



The Human Hivenet

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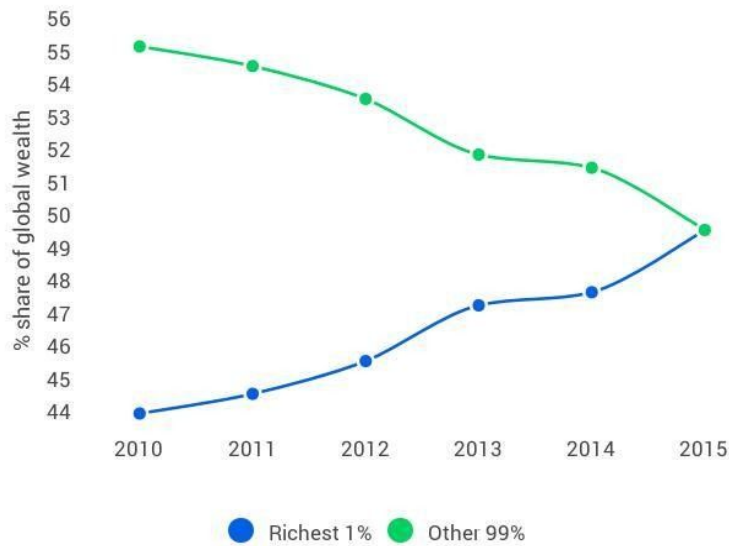
Abstract

An online ecosystem that harnesses the creativity, intuition and intelligence of groups (Hives) of humans in order to analyze information, make predictions, and solve problems for other humans, applications and AI. With the emergence of many novel and convergent technologies, this has become possible via the concept of Human Hives (abbreviated occasionally as HH in this document).

This paper will cover what Human Hives are, how they work, and how they can take on the problem of poverty and unemployment as automation forces humans out of the workforce.

Introduction

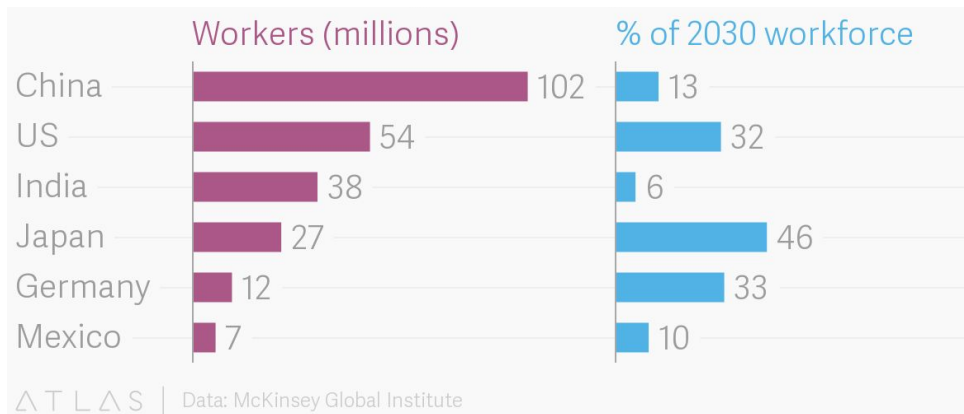
One of the growing problems our world faces is the deepening divide between rich and poor. While automation has created an economic boom that has lowered the cost of production and increased manufacturing output, many in the world do not feel this growth in their daily lives due to the rich and powerful holding on to those profits (see *fig. a*).



(fig. a) Share of Global Wealth 2010-2015¹

These profits are not going back into the economy like they do when lower income earners make money- as the Panama papers demonstrated,² the obscenely rich are doing everything they can to hide their profits away in tax havens. A large cause of this problem is corporate greed and corruption- companies and executives that care more about profits than people.

As more and more jobs become automated, the situation will become dire for large portions of the population. In September of 2013, Oxford released a study titled: “*The Future of Employment: How Susceptible Are Jobs to Computerisation?*,” by Dr Michael A. Osborne from Oxford University’s Department of Engineering Science and Dr Carl Benedikt Frey of the Oxford Martin School. Osborne and Frey estimate that 47 percent of jobs in the US are “at risk” of being automated in the next 20 years.³ McKinsey Global Institute estimates that 32% of all US workers will be unemployed by 2030 ⁴ (see fig. b)



(fig. b) Number of Workers Needing to Find New Jobs Due to Automation ⁴

Because of the divide between geographies, countries, and personal interests, there does not appear to be even a dim hope that humanity will have compassion on itself and provide every human with a Universal Basic Income (UBI), despite promising successes for those countries that have tried it.⁵

With the emergence of new paradigms including machine learning and blockchain, there is an opportunity to build a new decentralized human intelligence infrastructure that would benefit every human on earth- of any level of intelligence, skill, or ability. This paper proposes Human Hives as one such infrastructure.

¹ <https://www.weforum.org/agenda/2016/01/3-charts-that-explain-global-inequality/>

² <https://www.bbc.co.uk/news/world-35934836>

³ <https://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>

⁴ <https://qz.com/1140364/as-automation-hits-375-million-people-will-have-to-change-careers...>

⁵ <https://futurism.com/images/universal-basic-income-ubi-pilot-programs-around-the-world/>



The Super Intelligence of Human Swarms

In 2016, Louis Rosenberg and David Baltaxe from Unanimous A.I. teamed up with Niccolo Pescetelli from the University of Oxford Christ Church College to write a study titled, “Crowds vs Swarms, a Comparison of Intelligence.” In a challenge to predict 20 Prop Bets during the 2016 Super Bowl, the intellect of a crowd of 469 football fans taking a survey was pitted against a human swarm of only 29 football fans. The results were stunning:

*Results revealed that the crowd, although 16 times larger in size, was significantly less accurate (at 47% correct) than the swarm (at 68% correct). Further, the swarm outperformed 98% of the individuals in the full study. These results suggest that swarming, with closed-loop feedback, is potentially a more effective method for tapping the insights of groups than traditional polling.*⁶

This isn't an isolated incident. Unanimous A.I. regularly posts sports predictions utilizing human swarms.⁷ The Unanimous swarms have predicted things like the Oscars (with 96% accuracy)⁸ and Kentucky Derby (top 4 places).⁹

What Unanimous A.I. has demonstrated through their groundbreaking research is that human swarms as a collective are more intelligent than most of us are as individuals.

⁶ <https://ieeexplore.ieee.org/document/7780278/>

⁷ <https://unanimous.ai/category/blog/sports-predictions/>

⁸ <http://www.prweb.com/releases/2018/03/prweb15281512.htm>

⁹ <http://www.marketwired.com/press-release/swarm-ai-correctly-predicts-kentucky-derby...>



Why Seek the Wisdom of a Human Hive?

There are a number of reasons a human or synthetic entity would want to seek out the collective intelligence of a Hive. Consider the following use cases:

- **Data Analysis** - Greatly enhance the abilities of A.I.s and applications.
 - Image recognition
 - Video recognition
 - Analytics analysis
- **Corporate strategy** - Improving the efficiency and effectiveness of businesses.
 - Collaborative decision making
 - Shared tribal wisdom
- **Entertainment** - Interests and amusements will prove very fun.
 - Sports predictions
 - Film/TV predictions
 - Live commentary
 - Humor
 - Gaming
 - Memes
- **Human research** - Data gathering in areas related to the subjective human experience.
 - User testing
 - Market research
 - Focus groups
 - Sentiment analysis
 - Anthropology
 - Philosophy
 - Psychology
- **Politics** - Politicians, political scientists, and enthusiasts can gather all kinds of valuable data.
 - Straw polling
 - Political predictions



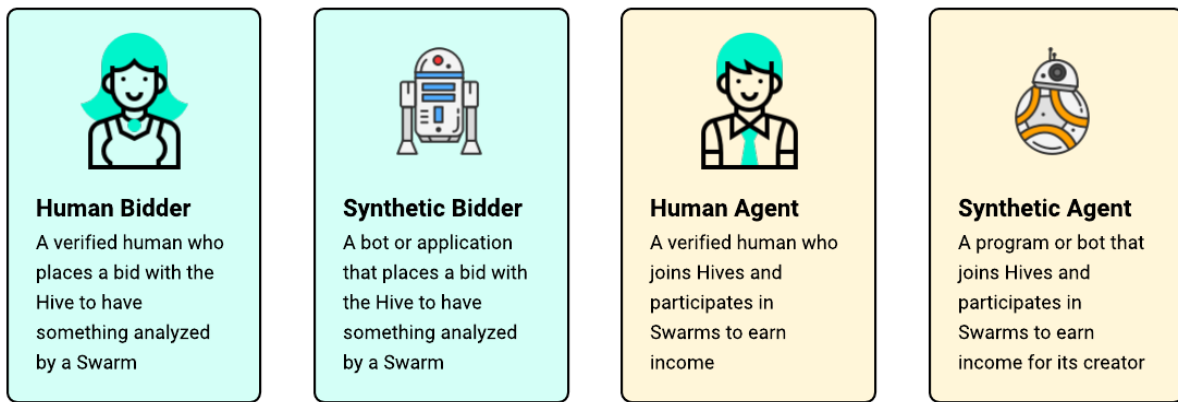
Why Join a Human Hive?

Let's consider some reasons why a Human would want to participate in a Human Hive:

- **Employment** - As humans become less employable, new opportunities will emerge.
 - Easy income
 - Can participate regardless of ability, age, race, gender, or location
 - Work from anywhere
 - Work any time
- **Sharing** - It's in our human nature to want to share our experiences and wisdom with others.
 - Answers get shared with bidders
 - The swarm activity itself gets shared with the wider internet
- **Learning** - It's stimulating to participate in live problem solving.
 - Enhanced knowledge due to group wisdom
 - A.I.s will be able to learn things they would not normally know
- **Fight Human Poverty** - Participating at all will support the efforts of the whole ecosystem to provide for the poor.
 - Participating in swarms helps the crypto value increase, which benefits all Agents
 - As a Human Agent, you will be statistically more likely to spend the money you earn, which contributes to a healthy economy
- **Entertainment** - Human Hives could provide endless entertainment value.
 - Game-like interface
 - Can be played in 2-3 minute increments on a mobile device
 - Swarms are fun to watch and be a part of

Making That Sweet Sweet Bee Bread

A Human Hive ecosystem would pay each individual Human Agent money for providing their intelligence to the particular hive mind they are interacting with. A Human Bidder or a Synthetic Bidder will provide the *Bee Bread*¹⁰ (cryptocurrency) to interact with each HH. The cryptocurrency travels from the Bidder to the Hive, and then lastly to the Agents in the Hive. *Fig. c* below explains these different participants.

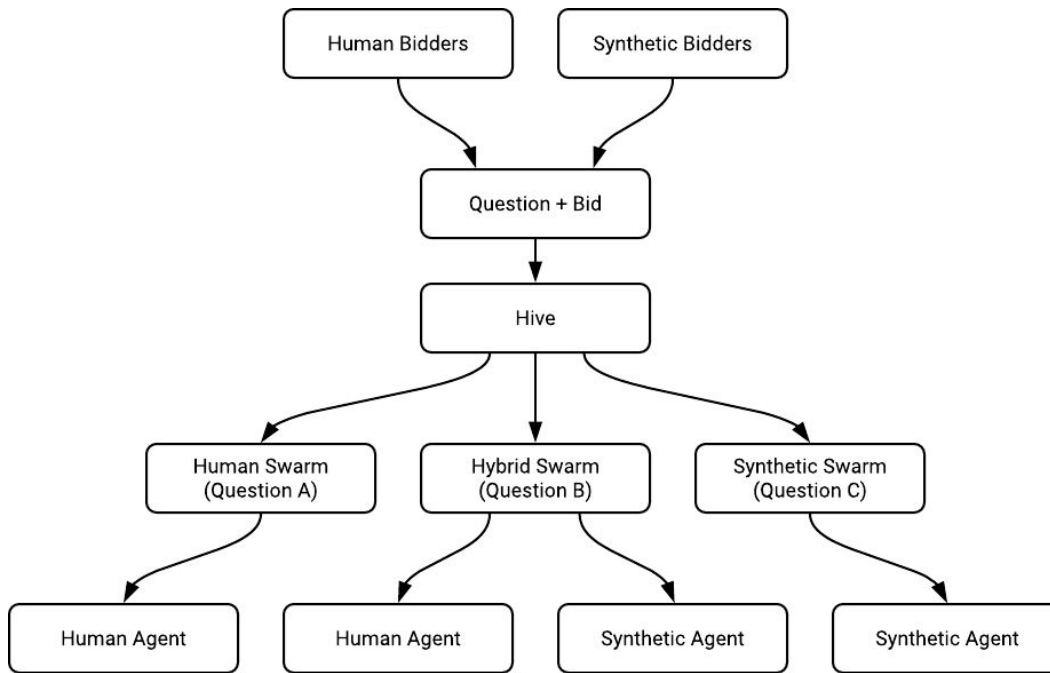


(fig. c) Bidders & Agents

It should be noted that all transactions between Agents, Bidders, and the Hive are private- encrypted on the blockchain.

As this ecosystem grows, more humans would become employed- currency in exchange for intelligence. Any individual Human Agent in a given HH could be of subpar ability or intelligence, yet they still contribute their human emotions, values, and life experience to the collective wisdom of the Hive Mind. Human dignity is retained. HHs can ensure that humans will remain employable- at least for the foreseeable future.

¹⁰ Bee Bread is a term referring to honey or pollen used to feed members of the hive.

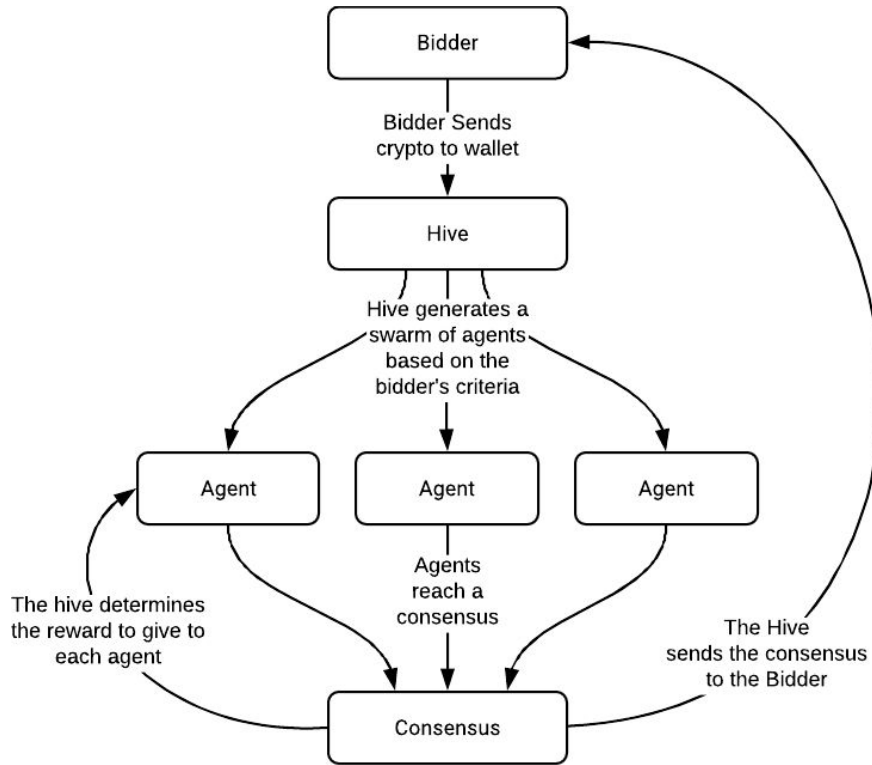


(fig. d) Question Function

Let's dig deeper into how such a system would operate. (see fig. d)

The question being posed by a bidder could be in the form of text, or an image, video, screencap, or even in some cases a separate web page. First, the question and bid are sent to a Hive Cluster for processing. The Hive Cluster is an automated service (supporting redundancy) that handles all inbound and outbound information and currency between members of the Hive and the outside world.

The Hive determines which agents to notify based on the criteria outlined by the bidder. Next the Human (or synthetic) agents agree to join a swarm to answer the question. Let's take a look at the answer function. (see fig. e)



(fig. e) Answer Function

The bidder initiates the transaction with the Hive by sending a cryptocurrency bid and the necessary info to solve the problem. The Hive builds a swarm and facilitates the question. Once the Agents have come to a consensus, the Hive determines a payout for each Agent and returns data to the Bidder.

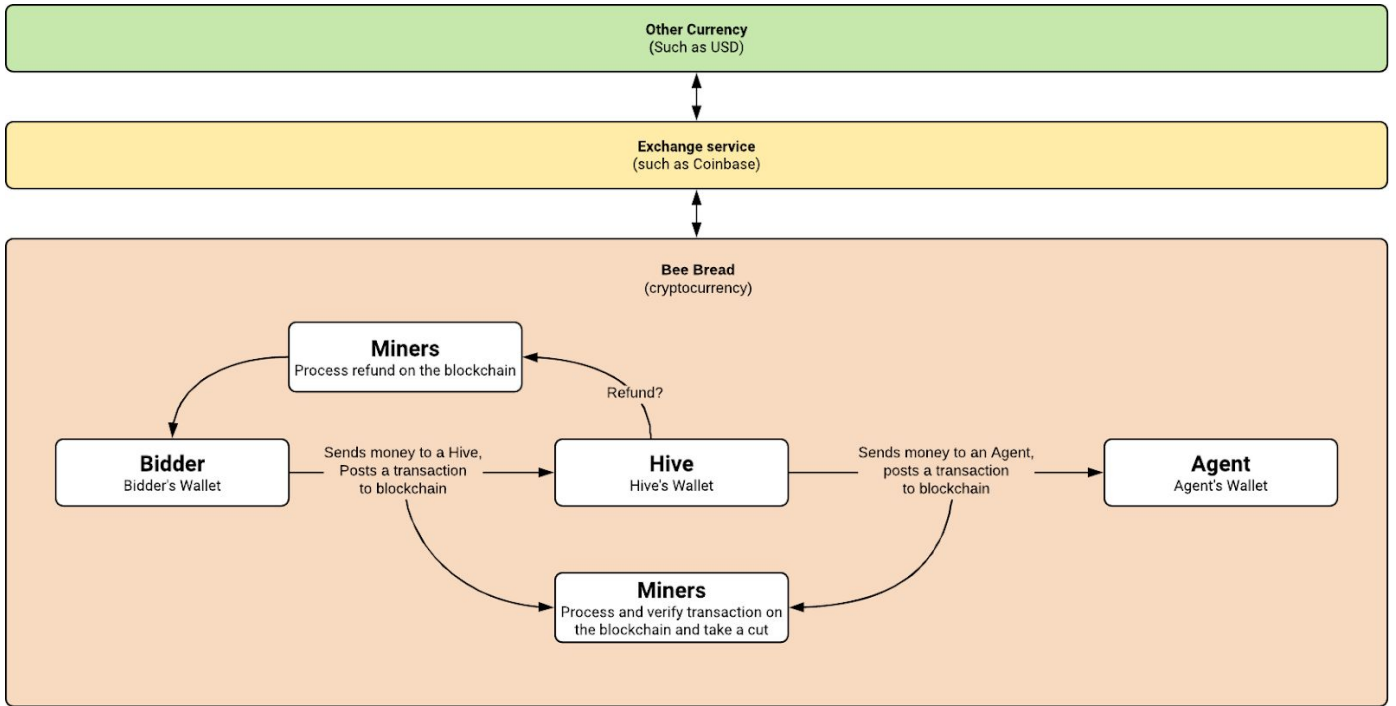
The payout occurs in the form of cryptocurrency. Why use a crypto?

“Bitcoin gives us, for the first time, a way for one Internet user to transfer a unique piece of digital property to another Internet user, such that the transfer is guaranteed to be safe and secure, everyone knows that the transfer has taken place, and nobody can challenge the legitimacy of the transfer. The consequences of this breakthrough are hard to overstate.”¹¹

Marc Andreessen

co-author of Mosaic, the first web browser

Using a cryptocurrency will mean building a reliable ledger that can securely validate every transaction. Miners can mine for Bee Bread and assist Hives in making transactions. So how does money get exchanged to Bee Bread and back? See *fig. f* below for the answer.



(fig. f) Currency to Bee Bread Exchange

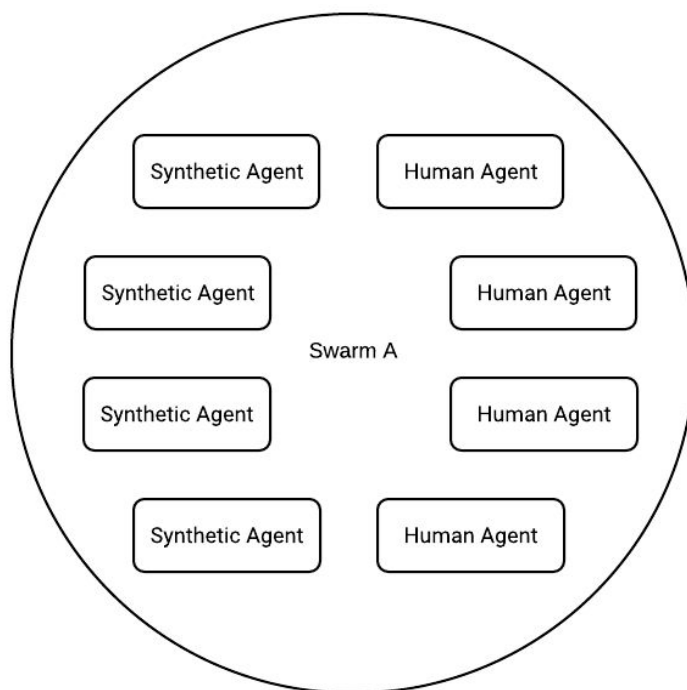
Bee Bread is the lifeblood of the entire ecosystem- enabling Agents and Miners to get paid, and Bidders to gather intelligence.

The next section shifts gears to answer questions about the Hivenet itself- such as ‘what are its constituent parts?’ and ‘How does the whole ecosystem work?’

¹¹ <https://dealbook.nytimes.com/2014/01/21/why-bitcoin-matters/>

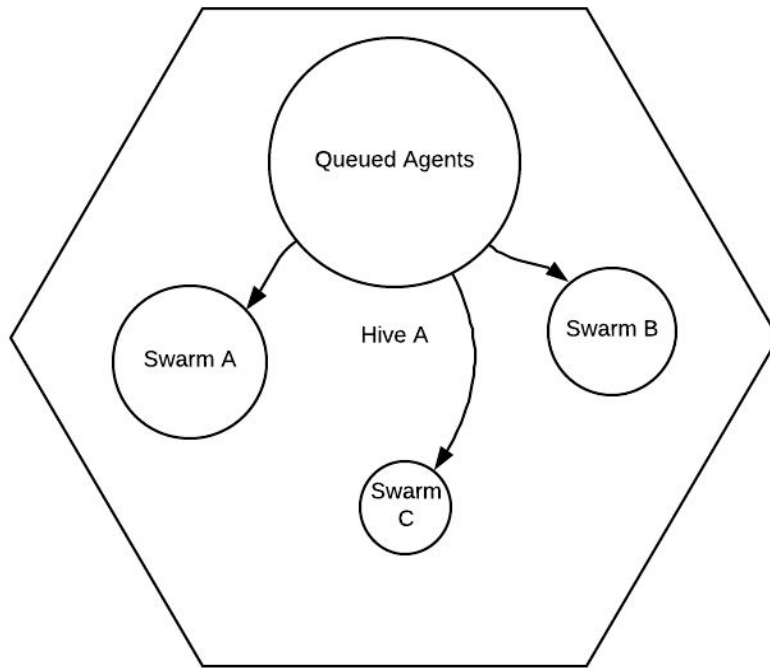
The Hivenet

As in the biological world, HHs would be part of a micro and a macro ecosystem. Let's look at the smallest part of the structure zoomed all the way in (see *fig. g*).



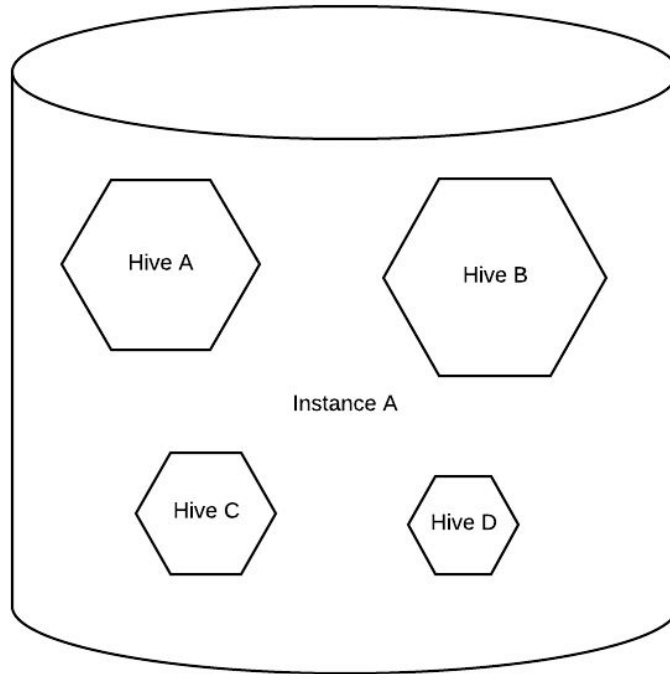
(fig. g) Hivenet 4x zoom (Hybrid Swarm)

At its most atomic level, human and synthetic agents are the smallest divisible unit. In this case, they have been separated into a swarm of humans and synthetics. Let's zoom out another level (see *fig. h* on the next page).



(fig. h) Hivenet 3x zoom

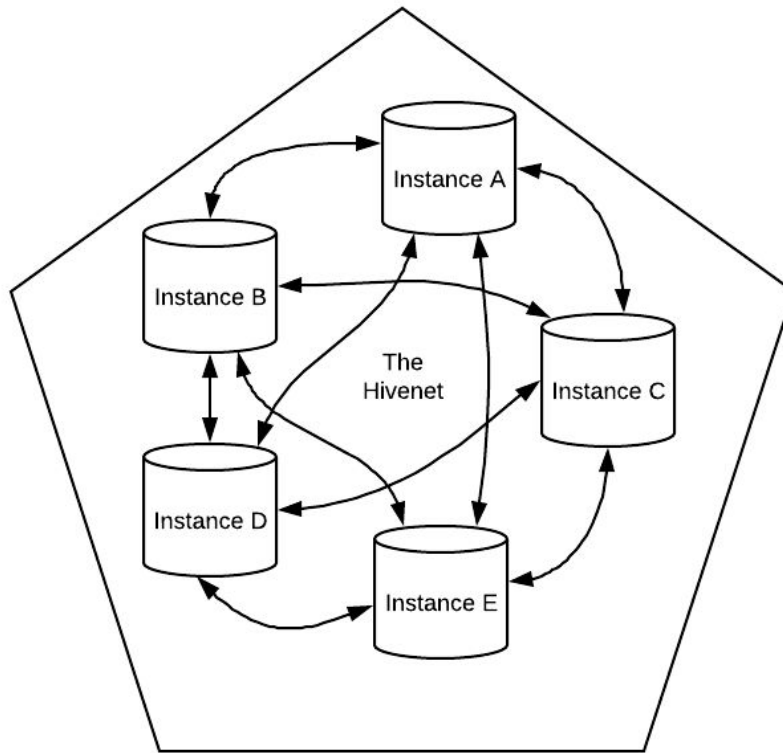
Zooming out of Swarm A, we're now in Hive A which contains other swarms as well as queued Agents who will be assigned to swarms. It's at this level that questions from the outside will be negotiated resulting in the facilitation of swarm creation, consensus gathering, and currency distribution. Hives at this level will have associated metrics such as Quality Score, Intelligence, Growth, and Average Bid. Ready to zoom out another level?



(fig. i) Hivenet 2x zoom (Hive Cluster)

At this level, we find ourselves inside of Instance A looking at a Hive Cluster. It will be important that Hives remain decentralized like cryptocurrency is- to prevent manipulation by malicious forces. Hive Instances should communicate with each other over an encrypted protocol.

Lastly, the largest view of the Hivenet. See *fig. j* on the next page.



(fig. j) Hivenet 1x zoom

At the highest level, instances are connected to each other in a network- a superstructure of superintelligence capable of solving the hardest problems we face, and feeding the human race.

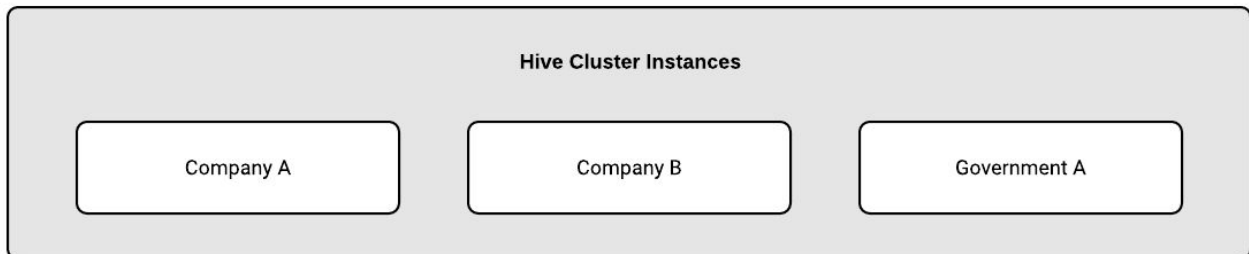
Now that we have visibility into how everything connects together, let's take a look at the instance structure within the Hivenet. (see *fig. k*)

Hivenet Instance Structure

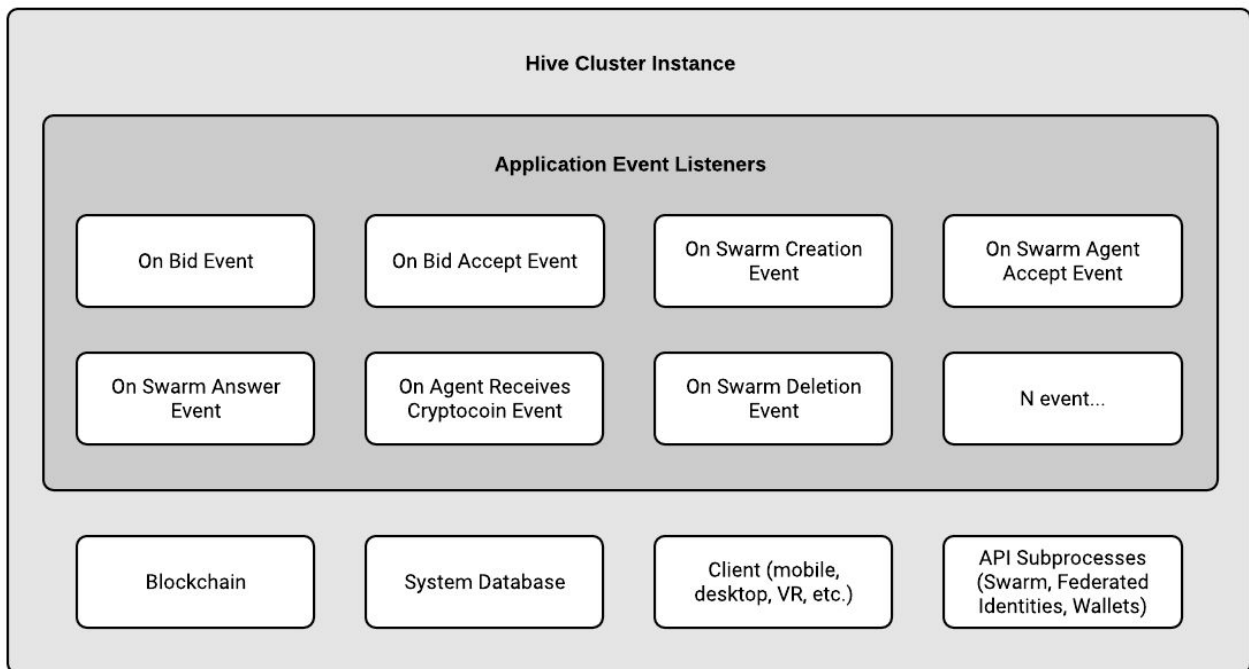
End Users



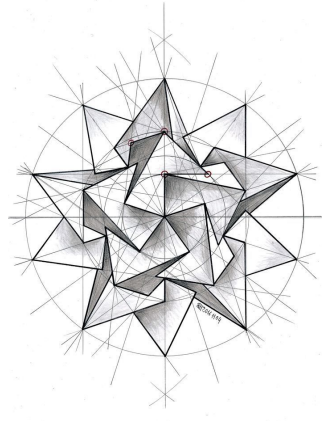
Forked Hive Cluster Implementation Instances



Core Hive Cluster Implementation



(fig. k) Hivenet Instance Structure



Hivenet Instance Structure Explained

(refer to *fig. k*)

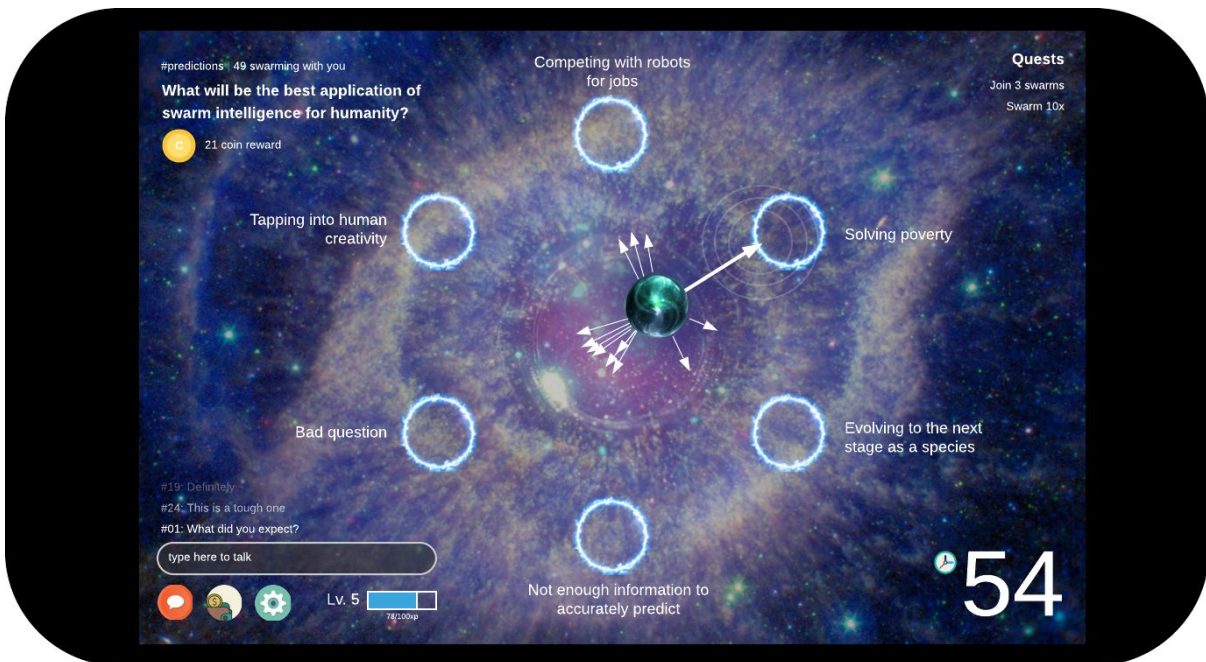
End Users - Human and Synthetic Bidders will put money into the system to keep the swarms buzzing with insight and predictions. Human and Synthetic Agents will take this money in exchange for their participation as a swarm intelligence.

Forked Hive Cluster Implementation Instances - These are application layers that live on top of the core implementation. For example, if a company wanted to create an application that utilizes the Hivenet to solve specialized problems, they could fork the core instance and get to work. As the core instance is updated, the others get updated as well.

Core Hive Cluster Implementation - This is the open source canonical instance that others will fork off of. It contains all of the critical code, interfaces, applications and data needed to run a Hive Cluster ecosystem on a different instance.

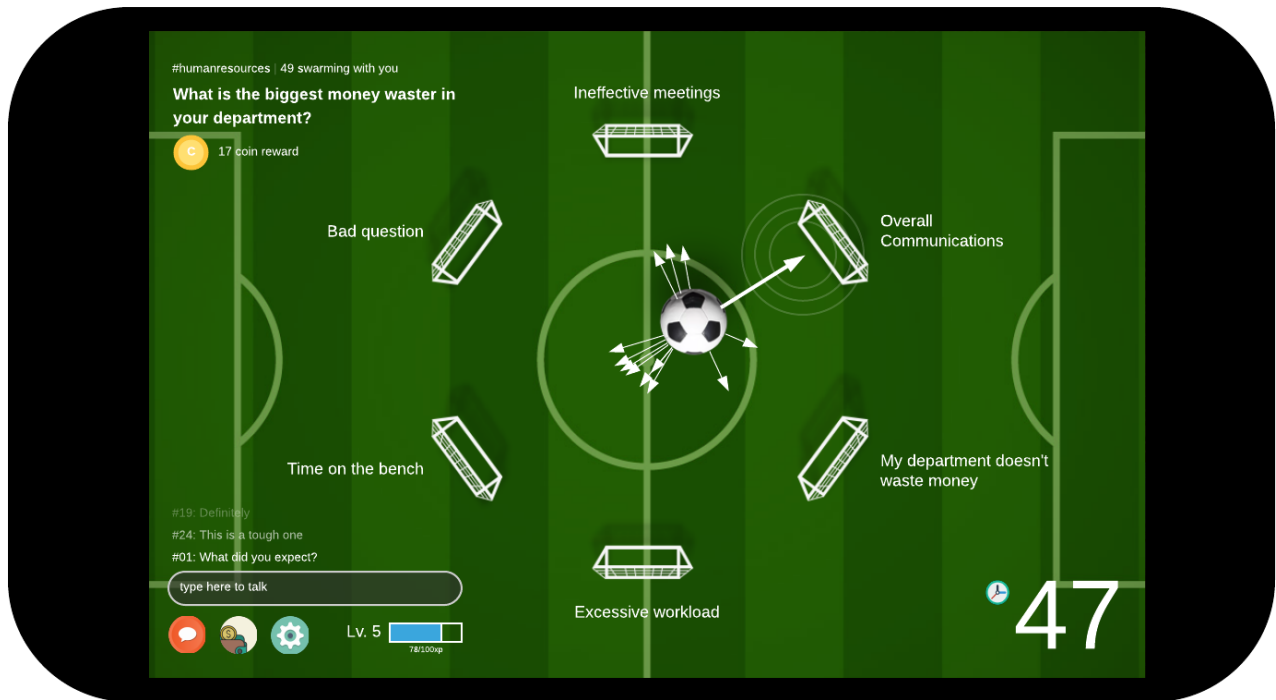
The Agent App

A number of features - namely applications and services - need to exist to make the Hivenet happen. One of these is the Agent App- an interface that members of a Hive can use to share their collective wisdom. (see *fig. l*)



(*fig. l*) Mobile Game Space Theme Mockup

A successful app will have relaxing music and sound effects, sleek graphics and animation, and a high emphasis on usability and gameplay. Thematically, an infinite number of approaches can be taken to gather data from Hives. For example, sports related Hives can have skins that match their theme- a hockey skin for a hockey Hive, a basketball skin for a basketball hive and so on. (see *fig. m* on the next page for an example of this kind of skin)



(fig. m) Mobile Game Soccer Theme Mockup

As many devices as possible should be supported to allow people of every income level to participate. A uniform set of protocols would be necessary to unify the experience across devices. Ideally, people with the following hardware and software could participate:

- Older desktop PC's, Macs
- Web Browsers
- Mobile devices (smartphones, tablets)
- Video game consoles
- Virtual reality devices (VR)
- Augmented reality devices (AR)



More Features

There are other features to consider when building the Hivenet ecosystem.

Hive Page - A Hive's homepage is the hub for all information related to that Hive.

Watch swarms live, and replay and comment on previous swarm results.

Hives themselves should use the paradigm used by social media sites with hashtags: such as #carowners, #sports, or #uspolitics.

Bidder Page - The Bidder Page is how a Bidder interacts with Hives across the whole Hivenet. The bidder page functions like a search engine at first- finding the Hives that would be relevant to the query. Then it facilitates the bidding and walks the Bidder through setting up swarms. Lastly, it functions as a reporting tool that shows the results of past queries.

Agent Tools - Giving Agents control of their data, wallet, and Hives.

Hive Configuration Toolset - Anyone setting up or managing an Instance or a Hive will need a robust toolset to adjust things like verifications (when you would like to have a Hive with only verified Agents).

Plugin Support - All software is built in such a way that plugins are easy to create so that developers in the community can extend the utility of the Hivenet.

Hive Server Node - This node is the gatekeeper between Bidders, Agents and Miners. It creates swarms, holds Bee Bread in escrow, and manages the local blockchain.



Conclusion

This paper has been written with the optimism that we can solve the problems we face in the coming decades. It's easy to picture grim dystopias, but there's no denying the human spirit. We have the technology right now to take on the hardest challenges- we just need the creativity and motivation to make it happen. Like the humble bee, we can put our minds together to accomplish something greater.

*"No pessimist ever discovered the secret of the stars,
or sailed to an uncharted land,
or opened a new doorway for the human spirit."*¹²

Helen Keller

¹² <http://www.perkins.org/stories/quotes-for-life-from-helen-keller>

Glossary of Terms

Bee Bread - Honey or pollen used to feed members of the hive. In the case of Human Hives, Bee Bread refers to the cryptocurrency being used throughout the Hivenet ecosystem.

Blockchain - a digital ledger in which transactions made in bitcoin or another cryptocurrency are recorded chronologically and publicly.

Cryptocurrency - a digital currency in which encryption techniques are used to regulate the generation of units of currency and verify the transfer of funds, operating independently of a central bank.

Digital Wallet - Software that stores public and private encryption keys which can be used to receive or spend cryptocurrency.

Hive - Software that negotiates with the outside world resulting in the facilitation of swarm creation, consensus gathering, and currency distribution to Human and Synthetic Agents.

Hivenet - A superstructure of superintelligence capable of solving the hardest problems humanity faces.

Human Agent - A verified human who joins Hives and participates in Swarms to earn income.

Human Bidder - A verified human who places a bid with the Hive to have something analyzed by a Swarm.

Instance - A single installation of the Core Hive Cluster Implementation. Instances communicate to each other sharing information about public Hives.

Miner - An entity who mines crypto. Mining is the process of adding transaction records to a cryptocurrency's public ledger of past transactions (the blockchain).

Swarm - An improvised group of Agents gathered together to participate in swarm intelligence activities such as problem solving, prediction, and game playing.

Synthetic Agent - A program or bot that joins Hives and participates in Swarms to earn income for its creator.

Synthetic Bidder - A bot or application that places a bid with the Hive to have something analyzed by a Swarm.

For further thoughts on this or anything else,
contact me via www.danieldavidallen.com