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Systems Science CCHANGE: Currency of Collaborative Health Ambitions Netting Greater Equity

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ABSTRACT: CCHANGE is a system designed to create opportunities for preventative health care and new financial options. The system incorporates a digital currency (backed by healthy behaviours) with a unique set of rules to control for the supply and demand of the currency. The currency (CC's) is created by participants completing approved, digitally recorded, health-related tasks (miles on a treadmill, purchasing local organic vegetables, automatic recycling machine) in exchange for deposited CC's in a CCHANGE banking account. Participants are free to exchange the currency for any goods and services from other participants. To control for the amount in circulation, the currency loses value under the following circumstances: per exchange and if it remains idle for a period of time.

KEYWORDS: Systems Science, Preventative Health Care, Currency, Digital Currency, CCHANGE, Healthcare.

I. INTRODUCTION

Is it possible to start a domino effect of motivation to actively participate in preventative health care? Health care costs in the United States have consistently been on the rise. According to a recent publication, since 1999, health care costs have been growing faster than the national income [17]. Most of the costs are incurred from illnesses and accidents that can be reduced. If illnesses and accidents were eliminated, the health care costs of a society would theoretically equal zero [16]. According to the Centers for Disease Control and Prevention, preventable diseases account for 70 percent of all diseases that Americans are afflicted by [4]. Consequently, implementing initiatives that target preventable diseases will have a significant impact on our health care costs and the overall health of our nation. In addition, an increased opportunity for preventative health is relevant and needed within the current health care system as a potential to not only reduce health care costs; but also improve overall health and wellbeing of the population.

Incentives are effective motivators for behaviour change. According to Gneezy and colleagues, the basic law of behaviour states that higher incentives will lead to more effort and higher performance. Consequently, people are more likely to adopt a behaviour or lifestyle change if the incentive is substantial enough [19]. Historically, money has been a significant motivator for many human behaviours. Unfortunately the types of behaviours that are motivated by money often compromise the health of people and the environment.

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It is not uncommon for businesses to sacrifice the health of the consumer in order to keep up with the competitors. Farmers sacrifice the health of the consumer by using chemical pesticides, genetically modified seeds, hormone injections, and other modified farming practices to produce more product. Food industries sacrifice the health of the consumer by adding sugar, removing fiber (to feel less satisfying), adding caffeine, or other addictive substances to maintain loyal customer patronage. Consequently, the abundance of products create additional waste that is occupying landfills and contaminating the soil and water supply. Furthermore air pollution from industries and other by-products not only effect the respiratory system of individuals; but also effect the entire ecosystem. Additionally, with the advancements in technology, we have eliminated multiple opportunities for exercise in the work day.

Public health programs attempt to target many of these concerns and they have shown some success on a small scale; however how can public health programs compete with such a strong motivating factor; money. Competitive markets create effective social systems to motivate a strong economy; however in its current state it desensitizes the need to take responsibility for the health of the consumer and the environment.

Is it possible to have a competitive market that supports and encourages preventative health care of consumers and the environment? If we take all of the current health initiatives and unite them with one motivational tool that historically has proven to be a successful motivator (money), there is a chance that CCHANGE (Currency of Collaborative Health Ambitions Netting Greater Equity) has the potential to take on that challenge.

Money only has value if we believe it has value. Therefore, anything can become money as long as we are willing to exchange goods and services with it. In the past, we decided to value a substance in the ground (gold) and agreed to have it represent money. Later, we realized that enough people valued the money in circulation that we no longer needed to back it by gold. Rather than being backed by gold, or a promise/notion; CCHANGE currency would be backed by healthy behaviours.

Technology advances give us the tools to create this new currency. The Internet allows us to access the world and new technology allows us to explore multiple monitoring and tracking devices. We have the ability to monitor multiple types of health-related behaviours including: exercise, food purchases, recycling, carbon footprints, blood pressure, blood sugar, urine data, etc... Additionally, advancement in security systems would allow CCHANGE to be structured similarly to a bank.

Global CCHANGE is the platform for the invention. The mission of Global CCHANGE is to unite all health initiatives with a universal motivational tool, increase opportunities for preventative health care, and provide new financial options. CCHANGE is the digital currency of Global CCHANGE.

II. RELATED WORK

Other digital currencies have created a market in the last few years. Figure 1 compares CCHANGE to Bitcoin; the most common digital currency at this time. Some of the advantages of digital currencies like Bitcoin have been found to be freedom of payment, more user control, faster, and safer transactions [29].

Participants generateCCHANGE by completing a health-related activity (that can be digitally recorded). Bitcoins are generated by virtual mining. Bitcoin mining is determined by completing mathematical problems. Once Bitcoins or CCHANGE are available, participants are free to exchange goods and services with the currency. Once Bitcoins are generated, they exist indefinitely. Once CCHANGE is generated, it losses value per exchange and after remaining idle for a period of time. CCHANGE must continuously be generated. Bitcoin will no longer need to be generated once it reaches a set number in circulation.

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Digital Currency	How it is generated	Amount in Circulation	How it is controlled
CCHANGE	<ul style="list-style-type: none"> From participants: Selling goods and or services in the CCHANGE market By creating it: Completing a health promoting behaviour from a list of designated data collection options. [18]. 	Pending implementation [18]	<ul style="list-style-type: none"> Participants bring it into circulation Loss percent over time Loss percent for being idle [18].
Bitcoin	<ul style="list-style-type: none"> Earned and used as payment for goods or services. Purchase Bitcoins at a Bitcoin exchange. Exchange Bitcoins with someone near you. Create Bitcoins through competitive mining[2] 	13,345,850 [5]	<ul style="list-style-type: none"> Bitcoin is controlled by all Bitcoin users around the world [2]. Limited number of Bitcoins will be generated. Users need to use software that comply with the same set of rules for Bitcoin to work.[11].

Fig. 1.Comparison of CCHANGE and Bitcoin(2014)

Additional digital currencies related to Bitcoin include: Namecoin, Litecoin, Peercoin, Mastercoin, Primecoin, and Dogcoin. Figure 2 compares how each coin is generated, the amount in circulation, and how it is controlled.

Digital Currency	How it is generated	Amount in Circulation	How it is controlled
Namecoin	<ul style="list-style-type: none"> Earn Namecoins from mining them Earn Namecoin from trading them.[23] 	9,993,300 [5]	<ul style="list-style-type: none"> Controlled by owners, users and miners of the coins Limited number [23]
Litecoin	<ul style="list-style-type: none"> Earn Litecoins through competitive mining Buy Litecoins from a list of designated places Buy Litecoins in person from a local person in the community[20] 	32,680,738 [5]	<ul style="list-style-type: none"> Controlled by users, miners and owners of Litecoin Limited number [20]
Peercoin	<ul style="list-style-type: none"> Earn Peercoins through competitive mining Buying Peercoins from a miner Exchange other cryptocurrencies such as Bitcoin for Peercoins [24] 	21,791,642 [5]	<ul style="list-style-type: none"> Controlled by owners, users and miners of the coin Limited number [24]
Mastercoin	<ul style="list-style-type: none"> MSC were generated as a result of a public fundraiser in the style of Kickstarter.com Can be obtained by trading in Bitcoins [21] 	563,162 [5]	<ul style="list-style-type: none"> Cannot be mined. Limited number [13] 1 BTC in exchange for about 100 MSC [21]
Primecoin	<ul style="list-style-type: none"> Acquired through mining Primecoin exchange and trade for other currencies [25] 	6,964,105-7,495,849 [5]	<ul style="list-style-type: none"> Controlled by owners and users of the coins globally Limited number [25]
Dogecoin	<ul style="list-style-type: none"> Buy or Trade Through mining By tipping [10] 	93,864,070,027 [5]	<ul style="list-style-type: none"> Controlled by users and owners of Dogecoin across the globe Limited number [10]

Fig. 2.Comparison of additional digital currencies (2014)

Additional digital currencies related to Bitcoin are generated through mining. However Mastercoin is generated as a result of fundraising rather than mining. Each currency has a limited number for circulation and is exchanged among the users.

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III. INVENTION

What is CCHANGE?

CCHANGE is an online currency (also known as CC's). Currently there is no access to CCHANGE; however this document explains how CCHANGE can be created and used to improve global economies and healthcare systems. CCHANGE is money (no physical representation such as a dollar bill) that is created and controlled by a unique set of rules. CCHANGE offers additional financial options to participants and is designed to coexist with current currency systems.

How do we gain access to CCHANGE?

The first step in gaining access to CC's is to create a CCHANGE account on the website (once it is made available). After creating a username and password the participant automatically becomes part of the CCHANGE community and their username is placed in a directory along with other participants (individuals, businesses, schools, offices, etc....). Once participants are members of the community, then they have access to their currency account (similar to a bank account) where deposits and withdrawals take place. Participants have many options on how they are able to earn CC's and deposit it into their account

The first option of earning CC's and depositing in a CCHANGE account would be to sell a good or service (known as g/s) on the CCHANGE Market (similar to Amazon) located on the website. An example of this option would be a participant/member choosing to sell her bicycle and posting it on the CCHANGE Market for 500 CC's. Another example would be a participant offering to paint another participant's house and posting the service on the CCHANGE Market for 3000 CC's. Once a member of the CCHANGE community decides to purchase the bike or paint service and the exchange is agreed upon by both parties, the member receiving the g/s would transfer the requested amount of CC's from their account to the account of the member who offered the g/s.

The second option of earning CC's and depositing it into a CCHANGE account would be to bring the currency into existence. The website will list a number of task options (approved by a board of directors) that allow the participant to bring CC's into existence. Once the participant completes a task from the list of options, CC's are automatically deposited into the member's account and ready for use (to be exchanged). Participants are free to use the CC's that they brought into existence in order to purchase g/s offered on the CCHANGE Market.

How do participants bring the currency into existence?

The participants choose from a list of approved tasks or data collecting options. Examples of these options (based on data collecting devices that currently exist) may include the following: taking a survey, reading an article on health and answering questions, purchasing fruits and vegetables from participating grocery stores, running a mile on a treadmill from participating gyms, recycling bottles in an automated machine, getting blood pressure checked from a participating public device, etc... There are many unique monitoring devices invented each day. One device sits inside the toilet and after you urinate on it, information on your nutritional deficiencies can be sent to your account. Global CCHANGE would save the health data for your observation and convert the values in healthy ranges to currency. Each task or data collecting option has a set of rules, such as the maximum amount of CC's that can be brought into existence per day for each option. Another rule may include receiving additional CC's if the participant completed the task within healthy ranges. An example of this rule would be the participant receiving 5 CC's for getting their blood pressure checked; however they may receive 10 CC's if the blood pressure was determined to be in the normal range for that individual.

If every member can bring CC's into existence every day, then how does CCHANGE maintain value (control for inflation)?

The CCHANGE monetary policy is unique in how it maintains the amount of money supply in circulation. Setting up the game of Monopoly can be used as an analogy to demonstrate the difference between currency in circulation for mainstream monetary policies and CCHANGE. At the beginning of the Monopoly board game, money is distributed

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(by the banker representing the governing body) evenly to each player (\$1500 each). The amount of money that is in circulation at the beginning of the game is determined by the number of people playing the game. Therefore, if four people are playing, then \$6000 (\$1500 multiplied by 4) is put into circulation. After the amount in circulation is determined, each player attempts to acquire the most money (and assets) from their opponents.

Similar to the set-up of the Monopoly board game, the amount of money supply in circulation for mainstream monetary policies is controlled by a governing body. If the governing body puts too much money supply in circulation and creates abundance, it loses value. People would charge more money for g/s, creating inflation. Monetary policies of mainstream currencies control for the amount of money in circulation by using a set of rules.

The CCHANGE currency system has a unique set of rules to control for the money supply in circulation. Money is brought into circulation by individual participants of the economy; rather than by a governing body. Money is eliminated from circulation (elimination rule) automatically by the money losing a percentage of value per exchange and by the money losing a percentage of value after remaining idle (not exchanged). The CCHANGE monetary policy is designed to motivate individuals to bring the currency into existence and to exchange it frequently. Once the currency is in existence, it loses value over time until it no longer exists.

Using the Monopoly board game set-up analogy to illustrate CCHANGE would require every player to start the game with no money. Rather than having a banker distribute money to each player, they must earn the currency (two options). During every players turn, they would choose between bringing the currency into existence (bring it into the game), or attempting to acquire the currency that already exists from other players.

The electronic version of the Monopoly game can be used to illustrate the elimination rule. If players have money that is remaining idle for a designated period of time (example: after 5 turns), it will electronically lose a percentage of value within their bank account. Also every time the player exchanges the currency (beyond the first exchange), it will electronically lose a percentage of value. The elimination rule is intended to motivate players to consistently get their money's worth by creating more opportunities for exchange.

Another analogy illustrating the monetary policies of CCHANGE would include picturing everyone with a money tree in their backyard. Each person would have the option of earning money from other people (by g/s) or by bringing money into existence by picking it off their tree. However once the money is in existence, it's on a timer (it remains in existence for only a designated period of time). In other words, it slowly loses value over time (by remaining idle and per exchange).

Reasons why a person might be motivated to be a member and create a CCHANGE account?

1. They appreciate additional financial options. For example, in the current system most families produce an income based on how much money in which the parents have the ability to earn. With CCHANGE, every member of the family is able to help produce the income.
2. They find it easier to provide a service or sell a product. Participants may feel a sense of freedom that they wouldn't normally feel when they spend cash. They may perceive cash as the more important form of currency and choose to save it for necessities. In the meantime, they may develop a guilt-free approach toward spending CC's on such things as additional entertainment options or other unnecessary g/s.
3. They value the idea of promoting positive health behaviors and choose to participate to show support.
4. They value the idea of promoting a new opportunity for financial freedom and choose to participate to show support.
5. They use CCHANGE as an opportunity to start a business.
6. They use CCHANGE as an opportunity to test the market with a service or product before they sell it for cash.

Reasons why a business would want to be a participant of CCHANGE?

1. They may be interested in using CCHANGE as a marketing tool by offering discounts on products or services if customers spend CC's. An example would be a store offering to sell a video game half off of the cash price if the

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customer pays the other with CC's. Once companies acquire CC's from their customers, they will most likely be interested in spending the currency as well (becoming part of the CCHANGE community).

2. The business might be interested in using CCHANGE to pilot a product or service.
3. They may offer a few products or services to be paid entirely in CC's (as a marketing strategy).
4. They may be interested in demonstrating their support for the social advocacy nature of CCHANGE by choosing to participate (philanthropy).
5. They recognize how much cash money they can save if they purchase certain items that they need to run their business through the CCHANGE Market.

Can a company or business create the existence of CCHANGE?

Only an individual can create the existence of CCHANGE. Once CCHANGE is in existence, a company, school, office, club, or any other group is free to offer g/s in exchange for existing currency. Once they have acquired existing CC's, they are free to use it as money among the other participants.

Is there a difference between the CC's that come into existence from the original source (data collecting options) and already existing CC's?

Yes. The CC's that come into existence by a participant using one of the data collecting options (examples: taking a survey, getting their blood pressure checked, or purchasing fruits and vegetables), are known as OC's (Original Currency). Once a participant spends the OC's, it becomes known as XC's (Exchanged Currency).

What are the definitions of each term related to CCHANGE?

1. CCHANGE: Currency of Collaborative Health Ambitions Netting Greater Equity. CCHANGE also refers to the name of the currency, and concept.
2. CC's: The universal term for the currency representing both OC's and XC's when distinguishing between the two types is unnecessary.
3. OC's: The distinctive term for the currency representing the CC's that have been brought into existence from a data collecting option and have not been exchanged.
4. XC's: The distinctive term for the currency representing the CC's that have been exchanged.

Why is there a distinction between the two types of CC's?

1. OC's are worth 100 percent of their value. Once OC's have been exchanged they lose a percentage of value per exchange. In other words if Bob sold a hat to Sally for 30 OC's, then Bob would receive 30 XC's (notice the CC's did not lose value in the exchange; however the type of CC did switch from being an OC to an XC).
2. The distinction also allows the participant the option of selling a g/s for OC's only. For example, a health insurance company may be interested in giving their customers a discount if they earned up to 1000 OC's in one year. They may not be interested in knowing how many XC's their customers have earned.

When a participant sells a good or service, do they need to designate whether they will accept OC's or XC's?

CC's represent both types of CCHANGE. Participants have the option of pricing a g/s for CC's, OC's only, XC's only, or for either XC's or OC's (at different prices for each).

1. If the participant chooses to sell a product for 10 CC's, then they are allowing the customer to make a decision on how they will spend their CCHANGE. The customer may choose to use OC's or XC's or a combination of both.
2. The participant may also choose to list the price of the g/s with two separate options. For example, if John chooses to sell a shirt for 20 OC's or 30 XC's, then the customer has the option to pay less using OC's or more using XC's.

How does the loss of percentage per exchange take place, when customers choose to combine OC's and XC's?

The algorithm for the system automatically changes the value of the currency once the exchange occurs. The portion spent from OC's will remain the same value (and become XC's) in the seller's account and the portion that was XC's will lose a percentage of value.

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Why would anyone want to accept XC's if they lose value when they are received and lose value when they are exchanged again?

The reason why a participant would want to accept XC's is because it allows them to offer g/s to companies, organizations, and other groups of people. Also, more participants will have XC's than OC's; therefore they are opening the market up to more possibilities. If you think about how common currency (money) is taxed, it has a similar function. When people receive money, they lose a percentage to taxes and when they spend money they pay a tax. Think of OC's as being tax free.

How will business, organizations, and individual participants know the value of CC's?

On the Global CCHANGE platform (and located in each participants account) there will be a constant changing regulator that will help identify the value of XC's, and OC's. Each value will be represented by the number (of XC's or OC's) in existence divided by the number of participants in possession of each. The value of CC's is simply the value of XC's and OC's combined.

Who decides what the list of options will be for the participants who choose to create OC's?

Individuals or businesses interested in having their data collection device as an option to create CCHANGE would submit an application. The board of directors reviews all applications and follows a set of procedures written in the CCHANGE bylaws to make the final decision. If the board of directors agrees to use a specific data collecting option, then the company that submitted the application would negotiate a contract. The application requires the interested party to include information on the following:

1. Valid and reliable research that supports how the data collection option motivates members to be healthier and provides an opportunity for preventative healthcare.
2. An explanation of how the data collection option is protected from members cheating the system.
3. An illustration comparing their data collection option to similar existing options with references to the suggested amount participants should be able to earn by using it.
4. The set of rules that would apply to their data collecting option.
5. A description of how they would make their data collection option accessible to the diverse population of the members.

Are all of the data collecting options free to the members?

Every data collecting option is put into a category (known as a unit) along with similar options. For example, if a blood pressure monitor is an option, then all blood pressure monitors would be in the same unit. Each unit must have a free option available to any participant before a profit making option is accepted and available for members. A profit making option is a device that requires the member to purchase a device or service in order to use it. After more than two options exist within a unit (one free and one for profit), any additional company offering a profit option within the same unit would split the cost of the free unit and give a designated percentage of profit to the company that continues to provide and maintain the free unit.

Why would a company with a profit making device want to compete with free option?

One reason why a company may create a profit making option to compete with the free option in a unit is to appeal to members who would prefer to bring the currency into existence using a private device rather than a public device. Another reason why a company may be interested in setting up a contract with the board of directors of CCHANGE to use their data collecting device may relate to a marketing strategy to sell their device or service. For example, if a company decided that they could sell more heart-rate monitors by creating an option to acquire CC's, then they might decide to create two different devices. The first device would be offered for free by sending it to the members that requested the option. The second heart-rate monitor option (members would have to pay for), would have the same ability to create CC's and also hold other enticing features (such as tracking devices for calories burned or distance ran) that would appeal to members who prefer to use an upgraded device.

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How is maintenance and availability of the free options controlled?

Within the Board of Directors, a subcommittee monitors the maintenance and availability of the free units by enforcing the following policies:

1. If a free unit is reported as malfunctioning, it must be repaired and accessible within a designated amount of time.
2. If the free unit is not repaired or accessible within the designated amount of time, the entire unit will be held responsible and pay a fine.
3. If the problems continue to exist over a designated period of time, the entire unit runs the risk of being eliminated as an option for creating CC's.

IV. CONCLUSION

Imagine a competitive market where individuals have the option to earn both the current currency of their country and a digital currency backed by health-related activities. Individuals who cannot get a job or are struggling financially will have additional options for survival. Picture household and school children competing to earn more CC's by exercising and eating healthier. Envision consumers taking more time to read health-related materials, participate in surveys, and increasing opportunities for more updated research (by donating their health-related data). Visualize people becoming more aware of their health status as companies compete to capitalize off of better monitoring devices.

CCHANGE has the potential to create a domino effect of change in the consumer's behaviour and motivation toward preventative health care. Although many food companies may still rely on addictive properties of their food (or shortcuts to produce a larger quantity) to stay in business, it is possible that more consumers will recognize the health concerns related to these food products and force the market to shift. It is also possible that the current economy embraces CCHANGE as the missing link to the competitive market and works together to create united solutions to economic and health care issues.

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