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nCent

A Decentralized Protocol for Incentive Networks

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TEAM

Core Team

Kapil K. Jain - *Lead Developer*

Prior to founding nCent Labs, KK was Director of the Computational Finance program at Stanford. He ran quantitative and macro hedge fund strategies at Citigroup, Perry Capital and D.E. Shaw & Co. KK holds an M.S. from Stanford University and an A.B. from Dartmouth College.

Prof. John C. Mitchell - *Cryptography and Security*

Prior to joining nCent Labs, Dr. Mitchell served as Stanford's Vice Provost for Teaching and Learning. He is the Mary and Gordon Crary Family Professor in the Stanford School of Engineering, on sabbatical leave through 2018. His research interests are in computer security, programming languages and type systems, and logic. He holds an M.S. and Ph.D. from MIT and a B.S. from Stanford University.

Prof. David L. Dill - *Protocol Research and Development*

Prior to joining nCent Labs, Prof. Dill was the Donald E. Knuth Professor at Stanford (now Emeritus) doing research on formal verification, voting technology and computational biology. He is a Fellow of ACM and IEEE, and a member of the National Academy of Engineering and the American Academy of Arts and Sciences. He was previously Chief Scientist at 0-In and at Locuspoint Networks. Prof. Dill holds a Ph.D. and M.S. from Carnegie Mellon, and an S.B. from MIT.

Dr. Rajeev Surati - *Core and Backend Development*

Prior to joining nCent Labs, Dr. Surati co-founded Flash Communications (Microsoft), Photo.net (GoDaddy) and Scalable Display Technologies which commercialized his MIT Ph.D. thesis. Dr. Surati holds a Ph.D., S.M., and S.B. from MIT in EECS. Dr. Surati holds over 10 patents in Instant Messaging, Computational Display, and Image Processing.

Michael Barile - *Partnerships and Application Development*

Prior to joining nCent Labs, Michael co-founded Kryptomon.io, an ethereum-based virtual game, and was active in the blockchain community. He was previously an engineer at Google where he worked on travel search and has experience at Uber and Oliver Wyman. He holds an A.B. from Dartmouth.

Contributing Team

Strategy

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Stanford Computer Science

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MISSION

A fairer Internet where you own the value of your work and networks

Problem: Our Networks are Valuable but Underutilized

"All in all, you're just another brick in the wall." -Roger Waters

The Internet connected us, but it hasn't yet unlocked our common potential. Our networks contain valuable knowledge about our capabilities, skills, interests and desires. Only a tiny fraction of this knowledge is online, and an even smaller fraction is being organized and directed to do useful work. If we can just organize this potential, we can unlock a vast untapped crowd work resource.

We are left with broken opportunities and markets that improperly allocate labor, capital and resources. Ads are still the online profit engine, and are still an inefficient and expensive way to acquire customers. Jobs and recruiting are fraught with friction and wasted talent. The gig economy is still in its infancy and already dominated by closed platforms that limit innovation.

Solution: Attribute Value Correctly to Incentivize Markets to Form

"Boost how we harness our collective talent, and you will boost every problem solving effort on the planet." -Douglas Engelbart

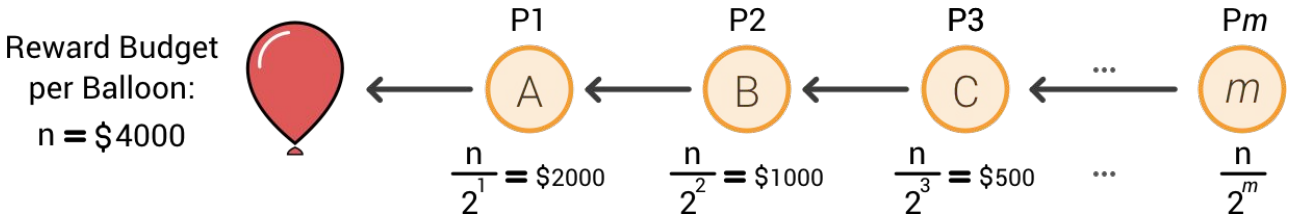
A protocol for value attribution creates the proper incentives for markets to form. People are motivated when they know their contributions are valued correctly. Markets can form when the correct incentive conditions are put Into place, resulting in previously unrealized opportunity for users and improved overall efficiency.

Incentive network markets are a natural blockchain application. Users can benefit from many crowd markets, and get value from distributed exchange among them, without sponsoring actors having to trust each other. The inherent auditability and transparency allows users to trust they will get the rewards they are due, and permit incentive networks to achieve Internet scale.

Red Balloons Everywhere

INCENTIVES SOLVE VALUE ATTRIBUTION PROBLEMS

In 2009, DARPA hosted the Red Balloon Challenge. The first team to find 10 red balloons scattered across the USA would win a $40,000 prize[1]. Shockingly, the MIT Media Lab organized a team that solved the Challenge in less than 9 hours, with only a few days of preparation. Their solution used recursive incentives to reward all the people who helped recruit balloon finders: If the MIT team won the challenge, $4000 would be allocated to each balloon's chain of finders & recruiters: $2000 to the person who found it, $1000 to the person who recruited the finder, $500 to the person who recruited the person who recruited the finder, and so on[2].



In this experiment, the MIT team proposed an answer to the problem of attributing value in social networks: recursive incentives. Recursive incentives rewards people not only for doing the work, but also for contributions in the form of connecting the jobs to the worker. This allows influential nodes in a network to earn higher expected payoffs, rewarding them for the higher portion of network value they bring in. We could easily come up with examples similar to the Red Balloon Challenge where recursive incentives are extremely effective:

Work Function	**The Red Balloons are ...**
Sales	Customers
Recruiting for Software Company	Developers
Real Estate	Houses
Online Markets	Limited Edition items
Fraud Detection/ Whistleblowers	Bad Behavior

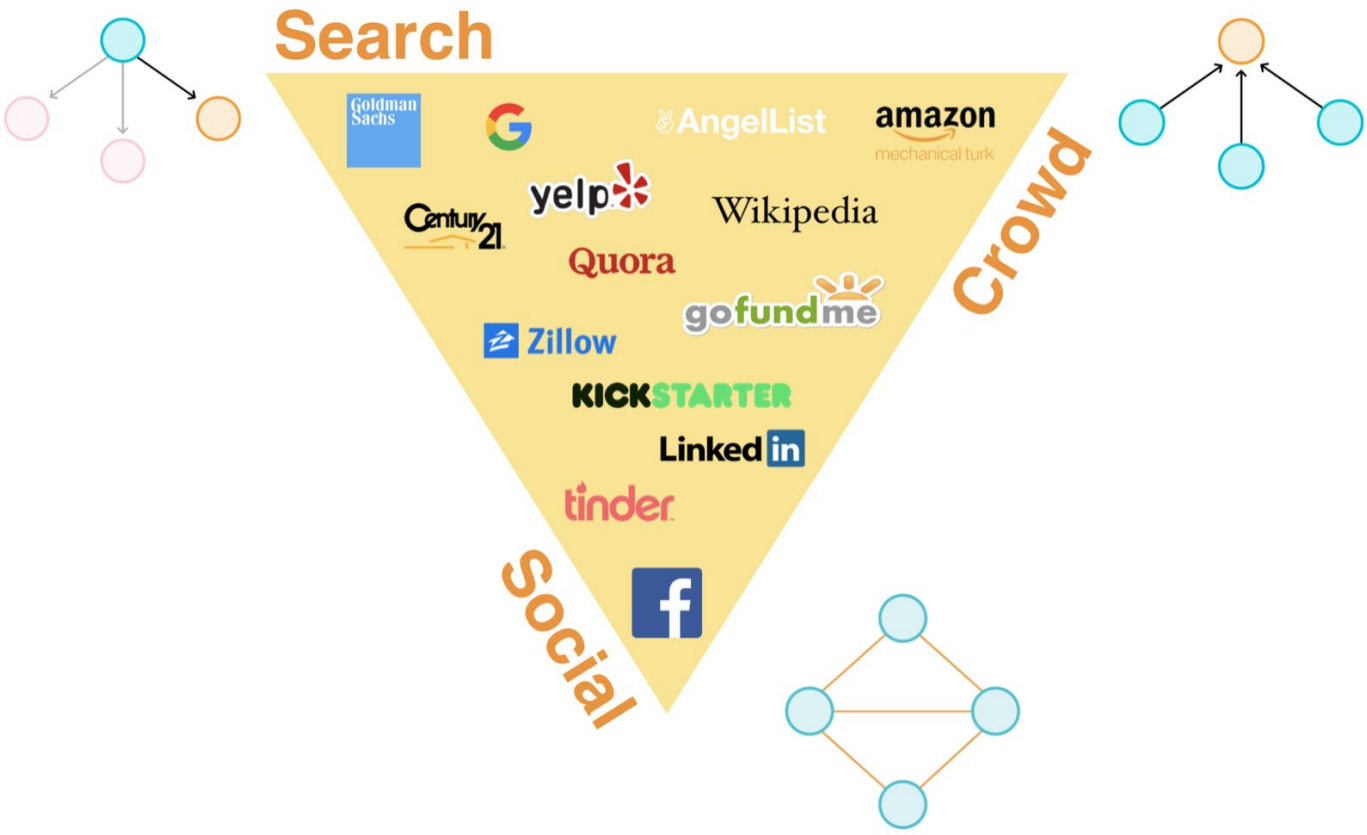
1 https://en.wikipedia.org/wiki/DARPA_Network_Challenge
2 https://web.media.mit.edu/~cebrian/p78-tang.pdf

APPLICATIONS

nCent is a Generalized Protocol

THE META-NETWORK TO ORGANIZE USERS

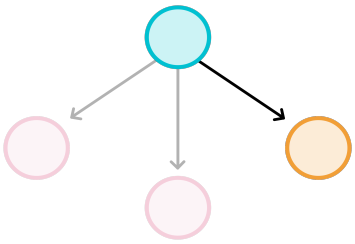
nCent is a generalized protocol. Specific applications and business that leverage incentives can be built on top it. Over time, these application layer networks have the potential to cover significant areas of economic and social activity taking place over the internet today. Our users will ultimately come up with novel ways to put nCent's incentive structures and technological foundation to use.



nCent Launch Applications

We are implementing particular use cases for our launch applications.

A search problem involves finding a path from users looking for something to the things or people that they are looking for. Recursive incentives, such as those used by the MIT team in DARPA's Red Balloon Challenge, are well suited for search problems.



Search

SEARCHING FOR THE CUSTOMER

Our first launch case involves customer acquisition, which is the lifeblood of consumer business. In this case, a sports team is searching for fans that are interested in purchasing team jerseys. Advertising is a large market powering many internet business, but it is merely a means to customer acquisition. If we can solve and essentially "commodify customer acquisition," the best products and services in the economy would rise to the top.

nCent works well with use cases that involve tribal or cult-like brand affiliation where a motivated community can form. Brand activation revenue alone reached $595bn in United States in 2016[3]. Examples of tribal brands and influencers include:

- **Sports:** Teams and players
- **Multi-level Marketing (MLM)**: Amway, Herbalife
- **Celebrities:** Musicians (Dead Heads), Actors (Friends), Reality TV (Kardashians), Influencers (Youtube/Instagram/vloggers/Twitch)
- **Cult brands**: Subaru, Southwest, LaCroix, In-n-Out, Ikea, Trader Joe's, Apple, Starbucks, Lululemon

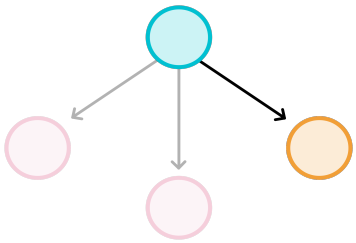
SEARCHING FOR THE DEVELOPER HIRE

Our second launch case is a specialized version of customer search we built for ourselves. It involves a recruiting game based on DARPA's Red Balloon Challenge, where the hire is now the red balloon. In our case, we are utilizing recursive incentives to propagate referrals from the outside and from current employees to find the most suitable candidates for hire. We are actively "dogfooding" this application and leveraging it for our own internal recruiting efforts, and may decide to open it up for outside consumption. The worldwide recruitment market alone was roughly $200B in 2017[4].

3 https://www.forbes.com/sites/joshbersin/2017/05/26/google-for-jobs-potential-to-disrupt-the-200-billion-recruiting-industry/#642764c04d1f
4 https://www.statista.com/statistics/650998/brand-activation-marketing-spending-usa/

Example 1: sportCent.io

This is a launch use case for nCent to facilitate enterprise adoption. Cultivating a loyal fan base is an existential challenge for any sports or fan-based brand.



Search

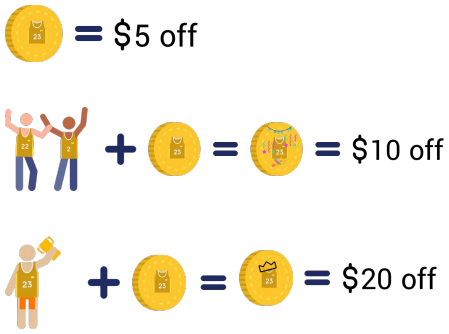
User:
The Hometeam
A professional sports team moving to Las Vegas (LV)

Needs To:

1. Stay engaged with their existing fan base in Oakland
2. Acquire and retain new fans in LV and LA markets
3. Reach key millennial demographic
4. Maximize engagement, merchandising & concessions
5. Market the team cost effectively

Solution:
Hometeam's ad agency acquires NCNT and stamps them to create FanCents. These FanCents are a novel, nCent-based coupon and engagement program as an application on the nCent network. Hometeam emails FanCent to its fan list. Alice gets a FanCent; she can:

1. Redeem it right away for $5 off a team jersey, *or*
2. If Hometeam wins, Alice can use the FanCent to get $10 off a team jersey, *or*
3. If the star player scores, Alice can use the FanCent to get $20 off the his jersey, *or*
4. If Alice is not interested in buying a jersey, Alice can send her FanCent to Bob who buys a "star" jersey. Bob gets $20 off the jersey; Alice gets $10 for doing the referral.
    - If Bob instead sends the FanCent to Carol, who buys a "star" jersey, then Carol gets $20 off the jersey, Bob gets $10 and Alice gets $5. Hometeam knew up front that their discounts/referral fees would total to under $40 and designed the program based on that budget.



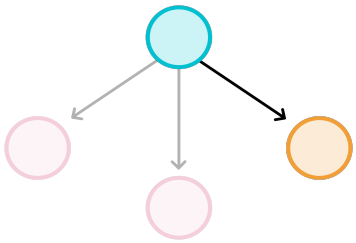
nCent fan engagement incentives can depend on game events

Discussion:
Unlike coupons, this nCent-based campaign is cost-effective to run (ex-merchandise discounts), can scale in multiple geographies, and speaks to millennials through its viral potential. FanCent boosts fan engagement by incentivizing a vested interest in Hometeam winning. Hometeam can effectively find and acquire new fans, by enlisting an *ad hoc* recursive affiliate network to sell jerseys. All network users, fans or not, contribute to the Hometeam community.

As an added incentive, the Hometeam drops geotagged FanCents onto certain seats in the stadium and TV screens for home viewers at halftime. Then, fans use their augmented-reality (AR) wallet apps to discover and pick up the FanCent. Furthermore, the Hometeam establishes an incentive: if 100 fans buy jerseys during halftime, everyone gets a free hat! The incentive structure can accommodate features such as an expiration date, limit on number of FanCent held by each fan, and different geolocation-dependent redemption policies.

Example 2: jobCent.io

This is a launch use case for nCent to facilitate internal recruiting goals. Recruiting talent is a difficult but important challenge for almost any business.



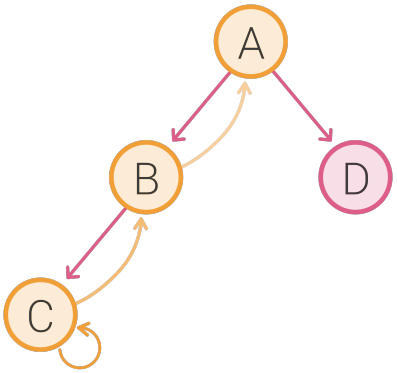
Search

User:
Startup Co.
A startup eager to hire 10 developers to implement its new deep-learning vision network for self-driving cars

Needs To:
1. Hire quickly and meet quota
2. Can't exceed fixed budget for a referral program
3. Recruit a diverse group of the highest-quality candidates
4. Avoid being buried in unsuitable resumes
5. Leverage an external network because startup does not have the critical mass to rely on internal referrals

Solution:
Startup Co. buys NCNT and stamps them to create 100 DevCents. NCNT distributes the DevCents to select CS seniors at Dev University. Alice gets a few of the seed DevCents since she is part of the Dev U Computer Club. Depending on what Alice wants, this can then play out in a few ways:

1. Alice applies to Startup Co. If she is hired, she gets a 10k NCNT signing bonus.
2. Alice could instead send the DevCent to Bob. If Bob gets hired by Startup Co., Bob gets 10k NCNT bonus and Alice gets a 5k NCNT bonus as the direct referrer.
    - Or if Bob passes the DevCent along to Carol and Carol gets hired by Startup Co., Carol gets a 10k NCNT bonus, Bob gets a 5k NCNT bonus and Alice gets a 2.5k NCNT bonus.
3. Within 2 weeks, if Alice does not send DevCent to someone else or apply for the job position, the DevCent expires and Startup Co. will reseed it elsewhere. Once all 10 positions are filled, the tokens expire.



nCent promotes better recruiting through indirect referrals

Discussion
Startup Co.'s DevCent recruiting strategy incentivizes people to either apply for the job or to refer the DevCent to a friend who is a good fit. If the friend gets hired, the original person gets rewarded for finding that successful candidate. Since there are a limited number of DevCents, people must choose their referrals wisely. This forces people to think carefully about their referrals and also to only refer the best matches for the job. Since there are only 100 DevCents, at maximum Startup Co. would receive a limited number of job applications at a time. After Startup Co. hires their desired 10 developers, there will be no more DevCents, ending the recruiting campaign. The DevCents also expire after 3 months. Due to the transparency and safeguards of the system, Startup Co. ensures that it would not exceed its fixed budget.

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