The Global Brain and the Emerging Economy of Abundance:

Mutualism, Open Collaboration, Exchange Networks and the Automated Commons

Ben Goertzel, Ted Goertzel and Zarathustra Goertzel

Corresponding Author's email: tedgoertzel@gmail.com

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ABSTRACT

The emergence of artificial general intelligence and the global brain provides new opportunities for realizing humanity's long quest for a more utopian existence. One possibility is a more successful implementation of the state socialist vision of a centrally managed economy, possibly controlled by an AGI "Nanny" instead of a central committee of politicians. A more desirable alternative, however, may be the mutualist vision of organizing economic and social life along voluntary lines as the state gradually withers away. A number of recent developments and new ideas may facilitate this outcome. The institution of the commons, in the past available only to small geographical communities, can now be used by global communities. Open collaboration and exchange networks facilitate voluntary cooperative activity by people at dispersed physical locations. Open Production Networks can make the most complicated economic exchanges transparent to consumers, allowing them to factor ethical and sociological considerations into their purchasing decisions. Offer networks can help people with similar interests and complementary abilities to organize joint projects and organizations. Blockchain technologies could be used to create transparent currencies in which transactions can be done openly. These and other related technologies have the potential to humanize global economic interactions, giving them more emotional resonance, as increasing affluence lessens individual and societal preoccupation with maximizing economic gain.

In 1845, a young Karl Marx (1970: 53) painted an appealing picture of a utopia where "society regulates the general production and thus makes it possible for me to do one thing today and another tomorrow, to hunt in the morning, fish in the afternoon, rear cattle in the evening, criticize after dinner, just as I have a mind, without ever becoming hunter, fisherman, herdsman

or critic." In Marx's vision there would be no need for coercive institutions and the state would simply "wither away."

But in the nineteenth century, there was no way for the state to "regulate the general production" without assigning people to jobs and making them work for their living. August Bebel (1910), Marx's only follower who seriously addressed the question of how society would be organized after the revolution, thought that decisions would be made by statisticians and technicians, and that people would follow them voluntarily. Any lawbreakers would be spontaneously punished by the people.

Of course, the world's practical experiments with Marxism turned out very differently in practice, but the emerging technologies of the twenty-first century offer new possibilities. Francis Heylighen (2015) visualizes humanity's future as a "Return to Eden" guided by a superhuman intelligence, or global brain, that will be distributed across all the world's people and artifacts, connected by the Internet. He anticipates that this fast developing technology will enable an ever more complex society to self-organize voluntarily. This will enable the flourishing of a "world of views" (Veitas and Weaver 2015), wherein a thousand flowers will bloom unconstrained by a Maoist gardener.

When intelligent robots are available to do all the unpleasant work, it will be technologically possible for all humans to live lives of leisure and creative fulfillment (Goertzel and Goertzel, eds., 2015).. But, there is no guarantee that these technologies will bring about such a result; nor that, if they do, this utopic phase will not be preceded by a very difficult transitional period. Challenging organizational questions need to be solved. How will society be structured and how will decisions be made? How will the transition from the current state of

affairs to the idyllic future be managed? We should not leave these questions until after the Singularity, just as Marxists should not have left them until after the Revolution.

Utopian outcomes such as the one Heylighen envisions are possible, but not inevitable, and most certainly not in the short run. There is always a range of sociological outcomes possible within the limits of a given level of technology. Even with nineteenth and early twentieth century technologies, history might have been quite different if less reliance had been placed on violent revolution and the use of state power to compel abrupt change. The emerging technologies of the twenty-first century are making an ever wider range of alternatives possible. It may be possible to successfully realize some ideas that were proven impractical in the past. And it will be possible to implement some arrangements that were not even thought of in the past because they were beyond the limits of technological feasibility. This paper considers several ideas from the past that may be given new life by new technologies, as well as several, such as the global commons and open collaboration networks, that have only recently been identified.

Centrally Planned and Managed Socialism. One possibility could be to rerun the Soviet experiment. One of the reasons for the failure of the Soviet economy to successfully compete with western capitalism was that the computer systems of the time were not up to the task of centrally managing an economy. The Soviet technological intelligentsia in the late 1950s was excited by Norbert Weiner's book *Cybernetics* and hoped that computerization would offer a solution to their management problems. But, after doing some serious feasibility studies, "it was impossible to centralize all economic decision making in Moscow: the mathematical optimization of a large-scale system was simply not feasible" (Gerovitch 2002: 273). They estimated that creating a computer network sufficient to the task would cost as much as the

Soviet space program. They turned down the opportunity, leaving it to the American military and venture capitalists.

While the Soviet model is not popular today, because of the human disasters it created, a few diehards argue that the Soviets were simply ahead of their time and that it would be possible to make such a system work with today's computers (Cockshott and Cottrell 1993, 2015; Dietrich 2015). With bar coding and other technologies, western nations are already well along on the process of computerizing all transactions. It is conceivable that a regime such as that in North Korea might copy western technology, much as they copied nuclear technology, and set up a networked system with which the state would control all economic transactions.

A centrally managed system might be more palatable if it were controlled, not by a central committee of politicians, but by a benevolent "Artificial General Intelligence Nanny" which would presumably act disinterestedly in the general interest. But no such technology exists as yet, and there is no certainty that such an intelligence would make human welfare its top priority.

Mutualist Economics. The social changes of the nineteenth and twentieth centuries might have been less traumatic if more attention had been given to mutualist economic theories that were current at the time. Based on the pioneering ideas of Pierre-Joseph Proudhon (Hoffman 1972; Wright 2015), Josiah Warren (Bailie 1972; Brown 2015), Benjamin Tucker (Tucker 1897) and others in the individualist anarchist tradition (Backer 1978; Brown 2016; Horowitz 1964), minimalist economic theory relied heavily on the labor theory of value (Carson 2007). The idea was to exchange goods and services according to the amount of labor time it took to produce them, rather than according to market prices.

Labor time pricing was not just a theoretical speculation; replacing market prices with labor certificates was tried in the nineteenth century by American anarchist Josiah Warren and his followers. Warren opened a retail store in Cincinnati in 1827 where goods were sold for what he paid for them in dollars, plus a four percent to seven percent markup to cover expenses. In addition to the dollar price, there was a charge for the time it took him to sell them, as noted from a large clock on the wall. The time was paid for with labor certificates that could be exchanged for labor by the purchaser. It made for quick, inexpensive shopping, and the store was quite popular.

Warren also helped to set up experimental communities in the towns of Utopia in Ohio and Modern Times (now Brentwood) in New York, where residents exchanged local goods and services with labor certificates, while continuing to use dollars to buy things from the outside. This worked reasonably well, better than many of the utopian communities set up on the communist principle of equal sharing based on need (Berry 1992). But using labor certificates instead of money did not bring about a revolutionary change in human relationships as Warren hoped. The certificates simply became an alternative currency. Economic studies have shown that most consumer goods already sell for prices closely correlated with the amount of labor it takes to produce them (Brewster 2004).

More lasting institutions that grew up from the same philosophy include producer and consumer cooperatives, worker-owned enterprises and credit unions, many of which continue to operate and which Wright (2010), Singer (2002) and others view as a path toward a better future. These enterprises, however, almost always use money as their medium of exchange and compete in the same markets as capitalist enterprises. Market forces compel them to mimic many of the

practices of capitalist companies. As a result most of the Israeli *kibbutzim*, the most advanced of voluntary socialist communities, have privatized their industries and operate them separately from their residential communities (Gavron 2010).

Unlike market pricing, labor time exchanges do not reward improvements in productivity that cut labor time. They depend on people voluntarily working effectively and efficiently, which works in some situations such as babysitting cooperatives where parents take care of each other's children. But it does not work very well in markets for consumer goods. Money prices are quick and anonymous: buyer and seller do not need to know each other's motivations. This makes them efficient and capitalist enterprises have contributed a great deal to economic productivity. But this impersonality often seems sterile and dehumanizing, it is criticized as leading to meaningless consumerism or materialism. The sense of community that comes from knowing where one's food or one's handicrafts come from is lost. For this reason alternative currencies such as Ithaca Hours, Calgary Dollars and Eusko (in the Basque Country) are sometimes still used to sustain local businesses and build a sense of community in local areas (Glover 2013). As the world becomes more affluent, thanks largely to the success of capitalist enterprises, maximizing economic productivity will become less important and there will be a growing opportunity to institute economic arrangements that maximize other values. This is the very outcome that Marx anticipated, that capitalism would build the resources for humanity to go on to build a more humane alternative

The Global Commons. One arrangement that may be revived with the new technological possibilities is the Commons. In European history, the commons were lands that were available to be shared freely by all members of an agrarian community. With internet

communications, the concept can be applied to resources that are shared freely by people around the world (Kostakis and Bauwens 2014). The best example is Wikipedia, an encyclopedia which can be accessed and edited by anyone. The Free/Libre Open Source Software (FLOSS) movement includes the Linux operating systems and many other projects. Much of the labor that goes into these projects, as into Wikipedia, is voluntary and unpaid. But major corporations such as IBM and Google have used and contributed to the Linux software. There is no restriction against using resources from the global commons for profit making activity, as long as contributions to the software are freely available to everyone.

The institution of a commons works best with products that have what Rifkin (2014) calls "near zero marginal cost," i.e., where production of additional copies of an item is almost cost-free once the initial production costs have been paid. This true for books, newspapers and magazines, movies and music recordings if they are published digitally. But reporters and authors still need an income, as do musicians and actors and movie producers. Rifkin, interestingly, charges market prices for his book, even in electronic form. Focusing exclusively on the marginal cost is unrealistic, you need to look at the cost of creating the original copy.

With today's technology, the "near-zero marginal cost" argument doesn't apply to products such as food, housing, medicine, transportation and energy. It will be several decades, at least, until we get replicators such as the ones on "Star Trek" that can synthesize a hot meal or a medication or a suit of clothes on order. The replacement of capitalism by the Creative Commons that Rifkin predicts will only be possible after the singularity, when robots and computers will do all the tedious or tiresome work. And even then, there will be costs imposed by environmental limitations and limited supplies of natural resources.

I-You and I-It Interactions. But even if products cannot be provided free of charge or exchanged for labor time coupons, the impersonality of market transactions can be overcome with available technology and new social arrangements. We see the beginnings of this when cooperative stores sell "fair trade" coffee and other products from third-world cooperative enterprises and consumers willingly pay a higher price knowing that it will help poor third-world workers. With current technology, however, consumers have no way of knowing how much of their money goes to the original producers, or even who these producers are. With open exchange technology, this would be transparent.

The principle of knowing where your products came from and who produced them could be generalized with open collaboration networks in which all aspects of the value chain are exposed to scrutiny in all their warm and human glory. This has potential to improve human life and smooth the path to a positive Singularity for all humanity, as people become aware of the people whose lives are impacted by their choices. This should apply to all kinds of exchanges and economic activities, not just to relationships between affluent consumers and third-world peasants.

This could make work more meaningful, even in the intellectual realms that are often thought of as inherently more creative. For instance, if a scholar is writing a review of a book simply to get a publication credit, or a journalist is writing one for pay, the tendency will be to write the review as quickly as possible so as to maximize productivity. On the other hand, if the reviewer and author are linked in a collaborative network, and may be reviewing each other's books, they are more likely to put real thought and feeling into the work. In the language of philosopher Martin Buber (1971), there will be more of an "I-You" interaction between the two

writers doing the mutual book reviewing -- more of a real connection between the people involved, each acknowledging the other as a meaningful human being and experiencing the other's mind and being. Whereas monetary interactions tend to reduce exchanges to the "I-It" level: other people are viewed as instruments for getting us money, which we can then use to get stuff we want (via the medium of other human instruments…). In a typical monetary interaction, there is no true "second-person experience" (Thompson, 2001); rather, the symbolic token of money is used to bypass second-person interaction and reduce human interactions to a level of objectification, which in some sense decreases the humanity of everyone involved in the transaction.

The network of I-It interactions does have real efficiency and usefulness. It's nice to go to the supermarket and just give the cashier some money and then get out of there quickly without having to have a deep I-You interaction with the cashier – or having to spend the whole day traveling between different farms to barter for different kinds of food with different farmers. On the other hand, one result of this I-It-oriented food system is that we tend to eat food filled with toxins and non-nutritive ingredients, created for the purpose of maximizing shareholder value of various corporations.

Many communities today have farmer's markets where food is sold directly by the farmers who produced it, and who presumably are more concerned not to fill their products with toxic chemicals. With open collaboration networks, consumers might click on a bar code in the supermarket with their smart phones and obtain information about the producer. Perhaps they could even link to the producer and question him or her about the product. While it would be hard to simulate the richness of face-to-face communication in a neighborhood farmer's market,

it would extend to products not available locally, such as fruits and vegetables grown in the southern hemisphere while it is winter in the north.

Open collaboration networks are especially useful for exchanges of services or sharing of products or tools that are often done for free in a face-to-face community where people trust that their neighbor will reciprocate their helpfulness when needed. This is more difficult when one needs help from someone in a distant community or another country, but open collaboration networks could facilitate these exchanges.

Similar issues exist in the formation of organizations. Running all-volunteer organizations is often painfully complicated, even with face-to-face interaction. One often has to laboriously wheedle people into doing what's best for the organization. For example, open-source software projects can work wonderfully, but can also turn into chaotic messes because key contributors are egomaniacs and nobody wants to do the boring necessary work, everyone wants to do the cool parts. Whereas paying employees to work on a project can be vastly simpler: one can just assign them tasks, pay them money, monitor and guide their progress via project management software, and watch the work get done. Of course it's not really that rosy and project management is difficult – but still, there is great power in being able to pay others to help realize a vision. Minor differences in orientation that can cause great havoc in an all-volunteer setting are often more easily set aside when a paycheck is involved – even very opinionated people are usually willing to do something that's "almost to their taste" if it's their route to earning a living. And yet, in the best case, an organization of volunteers working on a project contributing purely out of love of the project can be uniquely powerful and creative. People will put their hearts into a project if they consider it "theirs" because they are contributing

to it out of passion rather than as a means to getting paid. Open collaboration networks may make this kind of collaboration easier by keeping track of everyone's contribution and making everything transparent.

The question is whether there is some way to "obsolete the dilemma" (Goertzel 2010) posed by the dichotomy between I-It and I-You economic exchanges. What we want is the efficiency of I-It exchanges, coupled with the emotional and intellectual bandwidth and human depth of I-You exchanges. We would not expect a wholesale shift from I-It to I-You exchanges, but opportunities for I-You exchanges can be gradually increased, and as people become accustomed to them and enjoy the benefits, they may create even more opportunities.

Open Production Networks. Radical transparency may prove an important tool toward the goal of significantly transcending the I-It/I-You dichotomy in economic exchanges. Suppose every good or service provided came with a traceable, easily inspectable history, indicating who had produced which fraction of it, and what they had received in exchange for their part in the production. Suppose this production-history network were associated with an attractive, easy-to-navigate user interface. We would then have a sort of "Facebook of production." The new phone you buy in New York would be easily traceable to the people working in the factories in Shenzhen and Hanoi assembling the parts of the phone, and also to the people working in the dump in Ghana where the parts of the phone will be discarded when it gets old and broken. It would also be easily traceable to the engineers who designed the screen of the phone. One might call this an "Open Production Network."

This sort of Open Production Network might help to ameliorate the problem of compensating artists and journalists and other creators for their works, in the era of non-pay

walled blogs and free P2P file sharing. Consumers have little motivation to compensate corporate publishers for texts or music when they can access them online, maximizing the shareholder value of a corporation is not a priority. But if they can compensate the writer or artist, they may be motivated to direct a small amount of value (money, or effort on my part, or whatever) directly to them. The likelihood of this would be greater to the extent that the consumer knew about the personal life of the artist or writer, from information available on social media websites, and felt an I-You connection with him or her.

Offer Networks. Open Production Networks are compatible with monetary exchange. However, they also lend themselves to many different sorts of exchange. For example, they form a natural match with "Offer Networks" (Goertzel 2015). In an Offer Network, a person offers to provide a certain good or service to someone, in exchange for someone else providing another good or service to them. An optimization algorithm is used to reconcile various people's offers and requests. A number of barter-oriented websites exist today, mostly focused on binary transactions between physically nearby people; these are simple kinds of Offer Networks.

Offer Networks could also be used to form organizations. This would be a formalization and amplification of processes that happen already, but in informal ways. Suppose ten people make an offer to spend ten hours per week on a do it yourself hardware project making a toy robot of a certain sort – but each person conditions their offer on at least 5 other people making a similar offer. If these offers are made via a web-based offer clearinghouse, for example, then it doesn't take a very smart matching algorithm to match these people with each other and suggest to them that they should do a toy robot hardware project together.

Coupled with appropriate software, an online Offer Network framework could be used to enable people to automatically form teams and then incorporate these teams as formal corporations or nonprofit organizations. As well as traditional forms of organization, new types of organization such as Open Value Networks (Kostakis, et al, no date; Kostakis and Bauwens 2014) of various sorts could be created this way.

Transparent Currencies and Open Collaboration. Present-day currency systems are opaque in various ways. Government can inject money into their economies in complex ways, without publicly disclosing their activities. Current crypto-currencies are extremely opaque by design. On the other hand, it is also possible to design highly transparent currency systems. The OfferCoin mechanism (Goertzel 2015) is one example – this is a quantified measure of value that is derived directly from a network of offer-request exchanges, in a fully transparent way. In an Offer Network integrated with an Open Production Network, the ups and downs in value of an OfferCoin would be traceable directly to exchanges carried out between individuals. This tracing could be complex in some cases, but people could build software tools to track and visualize the processes involved and summarize the results.

OfferCoins could be implemented using blockchain technology, leveraging the security and the distributed, peer-to-peer aspect that makes blockchain so powerful. However, in the OfferCoin framework, unlike Bitcoin and most other current crypto-currencies, the initial founders of the coin don't get allocated especial amounts of wealth. And secrecy of transactions is not the key point. OfferCoins can be transacted anonymously, but the point of an Open Production Network is precisely the opposite, so in an Open Production based economy, major

transactions would need to be done openly, even if mediated and secured via blockchain techniques.

Offer Networks don't have to be transparent. But if they are transparent, they become a kind of Open Production Network. What we mean by the term "Open Collaboration/Exchange Network" or "OC Network" is an Open Production Network in which transactions are carried out either using exchanges in the manner of Offer Networks, which are transparently recorded; or using currencies whose values are (like OfferCoins) directly and transparently grounded in exchanges.

A distributed, decentralized software infrastructure for implementing this sort of economic framework might involve, for instance:

- Software "matching agents" that take request/offer pairs, and seek to find sets of requests/offers that will satisfy them.
- Matching agents would also provide "standard templates" for request/offer pairs, to make the process of requesting and offering less laborious. For example: a book reviewing template, a software-team formation template, a babysitting-club template, etc. New templates could also be created and uploaded and then potentially adopted by others.
- Software agents that report and summarize the networks of production involved in creating a good or service
- Software agents that allow a creator to register and broadcast the particulars of their involvement in production of a good or service

- Software agents that incorporate or otherwise formally concretize organizations that have been created via matching agents
- Matching agents could also dispense OfferCoins. Agents might then emerge to exchange OfferCoins associated with different matching agents, at various exchange rates.

This sort of open economy would have many advantages over current arrangements. It would enable and encourage people to incorporate as much I-You interaction into their economic exchanges as they have time for. It would ground money in specific exchanges between people in a transparent and concrete way, hence reducing the capability of powerful individuals to manipulate economies via behind-the-scenes monetary manipulations. It would provide mechanisms for creating exchanges and organizations that simply don't come about in the current economy – e.g., just to give a handful of almost arbitrary examples:

- writers reviewing each other's books on an exchange basis – resulting in more intellectual exchange happening; more growth of knowledge
- consumers paying writers directly for their articles, musicians directly for their songs, and so forth
- purchasers of electronics directing a bit of extra money or service to the individuals who assemble their electronics or deal with the garbage of their discarded electronics, out of compassion that emerges when seeing the actual humans involved in the production chains in which one's products are embedded
- teams coming together out of mutual interest, which (given the general nature of modern society) would not come together without some specific automated

matching mechanism. What useful or inspiring creative products might such teams create?

- consumers of food being able to read the comments written by the farmers producing that food. If the guy spraying a cornfield thinks a certain pesticide is bad and says so on his blog, you can find this by tracing through the Open Production Network to see which people were involved in growing the corn used to make the corn chips you're eating. You might even pay the farmer a bit for his blog post, to reward him for taking the time to share the information.

Transitioning to an Open Collaboration Network based economy of this sort would seem very difficult at present, because a likely effect would be to diminish the proportion of profit going to large corporations and their shareholders, and increase the proportion of profit going to individual contributors on all levels, and especially to individual contributors in developing nations. Most people would rather direct their value to the individuals more directly involved in producing the goods and services they consume. And many people would compassionately direct more value to individuals in the developing world, involved in the production chains underlying the products and services they consume, if they were directly connected to these individuals in a human way (seeing their pictures, reading their blog posts). It seems very unlikely that an Open Collaboration Network would lead to so many CEOs getting paid $20M/year while so many workers struggle in inhumane conditions for a dollar per day.

Humans are complex with multiple aspects. The current money-oriented economy tends to drive people to consider each other as objects, and to ignore other people's particularities, feelings, thoughts and needs. An Open Collaboration Network economy would help people to

interact with each other in more of an I-You fashion even when they are not living in the same community and interacting face-to-face. Of course, no economic system will magically make everyone wholly selfless and compassionate; and nor is this necessarily desirable. But there is no doubt that human behaviors and attitudes are heavily biased by the social networks and processes that people embed themselves in.

The Vision. The golden age for Open Collaboration Networks will come about once the era of scarcity is past and humanity enters into an era of abundance. After the singularity humans will enjoy a true economy of abundance and will not need to work in jobs in order to secure resources for their basic needs – food, water, shelter, clothing, healthcare, education, culture.

The available resources will not be unlimited, but they will be sufficient for everyday human happiness. Most people don't have a burning need to build a supercomputer the size of Neptune; even in an era of abundance, securing this level of resources might require some significant effort … but this sort of special-case problem will not concern the vast majority of people.

Some argue that people's desires will expand to exceed the available resources so that abundance will never be experienced, but we find this very unlikely. The human mind and body have their limits. We expect that, if people are physically comfortable and have ample mental and emotional and social stimulation, few of them will have a burning need to acquire more resources, a need sufficient to impel them to undertake long hours of unpleasant activities.

In an economy of abundance, the primary reason to carry out activities is for their intrinsic, personal or social value. As societies approach this state of abundance, people will have

more time for I-You interactions, and values and preferences will gradually change, especially among emerging generations. Some people, as technology advances sufficiently to enable radical abundance, may choose to enhance their minds and bodies so much as to become superhuman. The whole notion of economic exchange may become irrelevant for superhuman beings, even those that originated as humans. But for those who remain human in an era of abundance, human values will likely feel increasingly important, hence I-You interactions will likely feel like a critical part of life. Offer Networks and Open Production Networks, or more sophisticated variations of these ideas, would seem very natural ways to organize social, creative and aesthetic activities within a society of people whose main goals are to seek social, aesthetic and personal value.

The Transition. The similarity between this post-singularity utopian vision and the post-revolutionary vision offered by Marxist in the nineteenth and early twentieth centuries gives us pause. If we have learned anything from the experience of twentieth century revolutions, it is that humans find it difficult to adjust to revolutionary changes and that the period of transition from one condition to another can be very traumatic, often with massive loss of human life.

These transitions can be facilitated by building the new world gradually as the old one withers away, allowing people to gradually change their values and expectations. This might have been done better in the late nineteenth and early twentieth centuries if ideas already present at that time had been more successfully promoted. As Backer (1978: 2) observes, "if the French and French-speaking Swiss workers had triumphantly propagated Proudhon's ideas to the working classes of other European countries and in the process had eclipsed Marxist ideas, we would obviously live in a vastly different world."

Our task today is to propagate these and other ideas as widely as possible, encouraging experimentation and innovation, without pretending that we have a blueprint for the future. Of course, we cannot expect a wholesale shift to new modes of economic interaction in the current era of scarcity. But there are significant and growing opportunities to build these new institutions voluntarily within the legal framework of existing societies. The more this is done, the smoother the transition to a post-Singularity economy of abundance is likely to be.

As the era of abundance approaches, there is a growth of both challenges and opportunities. There are pressures for change that require a response, but that are not critical enough to generate a system breakdown and revolutionary transformation. Some of these factors include:

- The increasing concentration of wealth in a smaller and smaller percentage of the population of each nation
- The increasing elimination of jobs previously done by humans, and the taking-over of these jobs by machines
- The increasing dissemination of knowledge and information to everyone in the world, via the Internet, smartphones, and so forth
- The rise of "bullshit jobs" (Graeber 2013) which provide little true value to society, yet occupy people's time and provide them the money they need to sustain themselves in society

It's not hard to see where these trends are going. As robots and AI advance, eventually there will be fewer actually useful jobs left for people to do. This dynamic will be papered over

for a while by bullshit jobs, but eventually corporations will pare these down, as they are simply not beneficial to the bottom line.

As Marshall Brain (2015) has pointed out, one can expect this dynamic to kick in massively once computer vision systems reach the human level in accuracy. A surprising variety of jobs, today, basically consist of human beings serving as biological vision processors for complex computing systems. But vision is being worked on very hard by many large corporations – Facebook, Google, Baidu, and so forth. It is likely to be solved in years, not decades. And once it's solved, the long-discussed obsolescence of human labor via machine labor is likely to kick into high gear.

And then what happens to the people who are out of work? Options include

- They are left to die
- They are put on welfare – i.e. some form of "basic income" is put into place
- They are given "bullshit jobs" by the government, out of an archaic sense of work ethic

The fate of workers in the developing world is particularly concerning. It is relatively easy to foresee wealthy nations installing a basic income for their citizens, if the only apparent alternative is mass starvation and homelessness. It's more difficult to envision wealthy nations delivering a basic income to, say, sub-Saharan Africa. Will we see a situation where the majority of Africans need to return to subsistence farming, because the world economy has no jobs for them, but the wealthy nations (or, mainly, the small percentage of individuals who own the bulk of the wealthy nations) have no motivation to share their wealth? One solution may be to develop stronger direct relationships between local third world community systems of

exchange and production and high tech centers that can provide technology appropriate for the communities. Exchanges between these communities can be developed and maintained using the mechanisms discussed in this paper.

The further we can get toward an Open Collaboration Network type economy before human labor becomes obsolete, the better off we will be. What humanity needs, in order to launch a Singularity that is more likely to be positive for the vast bulk of people, is more I-You and less I-It; and Open Production Networks and Offer Networks will encourage this.

Sharing Common Resources. Open Collaboration/Exchange Networks also have potential to provide a highly effective method of dealing with common resources including

- Natural common resources such as air and water and parkland
- Man-made physical common resources such as bandwidth and transportation networks
- Informational and aesthetic common resources such as texts, music and visual art

Pure free market systems have a tendency to lead to "tragedy of the commons" problems, which are generally modulated in modern societies via government regulation. But government regulation is often heavy-handed, inefficient and slow to adapt.

In the case of informational and aesthetic commons, decentralized networks are already rising to the fore and wreaking havoc with the old ways – Wikipedia and peer-to-peer music sharing being two key, much-discussed examples. But these examples would actually benefit tremendously from an Open Production Network framework. As noted above, we suspect that if there were easy ways for music consumers to direct value to musical artists whose music they

appreciate, this would happen reasonably often, resulting in many musicians being compensated more than they are now.

And Wikipedia suffers somewhat from a lack of easy transparency. The internal politics and decisions of the cabal of high-ranking Wikipedia editors is opaque to most Wikipedia users. So, for example, Wikipedia pages on controversial topics such as transhumanism or psi can be "hijacked" by zealots with strong opinions, in a way that is hard for the ordinary reader to trace. One can read the discussion on a Wikipedia talk page, but one can't easily tell who a page's controlling editor is – how much they actually know about the topic in question, what their history of judgment or opinion on the topic is, etc.

In the case of physical commons, right now it is not made transparent how much of each common resource is used by each item we consume. For instance, many people in the US have coffee/tea machines that use small plastic coffee/tea cartridges – one for each cupful of beverage. These cartridges allow some small convenience. But they also create plastic garbage that has to go into some landfill somewhere – consuming a common resource. This is obvious when you think about it. But if the degree of common resource used by the plastic cartridges was made more apparent to the user – say, via a smartphone app that revealed the common resources used by an object whenever you photographed the object with your phone -- then one suspects the usage of these cartridges would go way down. Much as in the case of compassion for the workers laboring to make parts of one's electronics or clothes for a dollar a day, in the case of common physical resources as well, out of sight is out of mind. Opaque or difficult-to-unravel production networks, in a busy society, lead people to ignore things a few steps down the value

chain from the goods or services they consume. Transparent, open production networks would cause people to think a little more about the common resources they utilize.

Open collaboration/exchange networks would in many cases be considered a sort of "commons based peer production" (Kostakis and Bauwens 2014). But OC Networks could also be used for more hierarchically-organized production processes. Some processes may just be far more effectively executed in a fairly structured and hierarchical way, and there's not necessarily anything wrong with this. What OC Networks require is merely that the workings of the process be transparent, and founded on exchange media whose value is determined in a transparent way.

In a post-Singularity society, when a group of people share a set of common resources out of mutual agreement – such as desiring a communal lifestyle – this sort of transparent monitoring of commons usage would be an explicit part of the social contract. In contemporary, scarcity-era societies, most people find ongoing monitoring of commons-usage a hassle. To the degree the hassle can be minimized via transparent value chains and easy-to-use value chain inspection tools, people's best instincts and deepest compassion can be more frequently brought to bear on issues of commons usage.

Open Collaboration/Exchange Networks, AI and the Global Brain. Open Collaboration Networks do not intrinsically require advanced artificial intelligence. (Matching algorithms and so forth may involve optimization techniques, but these can be considered more "computer science" than AI.) However, AI has potential to greatly enhance the functionality of OC Networks in multiple ways, for example:

- Suggesting matches for people's offer/request pairs, based on understanding of the associated "soft constraints" and preferences

- Identifying which portions of the value chain a person will find interesting to look at
- Carrying out matching of requests and offers in ways that maximize beneficial use of common resources; and recommending purchases or request/offer pairs that seem likely to provide people with satisfaction while also being beneficial in terms of common resources

The latter function would enable AI to serve as the engine of a kind of "automated commons" – but not in isolation; rather, enmeshed with the operation of an overall OC Network. In this context, I-You relationships with other people providing goods and services would naturally occur alongside I-You relationships with common resources. The general vibe of economic interaction would be one of inspecting and understanding the exchanges implicit in one's choices – be these exchanges with other people or with common natural, physical or informational resources – rather than one of considering exchanges as isolated transactions of money for goods or services without any richer contextual meaning.

As with exchanges between individuals, this would not be utopic and would certainly not eliminate conflicts regarding utilization and development of common resources. However, it would tend to bring out people's better, more prosocial sides rather than their more selfish or indifferent sides. Whereas the current socioeconomic organization, focused on I-It monetary exchanges, tends to amplify people's tendencies toward selfishness and unempathic treatment of others.

Given the complexity of modern economies and the value chains that comprise them, there seems a potential major role for AI in presenting people with the human and commons

related consequence of their choices, and suggesting to them choices they will find relatively satisfying in all dimensions. Such an AI (or network of AI agents) would serve as a key tool shaping the network of human and robotic or digital economic agents into a kind of "global brain."

This sort of global brain would keep global aims (regarding common resources) in mind, and make recommendations to individuals regarding ways to fulfill their individual desires while also serving global aims effectively. It would also guide people to think more pro-socially and to engage in I-You interactions with others and with their physical, natural and informational environment. It would not interfere with people's right to make any sort of offers and requests they like (though of course societal laws might forbid certain offers); but it would nudge people's behavior in certain directions.

In current society individuals' choices are most commonly nudged via advertising, which has the key goal of maximizing shareholder value for large corporations, i.e. of accelerating the concentration of wealth in a small fraction of the population, and directing people's minds toward acts of consumption. Nudging people in the direction of I-You interactions and collectively positive growth and development of common resources does not seem inferior.

An Example Scenario. To make these ideas more concrete, let us consider an example scenario. Consider the case of an entrepreneur who wants to create a new form of entertainment robot, and have it manufactured at scale and sold.

Currently, in order to do this, the entrepreneur first must acquire funds from somewhere — perhaps via working in a job doing something else that society values more greatly, or perhaps via soliciting funds from a wealthy individual (who has, or whose parents or ancestors

have, done something that society values), or a venture firm funded by wealthy individuals, etc. Then the entrepreneur must make a conceptual design for the robot, and outline specifications for the robot's behavior. Then she will hire a prototyping firm to create a prototype version. They will pay employees to build the prototype, and will build in a certain profit margin to their fee, which the shareholders of the firm will ultimately use to enrich their lifestyles. Then to get the prototype built at scale, she will need to find funds to have a factory create the appropriate tooling for his product, and do an initial production run. If she doesn't have the funds on hand, he will go to a bank to borrow money for this… Then she will hire a marketing firm (which will also build in a profit margin to their fees, which will go to their shareholders) to market her product. Shippers and retailers also come into play, each with their own profit margins.

To choose which prototyping or marketing firm to use, and which factory to use, the entrepreneur will ask others she knows, to assess the reputations of various alternatives. She may find that the factory delays production of her robot for unclear reasons — e.g. they may tell her a bunch of obviously false stories about the delay, when the truth is that a bigger and more important customer temporarily pre-empted his production run. The marketing firm will pay media sources to run ads for her robot, intended to grab people's attention so they know the new robot exists. These ads enable the media source to (after extracting their profit margin) pay journalists to write articles, or actors and production crews to create videos.

One thing to note in the above process is: the process of transforming the entrepreneur's entertainment-robot design into a product, and bringing this product to the attention of potential consumers, involves a host of different business organizations, each one of which takes a certain profit, which is then distributed to the shareholders of the organization. If the product is

successful, the entrepreneur will benefit financially from the sales of her robot. But the various shareholders along the production chain will likely, as a group, benefit far more. They may "deserve" this, in the sense that they (or their ancestors) may have accumulated the funds they invested in the businesses along the way, via creating things of value to society. On the other hand, there is a well-documented "increasing returns" phenomenon regarding wealth (Piketty, 2013). The more money you have, the easier it is to make even more money. On the whole, funds achieved via investment dwarf funds achieved via directly creating products or executing services.

What would the above process look like in a world dominated by Open Exchange Networks? The entrepreneur could use an offer network in a crowdfunding-type manner, and offer to provide entertainment robots meeting a certain description to people, if the number of people willing to exchange at least 50 OfferCoins each for such a robot exceeds a certain number (say, 10,000, if this was the minimum amount needed for an economical production run). Supposing she gets enough takers, then other vendors may enter into the exchange via the offer network.

A prototyping collective (a group of people with diverse skills, working together to make hardware prototypes for various products) may have an outstanding offer to create a prototype based on someone's design, IF someone (potentially someone else) will provide them a certain amount of cloud-computing time, for use on their various projects. The folks desiring to obtain the robots can then use various pay or exchange mechanisms to obtain cloud computing time, which can be supplied to the prototyping collective. The prototyping collective itself may have

formed via answering someone's offer-network "call for participation" aimed at pulling together engineers, artists and project managers to create a viable prototyping organization.

All these chains of interaction would be mediated by software behind the scenes, requiring little more effort than making a credit card transaction. Similar chains would be carried out to handle marketing and manufacturing. The choice of prototyping collective, marketing collective and factory may be made solely by the entrepreneur, or the entrepreneur may ask the folks requesting the robots which of the available firms they prefer. Information about the history, philosophy and practices of each firm would be readily available. The customers might decide to pay 55 OfferCoins each, instead of the original 50 coins mentioned, to have the robot made in a factory that treats its employees especially well. Instead of advertising, exchanges might be used wherein people agree to watch brief videos about other people's products or ideas, in exchange for small amounts of OfferCoins, or in exchange for people watching their own videos or consuming other media productions they have created.

In this futuristic-economy version of the process, exchanges are occurring between individuals actually directly providing products or services, or organizations of people who gathered together as a team to provide a certain type of product or service that is better delivered by a group than by an individual. Shareholders play no role, and banks and loans are not needed. Everyone can, if they care enough to look, see the various ingredients going into the products they buy and create, and the services they receive and offer. End users of the product become familiar with the entrepreneur via their response to his initial offer, and also may be familiar with the prototyping firm due to noticing the cloud compute time they provided to them via the exchange network. Some may communicate with the entrepreneur or with each other

regarding the choice of factory or prototyping or marketing firm, and establish relationships valuable in future interactions. The role of the consumers and various organizations in the chain, in helping select the various other organizations in the chain, ultimately means that the nature of the final product is not the result of the entrepreneur alone, but of all the individuals along the way. If the prototyping collective is more of a freely formed network of collaborators than a typical hierarchical corporate structure, then the individuals involved in the collective are more likely to feel incentivized and permitted to provide their own opinions regarding various decisions made along the production chain.

Rather than posing as the sole creator of the product, the entrepreneur appears explicitly as the seed of a creative process carried out by a subnetwork of the Global Brain. Of course, something like this is already the case -- products already emerge from collective activity in self-organizing distributed networks of humans, machines and organizations. But the tendency toward secrecy and hierarchical organization, enforced by (among other factors) the key economic role played by businesses with a central goal of competitively maximizing shareholder value, places the focus on processes occurring within organizations and individuals rather than on distributed network activities. In the Open Collaboration/Exchange Networks approach, interactions occur among individuals -- and organizations form based on explicit exchanges between individuals -- and this allows higher-level patterns of organization and adaptation to become more complex and explicit.

The only "middleman" involved, in the Open Collaboration/Exchange Network scenario, is the software mediating the matching and distribution of offers and requests, the formation of teams, the inspection of chains and the assignment of reputations. This, however, can be

open-source software running peer-to-peer, or using cloud-compute time obtained via offer-network exchange with users. Donations from users of the software would likely be more than enough to fund an open-source development team maintaining and improving the software. Multiple coopeting versions of the software may exist, much like multiple Linux versions today.

This sort of futuristic, open exchange process doesn't require post-Singularity levels of abundance. It would work just fine in a massive-material-abundance situation where the only service being exchanged is human attention; but it also makes sense in the case of moderate material scarcity, such as we face in the world today. All it really requires is that the technology to enable open exchange and open production be relatively inexpensive. And arguably, we already are in this situation today. What keeps us from having an Open Collaboration/Exchange Network economy right now, in the developed world at any rate, are basically inertia and lack of broad understanding. But the cheaper and more pervasive communication and computing technologies become, and the more advanced AI and other software becomes, the less it will take to jolt our current economy substantially in an Open Collaboration/Exchange Network direction.

Conclusions. Currently emerging technologies have the potential to facilitate both utopian and dystopian outcomes. The kind of totalitarian state envisioned by Orwell in *1984* could be even more oppressive with modern computer networking than it was with the television cameras he envisioned (Pavlovski 2014). But mutualist and communitarian alternatives could also work better with the kinds of technological innovations we have described. To a great extent, new technologies make it possible to transcend the dilemma between the need for the efficiencies of scale and the desire for human-level interaction. The particulars via which this

potential will be realized, are difficult to foresee -- and to some extent, are ours to shape as we unfold the future together.

These changes can be implemented gradually, alongside the current market system, and will play a larger and larger role as intelligent technologies lessen the need for either economic or political coercion. Most likely, neither capitalism nor the state will disappear, but their role may diminish drastically to the extent that other institutions are created to take their place. As human and post-human activities are increasingly coordinated by the global brain, managing these activities will give the global brain better access to the thoughts and motivations of human and other actors -- and this access will ongoingly reshape the nature of the global brain itself.

Currently, in a non-transparent economy, the global brain has very limited access to a lot of what goes on in its "mind," just as humans have limited access to the minds of other humans. Open Networks will facilitate introspection and analysis, by humans and by artificial intelligences, into the massive details of a very complex emerging system. It is impossible to predict how this system will evolve, but there are concrete steps we can take now to help it evolve for the best.

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