decentralization is that it cannot be shut down. If we look at a government solution then when the politicians win or lose an election or when they are just in a bad mood they can decide to make irrational changes which can hurt the economic security of people who exclusively depend on them to always make the right decisions. If we look at the Affordable Care Act we can see that while it's intentions are good the website is designed in an archaic manner, is barely usable, and at any time in the future because it depends on politics (which are often based on popularity contests) it can be modified or cut by politicians.

The technological solution does not have this problem and while it should not act not as a replacement it can act as an axillary solution to provide the same services when the political solution fails due to human nature, human error, or corruption. By providing a technological solution we remove a possible point of failure and can help secure the economic fate of individuals depending exclusively on the political solution not failing.

## **Costs**

Additionally the technological solution can reduce the costs of the political solution. If for

instance Peer to Peer health insurance could someday compete with traditional health insurance then we could reduce the cost of the Affordable Care Act because Peer to Peer health insurance could be cheaper and equally effective. If we can provide in a decentralized manner something essential like food vouchers then we do not need to use the government for this purpose.

## **Privacy**

The government provides an EBT card which asks for the users ID in order to receive food stamps. This violates the privacy of the user who may not want it to be known that they receive food stamps. In this case the technological solution would be pseudo-anonymous and completely private while also capable of providing digital food vouchers backed by farmers willing to accept them. In a pseudo-anonymous environment there will be no expensive drug tests (Price, 2013) and no political litmus tests. Every participant in the technological solution should receive equal benefits in a pseudo-anonymous privacy enhanced manner.

## **Security**

Because the political solution requires an identity it creates a risk of identity theft. Identity theft has a cost associated with it. The technological solution is much more secure by design and because it is Peer to Peer it can be global from the start which bypasses all the political nonsense associated with political solutions. The technological solution cannot be shut down on a whim because it's Peer to Peer nature provides layers of redundancy.

It only requires a public key and that means identity need not be stored on centralized servers within databases. This also means your private information cannot be sold or traded around. The

increase in privacy removes the social and political stigma associated with receiving something like Food Stamps, Welfare Benefits, or subsidized Health Insurance because you're just a pseudo-nym. Medical records can also be more secure because they too could be under a pseudo-nym.

### **A summary of the risks associated with dependency on the political solution**

- ✗ The risk of human error, human failure, or simple mood changes among politicians.
- ✗ The risk of unsustainability due to a possible unexpected increase in cost or less tax revenue.
- ✗ The risk of identity theft, public scorn, or political persecution due to the lack of privacy.
- ✗ Bound by borders, the benefits are assigned by borders in an increasingly borderless economy.
- ✗ Change happens slowly, incrementally, and may be unable to keep pace with technological change.

### **Providing the basic dividend**

*“Peoples' Capitalism would generate the savings and loans necessary to finance massive new investments in modern technology and generate rapid productivity growth. And it would distribute the benefits of rapid economic growth to all. Everyone would become a capitalist. Everyone would own a share of the means of production.”(Albus, n.d.).*

All of the problems associated with the political solution can be solved by providing a technologically enhanced distributed basic dividend. To provide a basic dividend we must leverage intelligent machines and to leverage intelligent machines we must promote decentralization of

ownership of the intelligent machines.

### **Crowd funding through an exodus address or angel address**

One of the most important ways of bootstrapping or kick starting the process of development of these solutions is through the utilization of crowd funding. One successful way of doing that is to simply have an address designated as the exodus or angel address which is to be utilized as the crowd funding destination address. Anyone can send any cryptocurrency or cryptoasset they have to this address as part of the distributed fund raising campaign. The money raised by crowd funding is a loan to developers who can be paid to quit their jobs or who will get paid in shares of the crypt-entity/asset they are building. The entities who sent to that address will have transaction logged to the blockchain allowing their level of contribution to be converted to shares in the crypt-entity/asset.

### **The use of the savings address to simulate an annual salary**

A possible result of the decentralized crowd funding process is the decentralized distribution of ownership in crypto-assets. These crypto-assets can be treated like capital assets. Each wallet should have a savings address and a shopping or checking address. The savings address should be the most secured address and could be held in cold storage and / or set so that it is rate limited. The purpose of this savings address is to send a specific amount of currency to the spending address at a rate which simulates a salary. So the idea is that you can set your own annual salary in your national currency to be sent from this savings address to whichever addresses are randomly chosen from your checking address.

The necessity of this is to allow people to stretch their money over their lifetime because the majority of future incomes will come from investments rather than from what we today call jobs. Money which comes from investments may come in huge sums very fast and then trickle down to a crawl pace. This happens because typically there is an exponential growth period and then a period from which an investment profit tapers off. It may be important for some people to psychologically simulate an annual salary so that they don't burn through all their money and this type of rate limiting is built into the Bitcoin protocol under n-lock time which designates a waiting period before a transaction can be spent so that a transaction sent to self would not be spendable until some time in the future (not be spendable too fast).

### **The Pros and Cons of utilizing Proof of Work vs Proof of Stake**

If you're using cryptocurrencies you typically have Proof of Work and Proof of Stake. Proof of Stake allows for a dividend to be paid to every owner of the currency. Transaction fees would generate that dividend. The problem with this would be that the people who hold the most would get the most so Proof of Stake is not necessarily the most fair mechanism of distributing a flat dividend.

Another variation on the example would be to set it up so the subsidy goes to every owner of a specific key. This way with the public key of each user you could now distribute the dividend on a per public key basis and through this mechanism you could actually give an equal proportion of the dividend to every owner. This actually would work about as well as the government tax and spend model we have now with the transaction fee going to every non-anonymous user of the currency and as a side effect it would also encourage every user of the currency to have a permanent pseudo-anonymous identity.



A combination such as the above example which combines cutting edge technology in a decentralized and private manner would work even better. The individuals who receive welfare or who receive universe healthcare would never be identifiable because the basic income would go to everyone who can provide Proof of Ownership of some nominal amount of the cryptocurrency/crypto-asset and Proof of Identity.

So for instance you have your cryptocurrency wallet with whatever currency unit amount in it. You have a public key which allows for one specific identity to claim ownership of that specific wallet. If that wallet passes a certain threshold amount then it meets the minimum threshold to receive the dividend. Their public key is then connected to dividend paying shares which uses private sector mechanisms to pay dividends based on transaction fees to every shareholder. Shareholders would have to be real people, to make sure some people aren't trying to game the system the dividends can only be redeemed at an exchange which follows KYC guidelines.

### **Proof of Burn as an alternative to Proof of Work and Proof of Stake**

In addition to Proof of Work where computation is used to produce consensus and mine coins, and Proof of Stake where holding coins is rewarded with the generation of new coins, Proof of Burn avoids the environmental and economic hazard of Proof of Work while also solving the hoarding and dumping problem associated with Proof of Stake. In the case of Proof of Stake dividends are paid to whoever holds the greatest stake in the form of new coins while with Proof of Burn coins are continuously destroyed which can result in a stealth dividend which rewards all who hold the remaining coins.

**Types of dividends (there may be more types, feel free to give input here)**

For dividend types you have flat static dividends, flat dynamic dividends, hierarchical static dividends and hierarchical dynamic dividends. To further define them we can assign it as:

**Type A dividends:** Flat static dividends

**Type B dividends:** Flat dynamic dividends

**Type C dividends:** Hierarchical static dividends

**Type D dividends:** Hierarchical dynamic dividends

A flat static dividend is a fixed percentage of profit within a profit sharing contract which every owner receives an equal portion of. There is no economic hierarchy so there is no accusations of it being a pyramid scheme which benefits early adopters more than late adopters. There is a fixed number of slots and every user who enters into the slot before all the slots are filled will get an equal share of the profit generated.

A flat dynamic dividend is a dynamic percentage which can change over time or is voted on and changes but it's still flat. There are a fixed number of slots to be filled and every user who takes a slot or a seat at the round table before the seats are filled will be an equal. If they vote to raise their percentage of profit to go to the dividend they can or they can vote to lower it but everyone gets a vote and the percentage is equal for every owner.

A hierarchical static dividend is a dividend which pays a fixed percentage according to where you are sitting in an audience. So if it's a concert or sporting event some individuals have better seats

than others because they arrived earlier. The early bird gets the worm in this case and is richly rewarded for doing so. This mechanism can sometimes be viewed as a pyramid scheme or mistakenly viewed as a Ponzi scheme but in certain scenarios where you want risk takers to be rewarded then being early can matter. In this case all the risk takers will get a fixed percentage of the profit forever.

A hierarchical dynamic dividend is a dividend which pays a dynamic percentage of the profit which can change over time through something like Proof of Stake voting. Proof of Stake allows a software protocol to determine who has the greatest stake and then allow them to vote on what percentage of the profit should go to dividends. This form of voting allows for great flexibility among stakeholders but if a few hundred people own 30% of the crypto-equity then they get 30% of the dividend as well. This is good in some ways but it opens the ownership up to the accusation of being greedy.

### **Transaction fees can be used to pay for dividends**

But there are different kinds of transactions. Some transactions are small, some are large, some are recurring/subscription, some are not. But Bitcoin for the most part utilizes the same transaction fee indiscriminate of the transaction type and it is up for debate whether or not this fixed fee will be sustainable once mining revenue decreases as no new coins are generated (GodIsLove, 2013).

### **Types of transaction fees (there may be more types, seeking input here)**

**Type A transaction fees:** fixed sized fee hard coded into the client

**Type B transaction fees:** dynamic fee which adjusts according to transaction size

**Type C transaction fees:** dynamic based on voting mechanism.

**Type A transaction fees: fixed size transaction fees where every transaction pays the same fee are not sustainable**

Anyone who has experience using the Bitcoin client would know that the most recent update specifically addresses the fact that the volatility of Bitcoin has resulted in the cost of transaction fees rising in terms of \$ amount. This is a problem because Bitcoin is marketing itself as having lower transaction fees than Western Union. The Bitcoin protocol is designed so that after the 21 million Bitcoins are produced the mining is to be subsidized by transaction fees. The problem is that these transaction fees are voluntary, and all transactions are treated as equal.

This makes sense technically speaking because it's nearly free to process and transfer information and the cost of that processing is very cheap. Mining on the other hand is not cheap and currently is not profitable for the majority of human miners (system administrators) who had to purchase ASICs but due to seemingly exponential rising of difficulty are unable to recoup their investment. While the virtual worker does not care the human being has bills to pay and when the return on investment does not exist or is too low the human being will find something else to do. It is known that the Type A transaction fee model cannot scale and is not sustainable. Type B and Type C transaction fee models are sustainable.

**Proof of Burn and the potential for flat dynamic stealth dividends through coin destruction**

Proof of X works because X is sacrifice. X could be a placeholder for time, for computation, for

money, but perhaps a more precise definition is that Proof of X relies on the sacrifice of something of value. Proof of Burn relies on the sacrifice of coins rather than on computation. To understand why Proof of Burn may be necessary to implement we must first accept the fact that Bitcoin, Litecoin and other cryptocurrencies are inflationary and that this inflation (some cases as high as 20%) act as a sort of stock dilution or demurrage. If we think of owning Bitcoins like owning shares in a stock then 1 Bitcoin would be a share out of the 21 million cap. Because Bitcoin is inflating as miners generate new coins (and this may be useful as a way to market and distribute the coins), the value of the “stock” if we stick with that analogy is diluted. If it's Proof of Stake / Proof of Work hybrid then mining wastes valuable CPU resources on a useless task while Proof of Stake continuously inflates and dilutes the stock in order to provide a dividend.

Under certain conditions where demand is far greater than supply then even if Bitcoin or Peercoin are inflationary and the proportion you own decreases as the pie gets larger it's economic effects are hidden by the demand. It is for this reason that most people believe that Bitcoin is deflationary when in reality it's inflating at a predictable rate. Proof of Burn on the other hand is deflationary.

### **Proof of Stake voting as a means of initiating deflation through Proof of Burn**

Imagine a scenario where coin holders are allowed to vote on the rate of burn? This could be possible through a Proof of Stake vote where the shareholders/coin holders agree to switch Proof of Stake from being in coin generate mode into coin burn mode. In coin burn mode everyone who holds coins will have these coins burn similar to demurrage but instead of coins being redistributed like for Freicoin these coins would be destroyed. This feature would allow the coin holders to adjust the rate of

deflation in response to the environmental conditions they face in such a way that they would be able to control the rate of deflation and provide a stealth dividend to all coin holders in the process.

So if the burn rate is set and initially you have 10 million coins at the start of the year, you could have 8 million coins by the end of the year. If the demand for these coins stay the same or increase then the price will definitely increase. This is a stealth dividend which works by increasing the buying power through coin destruction and this is possible because cryptocurrencies are nearly infinitely divisible which means all that matters is the proportion of the pie that you hold and not how many units.

So if we use Bitcoin for example and we start out at 21 million coins then you can burn all the way down to 1 million coins, to 100,000 coins, it wouldn't matter because the proportions would stay exactly the same no matter how much you burn down. If you had 10,000 Bitcoins out of 1 million and those coins are inflating then your proportion is diluting which means your buying power is shrinking, but if you have 1000 coins out of 1 million and coins are being destroyed rather than generated then you still have the same proportions because the burn rate burns 1% of every holders coins at the same time. The proportions stay exactly the same for those who hold the coins but for those who want to buy there are less units to buy so the price goes up theoretically acting as a stealth dividend.

It must be said that this works better when the price of a single coin is considered relatively cheap than if the price of a single coin is thousands of dollars. In the case of Ripple for example where an XRP is 0.02 cent, and there are 1 billion Ripples, if Ripple wanted to provide a stealth dividend they could do so simply by adjusting the destruction or burn rate of XRP. If millions of XRP are burned every year then the price of XRP will rise each year and because XRP is considered extremely cheap

and there are 100 billion there are enough Ripples to burn them for decades. If and when Ripple is adopted by millions or billions of people then the burn rate can be accelerated or adjusted to provide a dividend by deflation to every holder of Ripple.

### **Attraction by incentive rather than coercive force (Incentive-centered design protocol)**

The political solutions typically rely on one group trying to force a behavioral pattern on another group. Taxes are not voluntary and require a Robin Hood strategy. Taxes are also seen as a punishment rather than a reward and the more money you make the higher the tax. Transaction fees are essentially a tax on the use of the Bitcoin network and that tax is used to subsidize mining. If the fee isn't high enough then the network cannot scale as easily, cannot remain decentralized as easily, and is less secure. As a result of this it is necessary under the Proof of Work scheme to pay the tax to the network of miners who process transactions and generate new coins because over time there will be less and less coins to generate and mining itself will become unprofitable. If mining becomes unprofitable it may become less decentralized and more vulnerable to a 51% attack.

The purpose of an incentive-centered design protocol is to encourage by incentives rather than to adopt the political method of threatening with jail time. The use of a social contract can be encouraged by cultural norms, incentives, and the human need to want to be a part of a community. To be a part of a community also means to give back to that community. If a community has certain principles then those principles and it's membership who believes in similar principles have to be supported in the social contract which can be enforced by peer pressure, tradition, culture, social norms, in the same way that people typically want to avoid scams, pre-mined coins, overly centralized unfair markets are not seen as desirable.

The incentive-centered design protocol should be built into the design of the social contract, the software, the design of every aspect so that every individual member can be richly rewarded for their efforts while at the same time become a benefit whichever virtual community or set of virtual communities he or she agrees with.

### **Miners are virtual workers**

Artificial lifeforms otherwise known as a-life can be useful to describe the concept of mining. The artificial workers in the Bitcoin Proof of Work for instance are computational processes which are simulating the role of a gold miner. Just as you can have artificial lifeforms which simulate the role of a gold miner, you can also have artificial lifeforms which can simulate the role of any other kind of laborer. The Proof of Work protocol is designed so that the artificial miner virtual lifeforms are presented with problems in the form of puzzles which must be solved.

These puzzles are cryptographic hashes which become progressively more difficult to solve as more virtual workers join in the effort to solve it. It acts in this way because it is designed to mimic the behavior of precious metals such as gold and is modeled in such a way to limit the inflation rate to a predictable rate and cap the overall amount at approximately 21 million Bitcoin units.

So in the case of Bitcoin we have a protocol which models itself after nature to produce precious numbers and which uses the principles of artificial life or a-life to design an precisely defined unit of account architecture. This architecture is now in the process of being extended further with the concept of colored coins which can mark or tag every single Satoshi. A Bitcoin is approximately



100,000,000 Satoshi and there are 21 million Bitcoins.  $21,000,000 * 100,000,000$  would equal to the maximum number of units in the Bitcoin protocol. What must be remembered here is that Bitcoin is not best defined as a currency but as a distributed protocol which acts as a public ledger modeled after a currency. The same way virtual workers, artificial life, and precious metals could be simulated and modeled to produce a virtual object/commodity of value what is of great importance are the concepts behind the protocol.

### **Modeling of natural and unnatural structures to leverage artificial life (Biomimicry)**

The use of colored coin conceptual metaphor can allow for the Satoshi to become a stock, a bond, anything. The focus of future innovation should be in expanding the conceptual metaphors, the use of artificial life, with new innovative models which can simulate more advanced and more important functions than merely a coin or a stock. What we have is a blank canvas from which you can create any kind of financial instrument so long as the incentives are aligned right to attract human beings. Any naturally occurring structure can be modeled in code and combinations which do not occur in nature can be modeled to solve any problem in code. So the concept of a bee hive which pays dividends to every pod.

### **Blending naturally occurring structures with unnatural occurring structures (Biomimicry based hybrid social structures)**

A bee hive is a naturally occurring structure. It is from the nature of the bee that we have the bee hive and the honey. A corporation is an unnatural structure and it is the law which created the corporation. Corporate person hood is the blending of the unnatural structure with a natural structure.

The concept here is that the corporation is now an artificial life form, and there can be a parent and child corporation. Protoshares is an example of blending natural and unnatural structures. The distributed autonomous corporation (Invictus Innovations Incorporated, 2013) is modeled loosely after the behavior of the real life distributed autonomous community, yet it also models itself after a corporation because it is through owning Protoshares that you can own all DACs in the Invictus Innovations family tree of DACs. In this way the root of that tree is the Protoshares which guarantees a proportional percentage of ownership in DACs created by Invictus Innovations. DACs are intended to be artificial lifeforms which decentralize and distribute the corporation so that it can inherit the benefits. The concept of the DAC is a good example but it is limited because it does not go far enough in decentralizing the stakeholders and ownership.

### **Decentralized ownership of intelligent machines (decentralized ownership of smart property)**

*“The survival of man depends on the early construction of an ultra-intelligent machine. In order to design an ultra-intelligent machine we need to understand more about the human brain or human thought or both.”* (Good, n.d.)

I.J. Good made the statement that the first ultra-intelligent machine will be the last invention of mankind (Good, n.d.). The concept of technological singularity, or super-intelligence both are related to the concept of ultra-intelligence. As we build toward the direction of ever more intelligent machines we must also do everything we can to decentralize ownership. Concepts such as distributed autonomous corporations, distributed autonomous applications, distributed autonomous agents, are some of the game changing concepts which when applied appropriately can result in a decentralization of the ownership of intelligent machines.

To facilitate the decentralization process we can use metaphors to help explain it. We can use the language which includes metaphors of such as shares, dividends, stocks, bonds, crypto-equity, crypto-subsidies, transaction fees, demurrage, coins, vouchers, points, credits, stamps, tokens, stakes, or anything else which is necessary to decentralize ownership of the intelligent machines.

A distributed autonomous corporation can be owned by 100 individuals and even if it's great conceptually it would benefit too few people. For example currently around half of all of the 12 million+ mined Bitcoins as of 2013 are owned by individuals (Wile, 2013). This situation is acceptable provided that there is opportunity for growth and that eventually those who hold those Bitcoins spend it. This is not a technical problem but a public perception problem. The perception is that fewer people are able to benefit if the stakeholders are overly concentrated into the hands of too few people than if it is more widely distributed. This can negatively affect the perception of fairness in the system and this negative perception is a potential risk which can be mitigated through diversification (altcoins with new blockchains and different ownership distributions).

The Internet of Things is expected to grow from 1.9 billion devices today to 9 billion devices by 2018. In the future the majority of workers and of transactions will be thing to thing, machine to machine, robot to robot, rather than person to person. DACs will transact with DACs. This trend may trigger a paradigm shift away from the human labor based system.

Protoshares are backed by the goods and services of Invictus Innovations which is honorable as a corporation but the single point of failure would be based around whether or not they uphold their social contract to redeem Protoshares. Social contracts currently do not have legal enforcement so this

too represents a potential risk. This risk can be partially mitigated by surety bond functions, collateral, and other yet untested means but ultimately legal means may be a requirement in order for the social contract mechanism to work. The jury is still out.

One mechanism which could be beneficial would be to have community owned DACs (decentralized autonomous communities). These DACs would be owned by a specific group to solve a social purpose rather than merely to profit. So if we look at an organization \*fill in the blank\* then they could have it set up so that their members own 50% of whatever the virtual community owns. The virtual community could for instance provide a dividend to every member using the same social contract that allows for something like Protoshares to provide a dividend to any owner of it. If we use \*fill in the blank\* as an example then every member of \*fill in the blank\* would be required to provide Proof of Identity so that it can be verified that they are a real person and this can be accomplished through know your customer. It would also have a side effect of incentivizing individuals to have verified wallets because those wallets would qualify to receive dividends from all \*fill in the blank\* community owned DACs.

### **Decentralized ownership of smart property, sensors, smart spaces and the Internet of Things**

To illustrate the concept of a smart space we can start with a smart property such as a smart house. That house has a human owner and that human owner theoretically would also own the private key giving him or her complete ownership of autonomous agents inside the house. Inside of a smart space you may have human beings living with autonomous smart devices which communicate amongst each other. These smart devices run autonomous agent applications/programs and an autonomous agent is a self directed intelligent application operating on behalf of its owner in this case.

A smart house for instance may include all sorts of devices such as smart televisions which shut themselves off when the owner is not in the room or not awake, LED “LiFi” (McKendrick, 2011) light bulbs which have a dual function as visible light communication devices for the Internet of Things, and of course cryptocurrencies which provide for a unit of account mechanism for human to device and device to device communication. Simultaneous audio video transmission has been achieved utilizing visible light communication (Son, Cho, Moon, Ghassemlooy, Kim, & Lee, 2013) which could allow for a distributed broadcast capability without the use of WiFi signals for instance but this visual light communications channel could also transmit transactions.

The idea of paying micro transactions to the toaster to make toast while having the profit be distributed as dividends to the shareholders who own the toaster, the refrigerator or the oven might sound absurd but the Internet of Things in combination with cryptocurrency based micro transactions make it possible today for humans to pay devices. The smart space itself could have it's own currency that it operates under and these devices will be able to each have wallets of their own, secure profits of their own to pay for their own upgrades and maintenance, or to pay human beings and other devices for services. The car itself could charge every passenger a micro transaction to pay for gas. If you set the car to drive itself it could charge the driver a micro transaction fee.

The car itself could pay for gas while it's driving in autonomous mode without the human being having to do it and if it's an electric car then the car could sell it's electricity to passengers who use it. The ability to transact in micro payments allows for every activity done by man or machine to have it's cost accounted for. It also allows for a group or community to own a set of devices and receive a dividend when those devices are used.

Sensors throughout a smart house can provide information to the owner of the house as well and these sensors could reveal information about the usage of every device in the house. Every time the stove is turned on, the refrigerator service is used, all these transactions could be logged, charted, graphed, analyzed, and any unusual usage patterns would be detected. Through personal datamining (Gorodetsky, 2013) the smart space itself could even learn to remember the typical usage patterns to know when the owner is in the house or if something might be wrong.

### **Distributed ownerless autonomous smart devices, sensors, smart spaces and the Internet of Things**

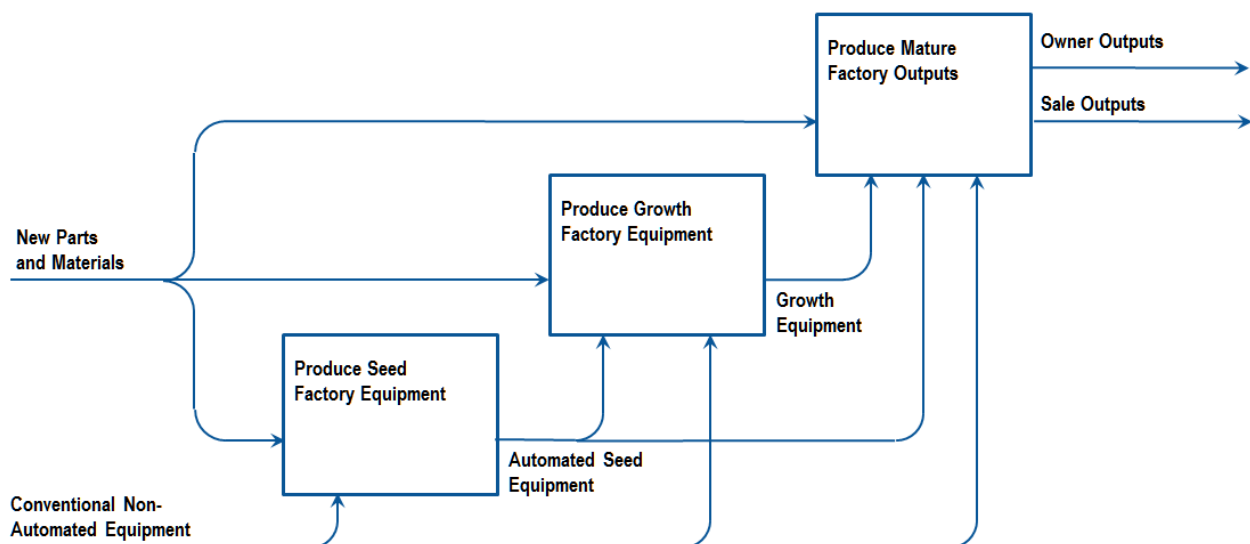
Just as some smart property will have owners there is also the possibility of having devices which have no individual owner. The device would own itself, pay for itself, and pay humans to maintain, service, upgrade, repair itself. In the case of something like Bitcoin you would say that the people who own the majority of the Bitcoins own it if voting were conducted via Proof of Stake. If we are talking about a DAC then we could say the DAC could be owned by a group of people or even by another DAC.

An ownerless autonomous device is autonomous, self owned, and uses human beings in a symbiosis in which human beings gain some value from it either by being paid by it or from its intrinsic value and it profits as a way of increasing that intrinsic value. An example of something like this could be a distributed autonomous smart energy grid which provides the electricity for a town so that the entire town must depend on it but it has no owner and it is solar powered. It's not a DAC because it's not a corporation, its profit are strictly to keep it alive and running.

### Fully automated distributed production network of factories (autonomous manufacturing)

Perhaps one of the biggest breakthrough solutions of all will be the construction of a fully automated distributed production network of seed factories ("7.0 - Distributed Production Network," n.d.). Ownership in these distributed automated factories can be decentralized and if the shareholders of these automated factories are distributed widely and diversely throughout virtual communal space it is possible to provide the shareholders with a currency backed by the output of these factories which can be traded on a decentralized exchange built on top of the Mastercoin protocol or using colored coin functionality. It is also possible to have ownerless autonomous seed factories which provide for any human being in need.

Figure. 1



*Note.* Descriptive imagery from Dani Edner's "Personal Factory"

## **Community oriented DACs/Open Value Networks defined**

A community oriented DAC is any DAC which agrees with the principles of the community it is a member of and which adopts a social contract which promises to the delivery of a agreed upon or voted upon percentage of the profit achieved by that DAC. The distributed autonomous person if it is to be considered an artificial life form can purchase membership within \*fill in the blank\* by paying the membership fee and receive a \*fill in the blank\* cryptographic-stamp. That membership fee would be a percentage of ownership of the DAC itself and would translate into a percentage of the profits. The higher the percentage, the more voting rights that DAC should have as a direct sponsor of the \*fill in the blank\* community and direct contributor to the resiliency of \*fill in the blanks\* 's economic health. DACs which obtain the highly sought after \*fill in the blank\* stamp should be prioritized within the \*fill in the blank\* community.

## **Decentralized decision support systems protocol layer (Decision making, voting)**

This protocol layer will leverage artificial intelligence, DACs, and intelligent machines to offer decision support systems as a service to the user. Decentralized decision support is a way to help a community make mission critical decisions based on the best available information. It can leverage prediction markets, user-contributions and open source intelligence. Ownership without good decision making can lead to very negative outcomes.

This decentralized decision support layer should also include a voting mechanism. The voting mechanism must be coercion resistant. It must be cryptographically secure. It can achieve greater security by not putting too much weigh or reliance on any specific technology and by using



technologies developed for one intended purpose for a dual use. Another mechanism of security is the use of multiple secure channels under the assumption that while all secure channels can be tapped it is unlikely that a single adversary will be able to tap them all at once (Clark & Hengartner, 2012).

Additionally, delegated voting must be built into the protocol from the start. Assume the use case scenario of an individual who is kidnapped or arrested, if he has delegated his Proof of Stake vote in advance then his vote including his voting power could be cast on his behalf even if he is sitting in prison. This capability would guarantee that voting rights could not be revoked even in the case of arrest, kidnapping, or demise. Delegated voting adds a redundancy to the system as well as a dead mans switch capability so that the votes cannot locally be stopped through coercion or political persecution.

**(More on coercion resistant code based voting protocol later)**

**Reality augmentation and alternate reality gaming protocol layer (Needs input from others)**

The correct way to describe the Resilience Network Project to the layman is to describe it as a serious game. It's a serious game which starts out on the Internet as a movement and then as it develops it should produce from it solutions to economic problems. We solve these problems in the context of an alternate reality game which uses metaphor and story-telling to explain and frame the technological concepts. Reality augmentation can assist journalists in telling and framing the story lines (Pavlik & Bridges, 2013) which should be based on real world economic events in some cases. This would in effect be a trans-media augmented reality based protocol layer which utilizes mechanisms of gamification to increase user interest and participation.

For instance the concept of a cryptographic badge system potentially adds both a certification and gamification layer where user contributions can be rewarded by status. This status could be a sense of immortality, fame, prestige, special privileges, additional economic benefits, but in order to unlock these badges the user must earn them. So while the basic layer of the system gives everyone the most fundamental economic benefit or basic dividend, the higher layers of the system should allow even greater rewards. Bonus points could be earned through completing a bounty and those bonus points could be redeemed for the purchase of certain badges. Other badges cannot be purchased and have to be earned. Some badges will come by luck. Some will can only be given when a certain amount of others trust the individual.

The gamification layer can serve many different functions and facilitate features such as:

- ➔ Distributed pseudo-anonymous reputation through badges, titles, reviews, tagging, tipping, moderation and more.
- ➔ Distributed autonomous reward distribution (bonus points, contests, bounties, tournaments, and more)

The purpose of the gamification layer is to motivate the user to take an active participatory role, to provide a sense of community, to promote continuous development which can initially be crowd funded and then fund itself. **(More will be elaborated on this layer at a later date)**

And it should go beyond just badges. The purpose of the reality augmentation and alternate

reality gaming / gamification layer of the protocol is the positive virtualization of the real world. The virtual world does not have the limitations of the real world and while you can model a virtual object after a real world object, a creative person could easily invent a virtual object which could not exist in the real world and create completely new forms of human organization and communication as a result.

In the DAC example that is a combination of a natural and unnatural structure but it's still based on the concept and legal structure of a corporation in the real world. The reality augmentation and gamification layer could model a completely alien structure. That alien structure could go far beyond the concept of a DAC, but still maintain the fundamental principles behind a DAC. If we think of virtual structures as a type of architecture then the DAC is very much an orthodox structure based around a political or legal concept which very much was created from and modeled from the world as it is today.

The purpose behind creating the reality augmentation and alternate reality gaming layer protocol would be to allow a team of artists, philosophers, writers, economists, mathematicians, and designers to all come together to create alternative virtual architectures, schools of thought, conceptual metaphors, mathematical models, while maintaining the fundamental principles. This layer is mainly to unleash creativity toward solving problems leveraging game mechanics.

Some software architecture for example is modeled after the behavior of insects, or the animal kingdom. Martial arts were modeled after the animal kingdom. The concept of stealth used in the stealth bomber or the concept of camouflage both were modeled after the animal and insect kingdom.

A when dealing with augmented reality, alternate reality gaming, and agent based artificial

intelligence and autonomous application is maintaining human values and principles. Informed consent is critical in the design of such systems, and the user must always be in a position to give or revoke their consent. It is also important that these alternate realities, augmented realities, virtual systems and architectures do not select the moral compass of the users but instead help the user to define their moral compass and decision making strategy and then provide a decision support layer so that the user always knows that the system is the system they themselves chose.

**A creative biomimetic approach to problem solving, unconventional heterarchical virtual architectures and protocol designs (creation of a robust protocol development kit, reference manual, and conceptual tool kit.)**

**(more on this at a later date)**

Most organizations in our society are hierarchical pyramid structures with a CEO or President at the top, managers directly beneath them, and senior and junior workers beneath them. This hierarchical structure is prone to corruption at the top allowing for a single point of failure. The path of least resistance algorithm also known as Dijkstra's shortest path algorithm is an example of taking a biomimetic approach to problem solving.

To illustrate if you look at an ant colony or the behavior of biological organisms like humans you will find that human travelers or ant colonies typically take the path of least resistance. This also applies to water and electricity which also take the path of least resistance to meet their target. The Dijkstra's shortest path algorithm or Fermat's principle both describe the same natural phenomena from a slightly different angle. The knapsack problem is an example of a very common resource allocation problem which can be solved by dynamic programming for example.

A decentralized protocol cookbook of these sorts of problems and algorithms are essential to forming a protocol design and development toolkit for building unconventional virtual architectures. Almost any solution can be found from a deep study and analysis of nature. The sort algorithm is a common example where you have to order a list of objects. The easiest illustration of a biological version of the sort algorithm is ask the participant to pick up a deck of cards, look at each card and mark it as being read, and then if it's a high number you move it to the top of the deck, repeat this process for each card until all have been read then put the deck aside as having been sorted. Any human being instinctively uses this sort algorithm on a daily basis, as well as the path of least resistance algorithm but for computers we must take the actions human beings do in ordinary life, turn them into algorithms and then translate those algorithms into computer code.

Ant colony optimization algorithms are also very common solutions for routing algorithms. I will not go into detail about the specifics of these algorithms but this is an example of a natural biological structure (the ant colony) being translated into an algorithm which finally gets turned into source code to become a useful protocol. Since the premise of any protocol design is to start with a problem, the best algorithm is the algorithm which most efficiently and effectively solves the problem and in many cases nature has solved at least certain parts of these problems.

If we looked at peer to peer and distributed finance these are solving problems by decentralization which takes advantage of the fact that we are becoming hyper connected as a species. These peer to peer and distributed network protocols leverage hyper connectivity to solve problems. We should also look to leverage intelligent swarms, the shrinking size of computing and sensors, the coming shapelessness of infrastructure which used to be big and clunky. In a hyper connected world no one would have a reason to go to a bank, wait in line, speak to a teller, or any of this. To do that would

be going against the principle of taking the path of least effort, least resistance, and it makes no sense to build technologies which try to put the genie back into the bottle while asking people to go to centralized institutional structures when the institution can be distributed, decentralized, and dispersed to the point of being anywhere at once.

The bank could be in the cloud, in the air, traversing along the waves of the electromagnetic spectrum or it can be in a fixed centralized location where it's easy to attack, easy to corrupt, whether by bank robbery, terrorist attack, or greed. If the bank becomes an autonomous artificial intelligence then it's location is where it's code is copied. The bank is open 24/7 because it does not have to sleep, and since the teller is an artificial worker (or human but virtual) they don't have to sleep either because if it's an artificial worker then it's artificial intelligence running where there is electricity and if it's humans but distributed around the globe then since they don't all sleep at the same time it is effectively open 24/7. This is not possible to do with a centralized localized bank.

At the same time while we must build cook book and tool kit of useful algorithms for the purpose of building much more efficient and better virtual architectures we also should start building up a collection of useful algorithms to solve the specific problem of providing resiliency. This could take the form of providing a basic dividend, it could mean a fee for the use of autonomous agents, or it could be something else, but primarily it is a matter of finding the best algorithms and documenting their success or failure of these algorithms in experiments. This will have to be an ongoing area of research and an open repository should be constructed specifically for this purpose.

**Always on, always open source, always transparent, always free (in this section we list some principles which guide what we are trying to do)**

For security reasons the software should always be open source, open peer review, open to auditing, and the design of any software based on this white paper must promote freedom, security, democracy, decentralization, for the user. The software in effect exists to serve the needs of the user,

Human beings are usually the weakest link and human error is the easiest target for hackers or governments to exploit because it's sure to appear anywhere humans are involved. Error tolerant protocol design is essential to any long term solution with the assumption that humans will make errors, or be corruptible, but the protocol/system has to withstand that. Part of the necessity for decentralized designs is to provide for fault tolerance mechanism and it is an example of a human error tolerant design because at least it assumes that if a human being rises to the top of a hierarchy the odds are high that the power they achieve will ultimately lead to their corruption.

It also assumes that humans in power can make mistakes or abuse their power and that it is desirable to avoid giving unnecessary power. If a problem can be solved without empowering human beings to potentially hurt other human beings then it should be solved that way. Behavior shaping constraints are a technique which can be used to provide error tolerant designs.

If we remember Murphy's law then we know that anything that can go wrong will. If we assume the worst but hope for the best we can mitigate a lot of risks.

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