The Internet of Communities (IoC)

Concept note

Intention

Rewiring the social fabric

The Internet of Communities (IoC) stems from the idea that human organizations would actualize greater value if they could maximize social engagement. Paradoxically, while a tremendous amount of resourceful people are immersed in connectivity, they have hard times to thrive individually and, as human groups, to address their challenges collectively. We propose that the main reason is that the social fabric is poorly wired to inspire cooperation and to trigger social engagement.

Even though opportunities, ideas, and solutions are abundant, people and their social organizations swim in an ocean of untapped resources. As a result, they experience a sense of lack, of struggle and of scarcity. We believe that this does not need to be a fatality. By rewiring our social fabric in a way that is more conducive to social trust[1], we might be able reach viable cooperation thresholds and maximize social engagement.

Inspired by close-knit communities like music bands, sport teams and start-ups, and mimicking complex adaptive systems that have simple rules of operation and no central coordination, the IoC proposes to scale up social trust and therefore social engagement in a way that is yet to be addressed by new social technologies.

[1] Cristiano Castelfranchi and Rino Falcone define social trust as the feeling about the good disposition of the other. In Cristiano Castelfranchi and Rino Falcone, *Social Trust: A Cognitive Approach*, National Research Council - Institute of Psychology, Unit of AI, Cognitive Modelling and Interaction, Roma, Italy, Jan 2015.

Opportunity

Without trust, online communities are left with an unmet potential

Even though we now have a much greater breadth and rate of interaction, the number of trusted peers we have today is pretty much the same as it was before the rise of social networks. And while these platforms provide an unprecedented opportunity to meet and interact with new people, they offer little tools for users to build confidence among themselves.

Being centralized systems, trust between participants is mediated by a central authority. The very architecture of such top down environments discourages those participants from developing personal relations of trust as a fundamental element in their relationships. *"Social networking platforms typically rely upon proprietary business models that collect and sell personal information about users, which is exposing another sort of structural barrier: social distrust. [...] But if networked technologies could enable individuals to negotiate their own social contract(s) and meet their needs more directly and responsively, it would enable the new sort of effective, quasi-autonomous governance and self-provisioning".*[2] Not ideally wired to forge bonds of trust between themselves, people come to lack the supportive social fabric they benefit from in their offline communities.

And with business models primarily focused on communication and network growth, users are encouraged to connect with an ever expanding set of peers that goes beyond the reality of their social interactions: *"[...] mounting evidence suggests that many of the forecasts and analyses being produced misrepresent the real world".*[3] Multiple distortions and biases from real life experiences prevent people from assessing the reliability of those they wish to engage with.

As a result, while social trust is pervasive in all human affairs, it still does not thrive in online communities. Cooperation is unlikely to occur, levels of engagement remain far below their potential, and little added value is created. Agreeing that *"[...] the social media outlets available could largely mold the ways in which individuals meet and*

[2] Bollier, D., Clippinger, J. H., *The Next Great Internet Disruption: Authority and Governance*, in *From Bitcoin to Burning Man and Beyond, The Quest for Identity and Autonomy in a Digital Society*, ID3, 2014, p. 24.
[3] Dhavan V. Shah, Joseph N. Cappella, W. Russell Neuman, *Big Data, Digital Media, and Computational Social Science: Possibilities and Perils*, The Annals of the American Academy of Political and Social Science, May 2015 vol. 659 no. 1 6-13.

interact",[4] the tool is meant to better adapt to the reality of social interactions, not the other way around. Indeed, we believe that, without addressing relationships between people, online communities are left with an unmet potential and with an equally unmet opportunity.

Proposal

Adding a layer of trust, interdependence and reciprocity on the Web

Inspired by close-knit communities and by complex adaptive systems,[5] the proposal is to add a layer of social trust, interdependence and reciprocity on the Web with no central control and with simple rules of operation. First, by interconnecting a multitude of human-sized communities, people are more likely to be part of a strong social fabric. Social trust is therefore more likely to remain strong enough for engagement to occur. Second, assuming that bad reputation repels and that good reputation attracts, the IoC aims to explore how collective reputation can be used as a catalyst to regulate social interactions. Indeed, if reputational interests are intertwined, a collective reputation mechanism could act as a systematic incentive to inhibit behaviors that are detrimental to the collective reputational asset, and to foster those that are beneficial to the group. Third, confined to small networks and tied by shared responsibilities, users will have to remain attractive to their peers. As a result, there is a strong incentive to anchor relationships in reciprocity, fairness and excellence. In that scheme, influence and leadership are more likely to shift to those who positively impact their communities, to those who lead by example, and to those who reciprocate with fairness. The desired output of the IoC is to facilitate the free association of people for common purposes. The method is to immerse social interactions in trust, interdependence and reciprocity. The main distinctive features of the Internet of Communities are:

1. human-sized networks nested in a continuum of trust
2. interdependence expressed by collective reputation
3. leadership anchored in reciprocity (emergent property)

[4] Kathryn Porter, *et al., Effects of Social Media Use on Relationship Satisfaction*, Chapman University, online pdf.
[5] A complex adaptive system is defined as *"a system in which large networks of components with no central control and simple rules of operation give rise to complex collective behavior, sophisticated information processing, and adaptation via learning or evolution"*. Melanie Mitchell, *Complexity: A Guided Tour*, Oxford University Press, Sep 2011.

1. Human-sized communities nested in a continuum of trust

Everyone knows people who can be trusted for certain human qualities, expertise, knowledge, know-how, *"street wisdom"* and unique life experience. This trusted social fabric one has access to, is here understood as a social portfolio of talents and expertise that can be easily mobilized (*see fig. 1*). Indeed, due to the nature of their privileged relationships, the real value of this social portfolio comes from the ability for individuals to engage each other. Everyone is therefore the gatekeeper of a social asset or social capital[6] of great value. The social portfolio can be seen as a personal network of trusted peers.

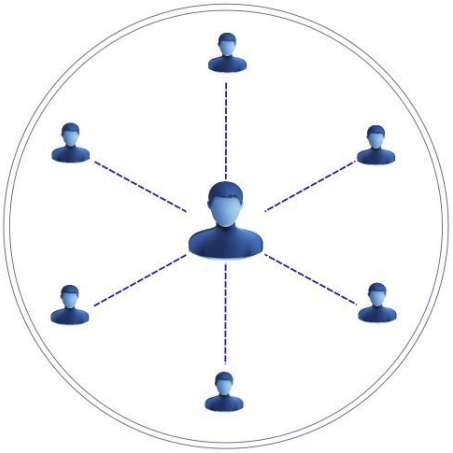

Fig. 1. Investing trust in others, the social portfolio.

Being able to trust others provides enormous advantages. Yet, trust being a willingness to depend on someone,[7] trust is therefore the willingness to take a risk, the risk of being betrayed. Because of this prospect, those special relationships can only be shared with a limited set of peers.[8] A social portfolio might be populated in part by those who are known to be trustworthy thanks to an extensive shared experience, and in part by those who are believed to open a window of opportunities though their track record might be thin and their trustworthiness not fully assessed. *"The fewer indirect contacts one has the more encapsulated he will be in terms of knowledge of the world beyond his own friendship circle; thus, bridging weak ties (and the consequent indirect contacts) are*

[6] Francis Fukuyama defines social capital as *"a capability that arises from the prevalence of trust in a society or in certain parts of it"* . Francis Fukuyama, *Trust: The Social Virtues and The Creation of Prosperity* , Free Press, 1995. Robert Putnam defines social capital as *"connections among individuals - social networks and norms of reciprocity that arise from them"*. Robert Putnam *et al.*, *Making Democracy Work: Civic Traditions in Modern Italy*, Princeton University Press, 2000, p. 19.

[7] David Gefen, Izak Benbasat & Paula Pavlou (2008), *A Research Agenda for Trust in Online Environments*, Journal of Management Information Systems, 24:4, 275-286.

[8] Anthropologist Robin Dunbar found a cognitive limit known as the Dunbar's number that prevents people to maintain qualitative relationships beyond a limited set of peers. Robin Dunbar, *Neocortex Size as a Constraint on Group Size in Primates* , Journal of Human Evolution 20 (6), 1992, pp. 469-493.

important in both ways".[9] Therefore, individuals are encouraged to balance risks and opportunities by teaming up with those who are known to be reliable on one hand, and on the other hand, with those who are more risky in terms of reliability but who are also more likely to increase their chance to connect with new social landscapes and meet new opportunities.

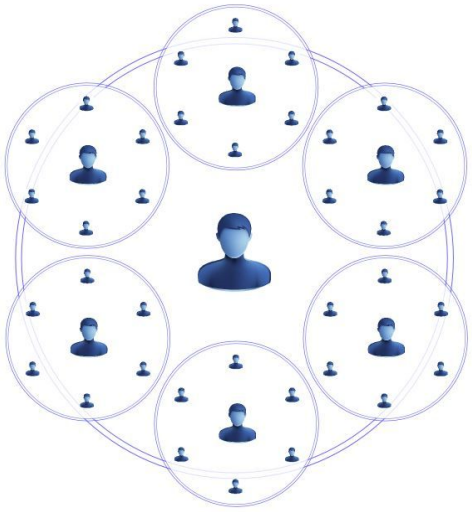

Fig. 2. People are both at the center of a micro social world and at the verge of many others.

People are at the center of their micro social world and at the verge of many others, meaning that they have a foot in various communities (see *fig. 3*). Everyone can therefore match a need expressed in a community with a corresponding resource found in another one. Like in real life, trusted peers are the doorways to a wider array of people and resources beyond what one has usually access to. The motive for individuals to bridge different micro social worlds could be manifold. Some may want to find complementary talents and missing expertise for their projects, some others may want to be the catalysts of potential success stories and enable win-win opportunities for themselves and their peers, and some others may want to build up collective capacity to access greater resources than possible individually.

[9] Mark S. Granovetter, *The Strength of Weak Ties,* American Journal of Sociology, Volume 78, Issue 6 (May, 1973), pp. 1360–1380, p. 1371.

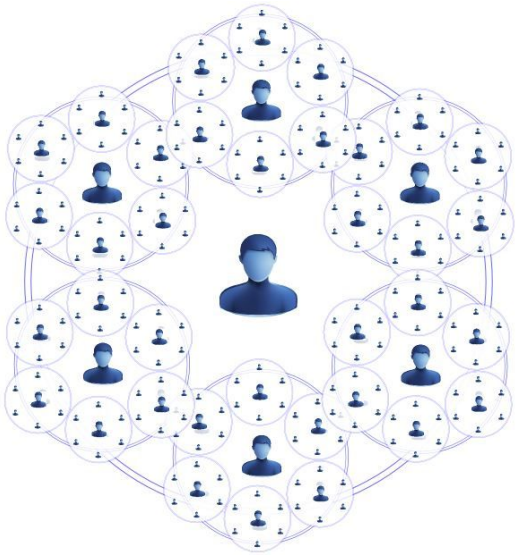

Fig. 3. User-centric network. Everyone being immersed in a social fabric, useful resources might be just a few handshakes away.

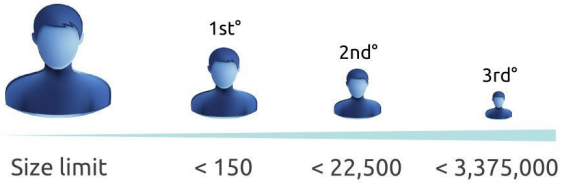

Fig. 4. A three degrees network: 1st° trusted peers (social portfolio), 2nd° pool of available resources within easy reach (friends of friends), 3rd° zone of influence (visibility).

The fact that people can easily mobilize their trusted peers and the fact that people are in a unique position to make meaningful links between people who are unaware of each others, highlight the first potential features of a network made of human-sized communities nested in a continuum of trust. The first one is the build up of a robust recommender system based on trusted first-hand information, and the second one is the advancement of an informal knowledge network that materializes the trusted relationships people maintain within, between, and beyond the social organizations they belong to.

1.1. A robust recommender system

Most often, online recommender systems are based on reputation. Reputation is "*an information used to make a value judgment about an object or a person we don't know yet*".[10] Today's online approaches include a lot of information provided by a lot of mostly unknown people. *"[…] users increasingly have to interact with unknown people. When choosing their interaction partners, they often lack direct experience and are forced to rely on ratings provided by others who are often unknown themselves"*.[11] Thus the

[10] Randy Farmer, Bryce Glass, *Building Web Reputation Systems*, Yahoo! Press, 2010, p. 8.
[11] Stephan Hammer, Rolf Kiefhaber, Matthias Redlin, Elisabeth Andre, and Theo Ungerer, *A User-Centric Study Of Reputation Metrics in Online Communities*, Department of Computer Science, Augsburg University, Jan 2013, p. 1.

users are faced with uncertainty as to whether this information is reliable.[12] While such reputational statements have virtues, the IoC proposes to offer stronger reputational claims that come from trusted sources, that can handle multiple dimensions of complexity and that are more honest and authentic. For that purpose, the IoC is designed (1) to deal with first-hand information only, and (2) to engage the reputation of those who provide recommendations.

First, people only resort to reputation when they do not have first-hand information. In other words, they rely on a social evaluation that strangers generate for other strangers with the belief that collective opinion is better than ignorance. By being remote to its source, reputation is by definition subject to distortion.[13] Indeed, reputation expresses a perception that may not reflect the inherent qualities of people: *"[…] When we refer to a person's reputation, we recognize that reputation is our perception of the person, that it is externally derived and not necessarily intrinsic to that individual. In other words, we understand that a person may not have complete control over the perception that has been created"*.[14]

Second, it becomes increasingly challenging to verify the sources that provide such reputational information: *"Distinguishing between bots and real users is a persistent problem for social networks. Fake users are often created to help users look more popular or to promote a product"*.[15] And, with an increase in online social interactions, "[…] *so does the threat of agents seeking to weaken the network by propagating bad information and services. […] Because of this danger, users must be wary of the quality or validity of the resources they access"*.[16] Research has pointed out that people tend to rely more on recommendations from people they trust (friends) than on online recommender systems which generate recommendations based on anonymous people similar to them.[17] It is reasonable to assume that with online reputation, no information *out there* is trustworthy, only the one emanating from a trusted source may. "*Belief should only be accorded to statements from people we deem trustworthy"*.[18] And *"It has been suggested that the future development of P2P systems will depend largely on*

[12] Stephan Hammer, Rolf Kiefhaber, Matthias Redlin, Elisabeth Andre, and Theo Ungerer, *A User-Centric Study Of Reputation Metrics in Online Communities*, Department of Computer Science, Augsburg University, , p.2.
[13] Cheryl Conner, *Amazon Sues 1,114 Fake Reviewers On Fiverr*, Forbes, October 18 2015.
[14] Governor Sarah Bloom Raskin, *Reflections on Reputation and its Consequences*, at the 2013 Banking Outlook Conference at the Federal Reserve Bank of Atlanta, Atlanta, Georgia, February 28, 2013.
[15] Deepa Seetharaman, *Fake Accounts Still Plague Instagram Despite Purge, Study Finds*, The Wall Street Journal, US Edition, June 30, 2015.
[16] Sergio Marti and Hector Garcia-Molina, *Examining Metrics for Peer-to-Peer Reputation Systems*, Technical report, Stanford University, 2008.
[17] Patricia Victor, Chris Cornelis, Martine De Cock, Trust and Recommendations, Dept.of Applied Mathematics and Computer Science, Ghent University, and Institute of Technology, University of Washington Tacoma. Also *"Nielsen: Global Consumers' Trust in 'Earned' Advertising Grows in Importance"*, April 10, 2012.
[18] Cai-Nicolas Ziegler, *On Propagating Interpersonal Trust in Social Networks,* in *Computing with Social Trust*, Human-Computer Interaction Series, Springer, 2009, p. 133.

the availability of novel methods for ensuring that peers obtain reliable information on the quality of resources they are receiving".[19]

Moreover, reputation evolves over time, depends on context, and is subject to personal interpretations. Therefore, while global ratings and trust scores have value when no better information is at disposal, they imply a necessary trade off in terms of accuracy and relevancy. On the contrary, *"Local Trust Metrics"*[20], or techniques able to predict the trustworthiness of a user in a personalized way, depend on the very personal view of individuals. Local Trust Metrics, in this sense, better correspond to the traditional approach of gathering information about someone's reputation which entails asking only a small number of trusted people. This results in a smaller amount of information, but also in mostly credible information. In the IoC, individuals do not need to rely on reputation because every new interaction is initiated and introduced by a trusted peer. Individuals can take advantage of the degree to which everyone knows everyone else to deliver first-hand and tailored information across their networks. The IoC is not about relying on the objectivity of reputational statements that can never be determined, instead it is about relying on the subjective opinion of the peers people trust.

Following that individuals provide first-hand, personalized and contextualized information, they engage their integrity toward their peers who will eventually respond in direct proportion. The main difference with traditional reputation systems resides in the fact that, while it does not cost much to individuals to express biased reputational claims for strangers, a breach in confidence with trusted peers might have devastating effects on their relationships, and in turn on their social asset, their social portfolio. It is probable that those concerned will not lose time in arguing endlessly. Instead, they are more likely to translate their statements in actions as those speak louder than words. In economics, this is coined as *"revealed preference"*.[21] Those who generate problematic relationships might lose access to their peers and to the groups of people behind them. The incentive to provide fair, accurate and relevant information is therefore much stronger if trusted relationships are at stake. Trustworthiness, or the belief in benevolence, ability and integrity of peers, is thus framed by intertwined reputational interests.

[19] Rod Collins, *Is Hierarchy Really Necessary?*, The Huffington Post, US Edition, 05/05/2016.
[20] http://wiki.p2pfoundation.net/Trust_Metrics
[21] Paul Samuelson, *A Note on the Pure Theory of Consumers' Behaviour*, Economaica 5 (17): 61–71. JSTOR 2548836.

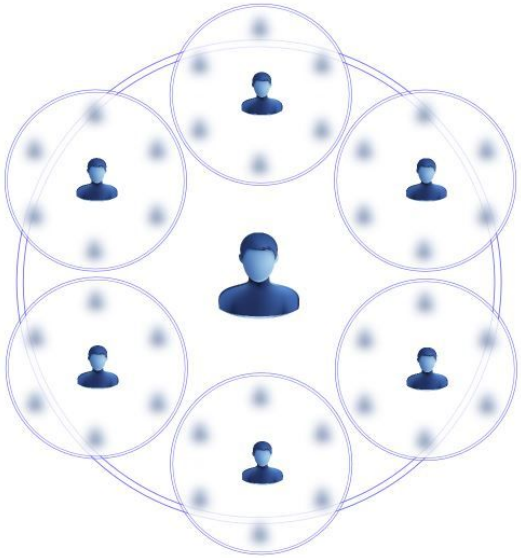

Fig. 5. Everyone being a membrane and a gatekeeper, privacy is better preserved.

The IoC aims at creating a more robust recommender system based entirely on first-hand information and secured by a reputational risk for those who recommend. Being personalized, the provided information is more relevant to those who request. Being intermediated and contextualized, the provided information better preserves the privacy of those who are recommended (see *fig. 5*). Because any new recommendation represents both an opportunity and a reputational risk, those who recommend act simultaneously as catalysts and as safekeepers of their social asset. Above all, they need to engage their integrity if they want to remain worthy of other people's trust. Because the IoC proposes a recommender system based on trust, not on reputation, reputational biases like herding behaviors, snowball, and bandwagon effects are not part of the picture.

1.2. An informal knowledge network

The second advantage of having human-sized communities nested in a continuum of social trust is that they allow to weave informal knowledge networks that are not tied to or restricted by any particular organization (see *fig. 6*). These networks create informal channels through which individuals gain additional intelligence. These informal exchanges allow them to keep themselves up to date and to remain agile. This is in sharp contrast with formal social organizations, public or private. Being top down, these social systems leverage control to maintain equilibrium by compartmentalizing themselves under a formal hierarchy.[22] While pyramidal structures provide clear lines of command and clear lines of communications, they also yield several impediments. Because they

[22] The business title *"Chief Executive Officer"* borrows from the military vernacular.

centralize power and authority at the highest levels possible, the leadership makes a suboptimal use of internal resources. Because they are compartmentalized, departments [23] develop tunnel vision reducing internal cooperation thus limiting the use of collective intelligence. Because members of such organizations are supposed to fit the form, they cannot fully express themselves and, in consequence, develop a habit to disengage from their work.[24] Because requests must travel up and then back down the chain of command, such organizations are by default impaired in dynamic environments and struggle increasingly to keep pace with the rate of change. In today's unpredictable context, a rewiring of human organizations is no trivial matters considering that change might soon imposes itself as the only constant.

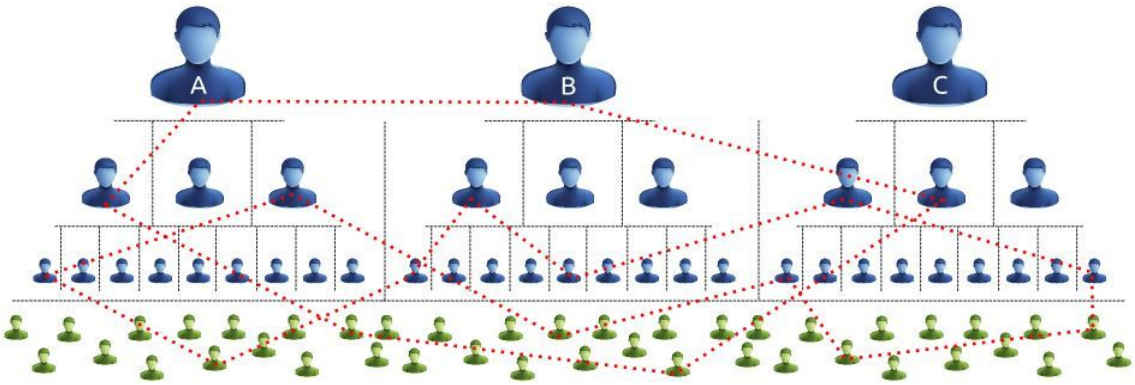

Fig. 6. Materializing the existing informal knowledge network interwoven within, between, and beyond formal organizations (A, B, C).

In a collaborative context, as organizations attempt to connect with their communities of fans, users, and potential customers (green icons in *fig. 6*), friction arises between the need for the hierarchy to keep control on one hand, and for the organization to open to new trends on the other hand, knowing that users are more likely to engage with organizations that are more open and reactive. The price for holding old organizational beliefs might well be to lose momentum with society, and therefore relevance as an organizational model. *"More and more, our organizations will become a network-of-networks: people who stay connected with one another and reach out for knowledge or expertise when needed".*[25]

Indeed, members at any level of a social organization can act as evangelists and reach out to various community leaders outside their organization so that it may gain in visibility, credibility and in detecting new opportunities. In turn, community leaders and their peers can more easily access and tap resources within the various levels and

[23] From Late Latin *"Departire"* from which English borrowed the sense of *"separate division, separate business assigned to someone in a larger organization"* (c. 1735).
[24] More than 70% of employees feel disengaged at the workplace, Gallup report 2016.
[25] Ken Perlman, *It's the End of an Era - Enter the Knowledgeable Networker*, Forbes, Leadership, Feb 13, 2013.

departments of formal organizations their trusted peers give access to. A knowledge network would offer an opportunity for organizations to better connect with their communities, and for these to upgrade from the status of followers to the status of partners so that they can make their voice heard more effectively.

By definition, the IoC is naturally a knowledge network. Indeed, individuals team up with people they trust not with those based on organizations affiliation. *"Knowledge networks are collections of individuals and teams who come together across organizational, spatial and disciplinary boundaries to invent and share a body of knowledge. The focus of such networks is usually on developing, distributing and applying knowledge. [...] Most researchers agree that network members participate out of common interest and shared purpose rather than because of contract, quid pro quo or hierarchy".*[26] Being more agile, dynamic and purpose oriented, informal knowledge networks that permeate multiple social organizations might be able to create new channels and increase capacity by circumventing hierarchical bottlenecks.

In summary, human-sized communities nested in a continuum of trust would offer:

- A robust recommender system that provides first-hand, personalized, and contextualized information that better preserves the privacy of those recommended and that is secured by the reputation of those who recommend.
- An informal knowledge network that provides intelligence and additional channels for people and organizations to better adapt to change.

[26] Katrina Pugh, Laurence Prusak, *Designing Effective Knowledge Networks*, MIT Sloan Management Review, Sep 2013.

2. Interdependence expressed by collective reputation

Because trusted peers always make the link with new people, reputation is not seen in the IoC as a way to assess new potential relationships. Instead, reputation is foreseen in the IoC model as a way to regulate social interactions within the group. A collective reputation mechanism has not yet - to the best of our knowledge - been deployed on the social Web. Similar to shared intentions, joint responsibilities and shared outcomes, collective reputation is a means for a community to express its interdependence and its strength as a whole. The recognition of interdependence is indeed the implicit recognition that people are stronger together. Interdependence is thus an expression of mutual empowerment. To be effective, mutual empowerment prompts individuals to favor benevolent behaviors toward each other and this is the purpose of a collective reputation mechanism.

When the inclination for benevolence toward others conflicts with the pursuit of individual interest, dissension is poised to arise and the belief in good practices alone is wishful thinking. Therefore, the primary goal of collective reputation is to resolve the conflict between individual and collective interests by providing behavioral incentives that align them toward common purposes. In that sense, collective reputation seeks to inhibit *free-riding* by rendering the pursuit of narrow advantages less desirable than the pursuit of more inclusive ones.

Assuming that bad and good reputation either repel or attract, the IoC aims to explore how collective reputation can be used as a catalyst to regulate social interactions without the need for a central coordination. Indeed, if the reputation of individuals affects the reputation of those they team up with, an internal collective reputation mechanism could act as a systematic incentive to curb behaviors that are detrimental to the collective reputation, and to foster those that are beneficial to the reputational asset. In that sense, collective reputation has the potential to foster qualitative participation and collective intelligence because individual issues are to some extent collective issues.

Fig. 7. Typical unidimensional rating distribution for user review. 2 star ratings are usually the smallest value, 1 star ratings express discontent, while 3, 4, and 5 star ratings express various degrees of satisfaction magnified by user's comment.

Fig. 8. IoC's wheel of recognized qualities. Multidimensional quantitative (from 1 to 4: -, +, ++, +++) and qualitative (free text input) feedback where users can celebrate their peers and raise concerns about their relationships and share leadership.

The premise of collective reputation is that one's reputation is to some degree affected by the reputation of the individuals or of the organizations one is affiliated to. Conversely, we might say that a group's reputation is only as good as that of its members. This reciprocal influence induces that each group member's welfare and incentives are affected by the group's reputation.[27] Thus, the IoC aims to explore how internal leaderboards, as embodiment of the collective aura, have the potential to create group dynamics that promote:

- Increased participation, both individually and collectively
- A self-regulatory mechanism for social interactions

2.1. An increase of individual and collective participation

Financial incentives are not always the main incentives behind social participation. Indeed, relying on such incentives have several limitations. First, money being a scarce resource, a limited amount of resources can be activated. Second, because financial incentives are a compensation for a work that would not been done otherwise, when the financial reward stops, so does the participation. Third, within emotionally bonded

[27] Jean Tirole, *A Theory of Collective Reputation* , The Review of Economic Studies, Vol. 63, No. 1, Jan 1996.

communities, financial retribution is neither the most natural nor the most effective way to leverage resources. Studies abound to show that money is in fact not a strong motivator and that intrinsic motivation is a stronger predictor to engagement.[28] The Internet of Communities wishes to explore how to better spark social engagement through internally rewarding incentives such as positive emotions and intrinsic motivations.[29]

Game theory recognizes positive emotions as powerful drivers to foster participation.[30] Particularly, positive psychology claims that the state of flow or *"the mental state of operation in which a person performing an activity is fully immersed in a feeling of energized focus, full involvement, and enjoyment in the process of the activity"* is the optimal strategy to stimulate engagement. The pleasure to belong, to share, to teach, to learn, to discover, to take part in epic adventures, to impact together and to be recognized for who we are, is a set of positive emotions that is grounded in intrinsic motivations. When individuals have the chance to embrace activities that are internally rewarding, they are more prone to act from their highest place with the lowest reliance possible on external rewards and future outcomes.

Neuro-imagery demonstrates that our brains neurologically compute positive emotions as being as valuable as money.[31] Respectively, the IoC promotes a crowd sourced environment where individuals can deploy their talents, where they can freely engage in activities that are aligned with their core motivations and where they can freely team up with like minded peers to tackle challenges that matter to them. The destination being less important than the journey, prime motives for participation do not depend on external rewarding schemes. Not knowing *where* it goes, individuals rejoice the process of *how* it goes.

To create group dynamics, the accomplishments of the many individuals who belong to a group or to a project (see *fig. 9*) are displayed on relative leaderboards. Being affected by the input of many individuals, the internal leaderboard continues to evolve over time. This might create a pull toward an increased participation and toward excellence for individuals to keep pace with those who lead. *"Creating competition and fostering cooperation are two alternative ways of creating incentives. […] The question we tackle here is: when should incentives be provided collectively, on a team basis, or relatively, thereby creating competition among the agents? Most of the mechanisms*

[28] Tomas Chamorro-Premuzic, *Does Money Really Affect Motivation? A Review of the Research*, Harvard Business Review, April 10, 2013.
[29] Ryan, R. M.; Deci, E. L. *Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-being*, American Psychologist, 2000, 55 (1): 68–78.
[30] Barry O'Neill, *Approaches to Modelling Emotions in Game Theory*, Visiting Professor, Department of Political Science, Visiting Fellow, Center for International Security and Cooperation, Stanford University, April 2000.
[31] Gregor Thut *et al.*, *Activation of the Human Brain by Monetary Reward*, Neuroreport, National Center for Biotechnology Information, U.S. National Library of Medicine, 1997.

identified in the Agency literature either favor pure competitive or collective schemes. But real-life examples abound in which the provision of incentives is mixed".[32] The IoC provides both individual and collective schemes for cooperation and for *"competition"* though competition is here understood as emulation because the strength of one participates in building up the strength of others.

At the individual level, the wheel of recognized qualities is meant to act as a self-assessment system (see *fig. 8.*). On one hand, users have the chance to be praised for personal qualities they were not aware of and to be warned for areas that require their attention so that they can explore new avenues more in line with their natural abilities and improve themselves if necessary. The wheel displaying multiple areas of human qualities, individuals have a better chance to be recognized for what they do best so that they can deploy their talents and build up capacity in their areas of excellence, and have better opportunities to reconcile income with purpose. *"Purpose is no longer a buzzword. It's a must-have. Passion and purpose will keep people focused on the job at hand, and ultimately separate the successful from the unsuccessful"*.[33]

At the group level, *"social emotions seem to fall into two groups, those that regulate self-interest and aggression, and those that promote group interest and empathy [...] Being able to experience what others are experiencing helps facilitate the rewards of reciprocity, affinity, and trust [...]"*.[34] The recognized qualities of individuals can be overlaid and correlated with those of the groups and projects they participate in (see *fig. 10*). Being part of a collective dynamic, individuals may more easily participate in positive feedback loops. And because people want to limit the potential effects of negative reputation, they will more likely team up with peers that stand above or within their own reputational range. This might have profound effects in the social dynamics of large scale projects as nominal social status does not guarantee access to group or project leadership. Instead, influence and leadership are more likely to shift to those who positively impact their communities, to those who lead by example, and to those who reciprocate with fairness.

[32] Pierre Fleckinger, Nicolas Roux, *Collective versus Relative Incentives: the Agency Perspective*, Paris School of Economics, July 2012.
[33] Richard Branson, *You Can't Fake Personality, Passion or Purpose*, LinkedIn Pulse, August 31 2015.
[34] John Henry Clippinger, *A Crowd of One, The Future of Individual Identity ,Chapter 5, A View of Human Nature* , Public Affairs, New York, 2007, p. 87-89.

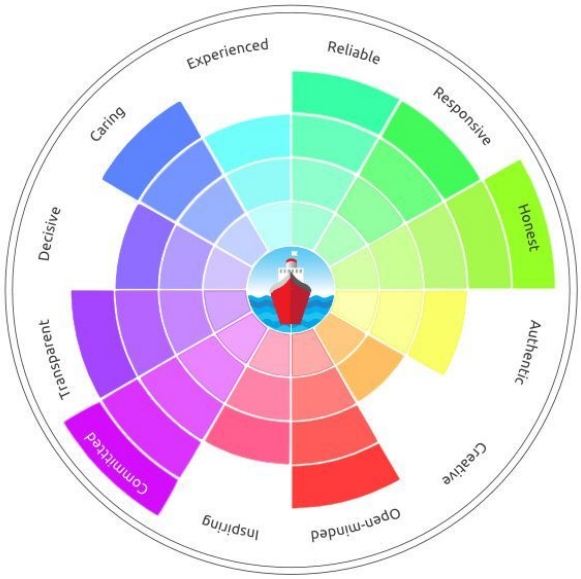

Fig. 9. Multidimensional display of the aggregate reputation of the members of a group or project.

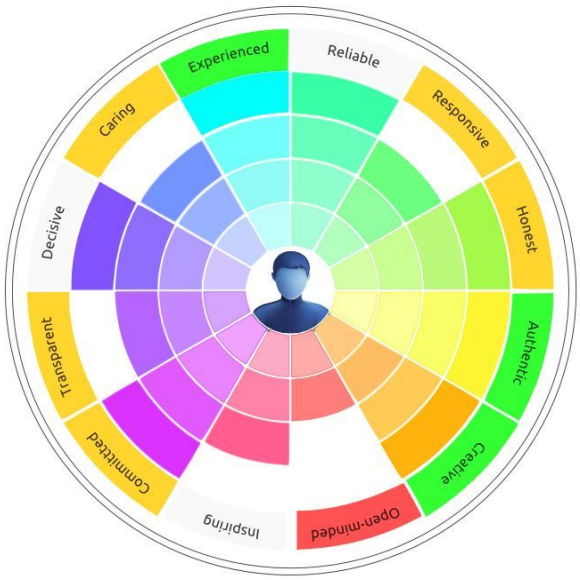

Fig. 10. Individual reputation overlaid with the one of the members of a group or project. Outer colors signal individuals where they lead and where they lag behind relative to their group.

Within small groups, the reputation of peers is naturally more impacting than in larger ones. Therefore, as they populate their social portfolio, individuals are inclined to cooperate primarily with peers who are safer in terms of reputation thus providing a sound foundation to their network. As their network expand, they can add the *"strength of weak ties"*[35] to the strong social fabric they already rely on. As such, the wheel is a relative leaderboard internal to the social portfolio or to a particular group or project. Being able to see where they stand compared to their peers, the wheel is meant to act at the collective level as a systematic incentive for group emulation, for benevolent interactions, and for participation that tends toward excellence.

[35] Mark S. Granovetter, *Ibid*.

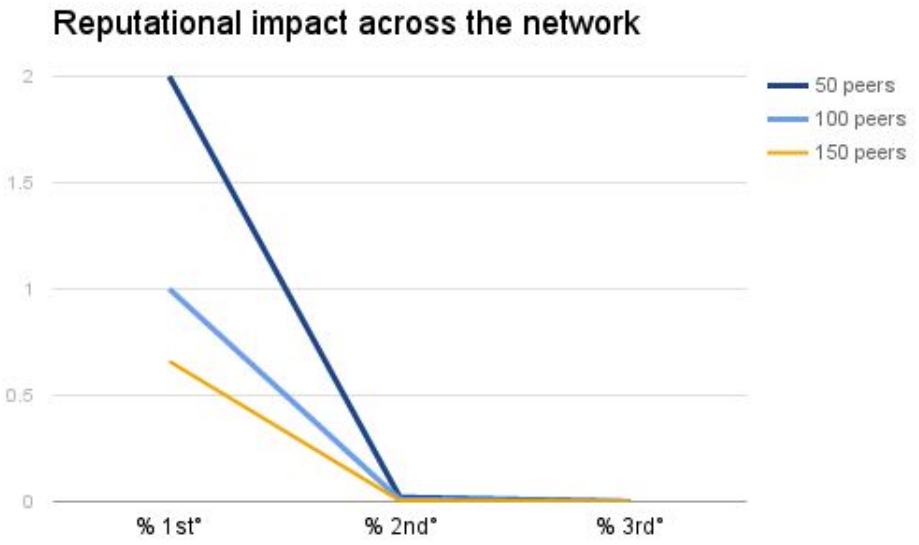

Fig. 11. Reputational impact of individuals relative to their network size.[36]

2.2. A fertile ground for collective intelligence

Though collective reputation is seen as a systemic incentive for benevolent interactions, the IoC's recommender system aims already at providing a fertile ground for the activation of collective intelligence, namely *"the group intelligence that emerges from the collective effort and that appears in consensual decision making"*.[37] First, trusted intermediaries have a fine assessment of the personalities, level of expertise and human qualities of the individuals they might connect or engage with. They are therefore able to provide timely, contextualized and personalized information that better encompasses the complexity of individuals well beyond what reputational metrics can offer. In other words, they are able to provide beforehand a clear picture of what to expect or not to expect. Second, members of a social portfolio being tied by emotional bonds, shared

[36] If all social portfolios are made of 50 peers, the individual reputational impact is 2% on the portfolio itself or 1st°, 0.02% on the 2nd°, and 0.0004% on the 3rd°. If all social portfolios are made of 100 peers, the values are 1% on the 1st°, 0.01% on the 2nd°, and 0.0001% on the 3rd°. For social portfolios of 150 peers, the values are respectively 0.66%, 0.004%, and 0.00003%. While individual reputation alters trusted peers' reputation (1st°) to a small amount, it has practically no impact on 2nd° and 3rd° peers.

[37] https://en.wikipedia.org/wiki/Collective_intelligence. *"Wikipedia is an example of Collective Intelligence [...] This community has developed an organizational design that allows thousands of people from all over the world to collectively create an intellectual product without centralized control and with almost all of those people being volunteers. [...] These things are just the beginning of whole new classes of intelligent entities that we will see emerging over the coming decades. In order to take full advantage of them, we will need to understand their possibilities at a much deeper level than we do so far. That's the goal of the MIT Center for Collective Intelligence where the core research question we pose is, "How can people and computers be connected so that collectively they act more intelligently than any person, group or computer has ever done before?"*, MIT Communications Forum, Greg Peverill-Conti interviewing Karim R. Lakhani, Thomas W. Malone, Alex Pentland, Oct 2007.

intentions, joint responsibilities and shared outcomes, their enlightened interest is to provide honest recommendations if they do not want to lose the favors of their social portfolio. Third, trusted peers being catalysts and creators of new social connections, they remain in the loop in case there is a need for moderation or conflict resolution. Yet, because people cannot easily extract themselves from their trusted social fabric, collective reputation could enhance the existing collective intelligence as it provides a systematic incentive to dampen harmful behaviors, to resolve existing conflicts and to prevent emerging ones.

By default, individuals are incentivized to pick new opportunities for their peers the best they can. With their reputation at stake, individuals might be more willing to express their *"response-ability"* and to act as careful gatekeepers of their social portfolio. Though, while sincere individuals may be experienced or gifted in certain areas, they also may be lagging behind in some others. Willing to pursue their relationships but concerned about some lacks that one may have, peers can always raise concerns in due time, give advice, and triangulate the relationships they initiated if requested.

This benevolent presence is more likely to withstand unsolicited demands and to prevent them from propagating further across the network. *"Another interesting feature of Local Trust Metrics is the fact they can be attack-resistant: users who are considered malicious (from a certain user's point of view) are excluded from trust propagation and they don't influence the personalization of users who don't trust them explicitly". (Levien 2003)* Complacent feedback loops can nevertheless artificially boost the social capital of a limited group of individuals. Yet, those involved in such practices expose their own reputation by recommending peers who are not aligned with their reputational score. Moreover, *"A peculiar feature of social capital is that [...] it is accumulated through social participation in group activities"*,[38] i.e. social capital cannot be created out of the blue without real world actions that give birth to it. In a strong social fabric, reputational bubbles are compelled to remain short lived.

Yet, if people were to abuse their peers, they would most certainly expose themselves to negative feedback loops. Trust being built over time, a breach in confidence would instantly generate distrust and sometimes a lasting adverse mindset toward the trustee. In severe circumstances, the ultimate recourse is to end up problematic relationships and to make new implicit statements by teaming up with other individuals. In the IoC, individuals are always at risk of losing the support of their most valuable social asset, the people they trust and who trust them in return.[39] As such, any forms of conscious

[38] Paolo Valin *et al.*, *On the Possible Conflict Between Economic Growth and Economic Development*, in Benedetto Gui & Robert Sugden, 2005.
[39] Harrison McKnight and Norman Chervany, *The Meaning of Trust*, Technical Report MISRC 96-04, Management Information Systems Research Center, University of Minnesota, MN, USA, 1996.

misconduct amount to shooting oneself in the foot. In the IoC, the cost of *free-riding* is meant to be proportional to the perceived offense of the misbehavior: *"In a dense network word of mouth travels fast, particularly when the content of the gossip is the violation of a local norm: an unreciprocated favor, an unpaid bet, an unfulfilled promise. This implies that the community as a whole can act as a device for the storage of personal reputations and, via simple behavioral punishments like ridicule or ostracism, as an enforcement mechanism".*[40]

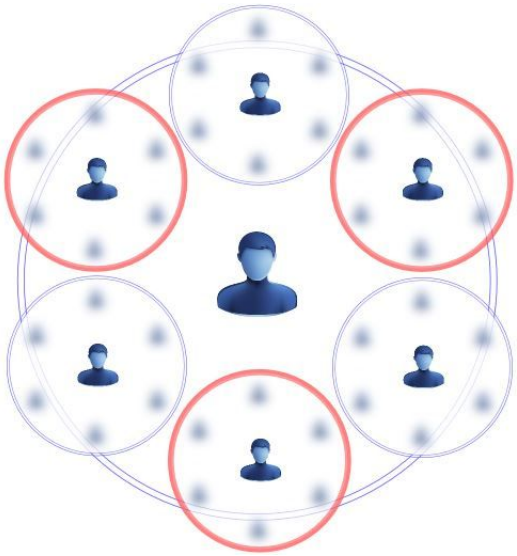

Fig. 12. Free-riders run the risk of losing access to their most valuable social asset, that is their trusted peers and the larger group of people they can give access to.

In summary, by creating a suction effect toward excellence, collective reputation might stimulate a higher degree of qualitative participation. Mutual interests being intertwined, the enlightened strategy is for individuals to take the collective interest in the same esteem as their own personal interest. Being on the same boat so to speak, their coordinated effort is to appropriately catch the wind of opportunity (from Latin *ab-portum*, toward the port) and steer the ship to a safe harbor collectively. Collective reputation leads to the recognition that ultimately *one is all* and *all is one*. Knowing that while they help others, they help themselves, the general incentive is for everyone to be strong and to remain strong. Therefore, a systematic behavioral incentive that prompts a capacity to recognize and embrace mutual interest could participate to the rise of more vibrant communities which value is held collectively.

[40] Manuel De Landa, *Deleuze: History and Science*, Atropos, 2010, p. 4.

3. Leadership anchored in reciprocity (emergent property)

Reciprocity is here understood as *"behaviors in which people give each other help and advantages"*[41] and is also *"the quality of being reciprocal: mutual dependence, action, or influence"*.[42] In the context of the IoC, reciprocity has two functions. One is to act as an additional means of exchange, and the other one is to anchor leadership in good practices.

3.1. Reciprocity as an additional means of exchange

The economic value of reciprocity comes from that it enables to initiate an exchange when money is unavailable or when strict accounting between people would feel awkward or even offensive. Indeed, *"Exchange can't be reduced to an economic transaction only. It is a good in itself in the form of a personal relationship that can be acknowledged in many ways. [...] Prices facilitate exchange when information is scarce and coordination difficult, conversely, reciprocal exchange has been preferred when trade involves a personal interaction, and when goods or services are unique, [...] or have many dimension of quality"*.[43] On the contrary, *"When the relationship becomes more impersonal, that is, as one moves out from the relation between brothers to that between virtual strangers, so a transaction is less and less likely to be established at all but it can, and increasingly does, become more purely 'economic', and the interested calculation which is never absent from the most generous exchange can be more and more openly revealed"*.[44] In the relational economy of the social Web, reciprocal exchange could provide additional leverage when the use of money or currencies would induce distrust in the community.[45]

Being about a feeling of equivalence that involves mutual expectations and responsibilities, reciprocity is a demand for a commitment as an end in itself. The unspoken agreement that *they would do the same in return*, helps to prevent against defaults because it has some features of a contractual obligation. By perpetuating relationships of social indebtedness, reciprocity helps to propagate social trust and to cement communities. As the feeling of equivalence is built over time, the timing, nature and perceived value of reciprocity are left to the discretion of individuals. And because the amount of a particular commitment is never recorded in its details, there is no

[41] http://dictionary.cambridge.org/dictionary/english/reciprocity
[42] https://www.merriam-webster.com/dictionary/reciprocity
[43] Avner Offer, *Between the Gift and the Market: The Economy of Regard*, Economic History Review, vol. 50, Aug 1997, pp. 450-476.
[44] Bourdieu, P., *The Logic of Practice*, Cambridge: Polity Press, 1992, p. 115.
[45] The word *community* comes from the Latin root *communitas* and is made of the prefix *com* meaning *with*, *together* and *munis* derived from *munire* meaning *to strengthen*, *to fortify*. The word community carries the intrinsic notion of mutual empowerment.

objective means to calculate precisely one's participation. *"With the advent of networked computers [and data flows], we are growing out of limitations of tit-for-tat exchange based tokens [money] to keep track of the social contracts that lead to building value"*.[46]

Instead, with reciprocity, the basic idea is for individuals to redeem favors and remain attractive to their peers. With increased recognition and reputation, individuals gain higher conductivity, higher flow, higher vibratory rate so to speak, and therefore higher resonance to attract people or to propagate their influence beyond their trusted social horizon. Viewed as an additional means of exchange, reciprocity creates the capacity for resources and for influence to flow in.

3.2. Reciprocity as a resonant leadership mechanism

Reciprocity can also be viewed as a social behavior that promotes a more resonant leadership.[47] Resonant leaders are those *"who exhibit attributes of emotional and social intelligence, are better able to connect with others most effectively, and so lead well"*.[48] The social portfolio being limited in size, it is foreseen that individuals will primarily choose to team up with peers who represent the greatest perceived potential. Indeed, having the chance to be surrounded by outstanding peers might become extremely valuable and sometimes priceless. We believe that individuals and organizations could undergo a *"qualitative easing"* process where they *"coopete"* through the process of reciprocity to remain attractive the best peers available. With the amount of information available today, it is outstanding that qualitative components affecting relationships remain underestimated. Indeed, in the forthcoming reputation-aware economy, *"it is not about your credit but your credibility"*.[49]

[46] Eric Harris-Braun from Metacurrency on: *What do you think about Bernard Lietaer's ideas about complementary currencies*, Quora, Sep 28, 2012.
[47] Boyatzis, Richard E., McKee, Annie, *Resonant Leadership: Renewing Yourself and Connecting with Others Through Mindfulness, Hope, and Compassion*, Harvard Business School Press, 2005.
[48] http://www.danielgoleman.info/resonant-leaders/
[49] Quote by Mervyn Alastair King, in *Welcome to the New Reputation Economy*, Wired magazine, September 2012.

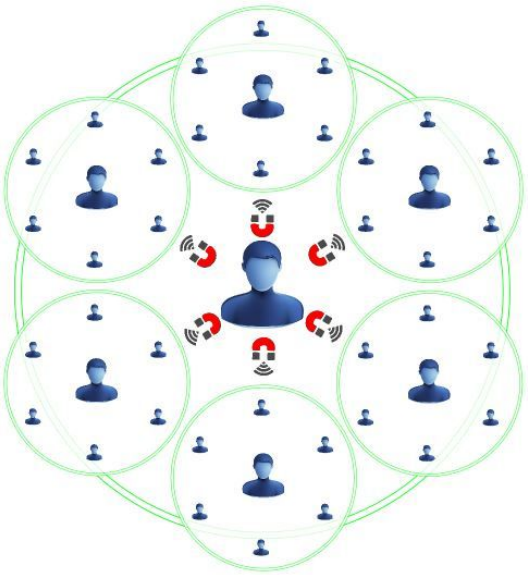

Fig. 13. Qualitative easing process for social clusters of higher collective value and for a more resonant leadership.

This pull toward excellence could help individuals and their social clusters to optimize their value and gain higher influence. Being tied by a collective reputation, there is a strong incentive to reciprocate. Influence is a by-product of reputation, which comes from the social recognition that a favor has been redeemed. Influence is therefore more likely to be the appanage of those who positively impact their communities and of those who lead by example. Having no central control, explicit rules nor regulations, the IoC's social fabric is meant to behave like a dynamic environment. Therefore, the best strategy for any individual and groups of individuals who want to gain influence is to act and reciprocate with integrity, benevolence, and proficiency.

Strategy and desired output

Growing from within coworking spaces

The proposed strategy is to develop and expand from coworking spaces. We believe that coworking spaces are one of the most suitable environments for the IoC. First, coworking spaces are the prefered setting where the leaders of social innovation meet, develop ideas and put their many initiatives into practice. As such, coworking spaces are the centers of excellence and dissemination of today. Second, members of these communities are known to be benevolent to each other, to test out new ideas, and to embrace good practices like sharing knowledge and integrating the feedback of their communities. Third, these grassroots communities are versatile in scope as their members are social enterprises, co-founders, VCs, members of NGOs, local communities, non-profit organisations, students, scholars, thinkers, makers, urban farmers and hackers. Therefore, those members could help the IoC to reach out to all segments of society at once.

The desired output for the Internet of Communities is twofold. First, to have a working model that effectively eases cooperation and improves social engagement. And secondly, the IoC aims at being the backbone onto which a larger array of social innovators can *plug-in* their own crowdsourcing initiatives, assuming that they are willing to expand on its three main pillars: trust, interdependence and reciprocity. Welcoming the Next Generation Internet initiative, the IoC intends to provide the ground for a new wave of innovators to create even more synergies and opportunities. From there, the ultimate desired output for the Internet of Communities is to become the blueprint and the reference for social engagement.

A working model for social innovators

Web based, the IoC intends to provide the necessary tools for social innovators to favor the propagation of trust among themselves, to reach more easily viable cooperation thresholds, and to engage with each other. From our experience as members of such communities, we believe that the IoC would help social innovators to detect and team up with reliable allies, to collectively develop an improved capacity and access more easily resources that would remain out of reach individually, to deploy their talents in a startup like atmosphere, to let the collective intelligence inspire new ideas, to impact collectively while benefiting individually, and to provide a springboard for those social leaders who are most aligned with themselves and their communities.

A backbone for external crowdsourced initiatives

Being purpose agnostic, the model can be transposed in principle to any domain of social innovation. This new set of tools and incentives could in theory address several sustainable challenges at a time. Innovators could take advantage of the IoC environment to develop their own crowdsourcing initiatives. For instance, with an additional set of tools and with appropriate licenses, they could transform the IoC's informal knowledge network into new participatory models. Some may want to plug-in smart contracts to develop an economy of the commons, some may want to use similar contracts for equity-based participatory models, some may want to add social currencies for a stronger local economy, some may want to overlay online deliberation platforms, new types of swarm intelligence[50] and collective decision making, while some organizations may want to take advantage of a more responsive social fabric to improve community engagement.

[50] UNU Swarm Intelligence, http://unu.ai/

Conclusion

Networked human organizations for the 21st Century

The IoC is a proposal to rewire the online social fabric in a way that is more conducive to trust, and therefore to cooperation and social engagement. We agree that *"[..] The real disruption taking place is not technology; it's a trust shift that will open the doors to new and sometimes counter-intuitive — ways of designing systems that will change human behavior on a large scale"*.[51] Combining multiple social theories in a unique tone, the IoC is a proposal for a networked social environment that introduces both a collective intelligence mechanism and a resource allocation system. Reasoning from first principles, the IoC introduces the idea of a new set of collective behavioral incentives to resolve the conflict between personal and collective interests. Being more attuned with the relational economy of the social Web, this new set of collective incentives is meant to actualize greater human, social and economic value from online communities by impacting both social engagement and leadership.

First, the IoC proposes to tackle the question of participation and engagement by mimicking the dynamics of human-sized and close-knit communities which levels of engagement remain unmatched. The amount of underused resources awaiting to be activated is staggering: a structural credit crunch for entrepreneurs who need to find new channels to reach the market; high rates of systemic unemployment[52] and high levels of disengagement at work that prevent large pools of talents to be deployed; and the unmet demand for a purpose-oriented economy that repels many from participating more.[53] With incentives like positive emotions and reciprocity which better correspond to the reality of communities, this new framework could open new creative avenues and give room to activate idle resources within additional channels . *"When users have tools for free and responsible association for common purposes, the value of the network soars exponentially [...] the best way to unlock enormous stores of value on networks is to develop a network architecture and software systems that can enable people to build trust and social capital in user-centric, scalable ways"*.[54]

Second, the breach of confidence in formal leadership[55] offers both an opportunity and an empty space for social innovation. The promise of peer-to-peer networks allowing

[51] Rachel Botsman, *Technology is Making it Easier to Trust Strangers*, Wired, January 29 2016.
[52] Circa 20% for the youth in the EU28, Eurostat 2015.
[53] Deloitte Millennial Survey 2016.
[54] David Bollier and John H. Clippinger, *The Next Great Internet Disruption: Authority and Governance, in From Bitcoin to Burning Man and Beyond, The Quest for Identity and Autonomy in a Digital Society*, Published by ID3, 2014.
[55] 2016 Edelman Trust Barometer, http://www.edelman.com/news/2016edelmantrustbarometerrelease/

people to reach consensus without the need of a central authority recently showed the limits of a governance[56] system purely written in the code.[57] Coupled with the promise of these new technologies, an additional layer of social trust nested in cohesive communities and secured by collective reputation, might help to unlock new social strategies. *"What is really changing in the world is not technology, or the globalization of capital, but the relationships between people, relationships that were once hierarchical and based on the force of authority. This has been radically flattened. What matters most now are the connections between people, the interdependencies and networks that can be formed and the unimpeded flow of information"*.[58] Because the social Web is an economy of relationships, *"By the end of this decade, power and influence will shift largely to those people with the best reputations and trust networks, from people with money and nominal power. […] It is time to go ahead of that curve"*.[59]

As offline stories increasingly shape online presence and because the wealth that lies in social relationships cannot be measured but can still be acknowledged, we witness a transition from an economy where we *rate* the inputs of human resources to an economy where we *narrate* the stories of resourceful humans. The upcoming paradigm for a more inclusive and human oriented economy is gaining momentum: *"The Next Generation Internet (NGI) should offer more to our society. It should provide better services and greater involvement and participation. It is essential that the next-generation Internet is designed for humans, so that it can meet its full potential for the society and economy"*.[60] Back to the father of modern economists, Adam Smith stated that *"How selfish soever man may be supposed, there are evidently some principles in his nature, which interest him in the fortune of others"*.[61] The IoC is an attempt to trigger these underlying principles, and upgrade our social operating system to better match the needs of the *Homo Socialis* of the 21st Century.

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[56] Governance relates to *"the processes of interaction and decision-making among the actors involved in a collective problem that lead to the creation, reinforcement, or reproduction of social norms and institutions".* Hufty, Marc (2011). *"Investigating Policy Processes: The Governance Analytical Framework (GAF). In: Wiesmann, U., Hurni, H., et al. editors. Research for Sustainable Development: Foundations, Experiences, and Perspectives"*. Bern: Geographica Bernensia: 403–424.

[57] Infodroid, *Critical update on DAO vulnerability: "Unlike traditional contracts, the idea was that smart contracts were going to eliminate the need for enforcement or dispute resolution. So that law is enshrined in code. But this incident has set a precedent, at least within Ethereum, that the project leadership will intervene to enforce the spirit of a smart contract"*, Hacker News, June 2016.

[58] Robert Green, *Google and the Napoleonic Model: Business in Revolutionary Times*, The Huffington Post, 05/06/2010.

[59] Craig Newmark, *Foreword: Trust, Reputation Systems, and the Immune System of Democracy, The Reputation Society, How Online Opinions Are Reshaping the Offline World*, edited by Hassan Masum and Mark Tovey, MIT Press, 2011, p. ix.

[60] Futurium Europe, http://ec.europa.eu/futurium/en/node/1460

[61] Adam Smith, *The Theory of Moral Sentiments, Part 1, Of the Propriety of Actions, Chap. 1, Of Sympathy*, Edinburgh 1759.

Appendices

The IoC and the blockchain, toward a self-organized social system?

The IoC being about the free association of people without central coordination, the question of how these people will self-organize and attain a collective governance that is effective is paramount. Fortunately, we do have evidence of self-organizing patterns both in small human groups and in Nature.

Self-organization[62] comes naturally for small human groups. The French theorist Alexis de Tocqueville claimed that: *"The village or township is the only association that is so perfectly natural that, wherever a number of men are collected, it seems to constitute itself"*.[63] For larger human groups, regulation must be constructed and hierarchies have been used as the primary model for social organization.[64] These two organizational systems have pros and cons. The self-organizing system is more reactive to changing circumstances and is the fact of small groups, while the hierarchical system is more able to manage large groups of people but is poorer at integrating change. The challenge is therefore to create a self-organized and organic system that can scale up without the supervision of fixed hierarchies.

Ecosystems do not employ the rules of top-down hierarchies either, rather a bottom-up structure of emergent processes known as *"Complex Adaptive Systems"*.[65] These are interesting to us because *"One key concept within complexity science is that of self-organization"*.[66] At their core, these systems are self-organized networks that leverage collective learning to adapt to changing circumstances. Though they produce hierarchies as byproducts, the fundamental architecture of these systems is the network where no one is ranked above another. This theoretical framework with roots in physics and biochemistry has often been proposed as having relevance to change in social systems. *"Specifically, the processes and design features associated with dissipative self-organization have been used to describe the dynamics of social groups and*

[62] Neural networks, heterarchies, fractals, bio-teaming, swarms and stigmergy are all examples of biomimetics that may underline the effort to cope with new governance processes in the network age. Markus Schatten and Miroslav Žugaj, *Biomimetics in Modern Organizations, Laws or Metaphors?*, Interdisciplinary Description of Complex Systems 9(1), 39-55, Faculty of Organization and Informatics, University of Zagreb, Varaždin, Croatia, 2011.
[63] Alexis de Tocqueville, *Democracy in America*, *Chapter V, Necessity of Examining the Condition of the States before that of the Union at Large*, 1835.
[64] David Sloan Wilson, *Invisible Hand: Why the Narrow Pursuit of Self Interest Always Fails*, Evonomics, Sep 2016.
[65] Simon A. Levin, *Ecosystems and the Biosphere as Complex Adaptive Systems*, Department of Ecology and Evolutionary Biology, Princeton University, Springer, Ecosystems, 1998, 431-436.
[66] David Anzola, Peter Barbrook-Johnson, Juan I. Cano, *Self-organization and Social Science*, Computational and Mathematical Organization Theory, Springerlink.com, June 2016.

organizations, especially in cases where highly turbulent and/or near-chaos conditions are present".[67] Such *"chaordic"*[68] social organizations call for a dynamic leadership that is best expressed in the words of Dee Hock, Founder and former Chairman of Visa International: *"Lead yourself, lead your superiors, lead your peers, and free other people to do the same. All else is trivia"*.[69]

To achieve the promise of self-organization, the IoC promotes two features. The first feature is a social architecture that is both user-centric and scale insensitive with a multitude of human-sized communities that are horizontally interconnected to each other. The second one is a set of behavioral incentives that have the purpose to resolve the conflict between individual and collective interests. These two features are intended to give birth, we believe, to an emergent process that will drive influence and leadership.

Yet, if formal agreements need to be secured, the core features of the IoC do not provide a built-in solution. In that instance, the IoC could benefit from the blockchain protocols. Blockchain protocols allow individuals to reach collective consensus with no trusted third party, and bitcoin, its first application, enables economic transactions where no trust is even needed. Opposite to the IoC which relies entirely on trusted intermediaries, the two approaches have the potential to work in synergy and to address each other's weaknesses. The blockchain *"trustless"* protocols[70] could become paramount to the IoC as they could help to manage digital identities, enable economic transactions with remote and non-trusted parties, secure equity and other formal agreements, and provide additional means of governance.

On the other end, the IoC might be able to provide a layer of collective intelligence when trust in the code is compromised. *"Unlike traditional contracts, the idea was that smart contracts were going to eliminate the need for enforcement or dispute resolution. So that law is enshrined in code. But this incident has set a precedent, at least within Ethereum, that the project leadership will intervene to enforce the spirit of a smart contract"*.[71]
Promoting social trust, the IoC could be a third way between centralized social systems and distributed ones. Indeed, centralized and distributed systems disregard social trust:

[67] Charles Smith, Debra Comer, *Self-Organization in Small Groups: A Study of Group Effectiveness Within Non-Equilibrium Conditions*, Department of Management, Hofstra University, Hempstead, New York, 1994.
[68] Chaordic: *"Any self-organizing, self-governing, adaptive, nonlinear, complex organism, organization, community or system, whether physical, biological or social, the behavior of which harmoniously blends characteristics of both chaos and order"*. http://www.griequity.com/.
[69] Quote attributed to Dee Hock, Founder and former Chairman of Visa International.
[70] The distributed ledger idea emerged to address a breach in confidence toward centralized institutions. The proposal is to remove any need for trusted intermediaries. *"At some point I became convinced there was a way to do this [bitcoin] without any trust required at all"* (Satoshi Nakamoto, allegedly the principal blockchain/bitcoin inventor and developer, 2010). Note: in a trustless environment, information tends to be hidden or in this case encrypted to keep its value.
[71] Infodroid, *Critical Update on DAO Vulnerability*, Hacker News, June 2016.

centralized systems to maintain nominal leadership, and distributed ones to remove third parties. Furthermore, both systems promote the use of currencies to account for social interactions, be it legal tenders[72] or bitcoins[73]. By extinguishing any liability and therefore any social debt at the time of the exchange, currencies dismiss social trust even more. In contrast, the IoC sees leadership as a by-product of its dynamic ecosystem, not as a fixed scheme. The IoC also sees everyone as being a trusted third-party. Finally, instead of currencies, recognition and reciprocity acknowledge an ever evolving social debt which itself reinforces the idea of social trust, cooperation and engagement.[74]

Combined, the two approaches might be able to cover the full array of economic exchange, as well as providing a comprehensive governance mechanism. In that sense, the IoC model might help to further pave the way for self-organized and networked social systems. A societal and technological evolution is at work and *"geared to addressing and helping resolve social equity and accountability issues that traditional tribal, state, and market actors have tended to ignore or are now unsuited to addressing well"*.[75]

Disambiguation on the IoC and reputation currencies

Reputation currencies is somewhat an unclear concept. Put together, the qualitative nature of reputation and the quantitative aspect of currencies repel the mind immediately. Reputation is indeed a social asset that has value which cannot be transferred and therefore which remains out of the reach of traditional currencies. Yet, *"With the advent of networked computers [and data flows], we are growing out of limitations of tit-for-tat exchange based tokens [money] to keep track of the social contracts that lead to building value"*.[76] Accordingly, we believe that our systems of accounting for value are compelled to include qualitative dimensions and thus to evolve in ways that better correspond to the complexities of our interactions. Certainly, *"In cashless systems [money] will become purely information which can be processed in many ways"*.[77] In that sense, the notion of reputation currencies is worth investigating.

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[72] *"Legal tender is a medium of payment recognized by a legal system to be valid for meeting a financial obligation"*. https://en.wikipedia.org/wiki/Legal_tender

[73] Bitcoin is *"a type of 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"*. Google search.

[74] In English, *"thank you"* derives from *"think"*, and originally meant, *"I will remember what you did for me"*, in David Graeber, *Debt, The First 5,000 Years*, Melville Publishing, 2012, p. 123.

[75] David Ronfeldt, *Tribes, Institutions, Markets, Networks: A Framework about Societal Evolution*, RAND, 1996.

[76] Eric Harris-Braun from Metacurrency on: *What do you think about Bernard Lietaer's ideas about complementary currencies*, Quora, Sep 28, 2012.

[77] Quote attributed to Mervyn King, Governor of the Bank of England, 2003-2013.

Currencies are usually defined as *"something that is in circulation [in a monetary zone] as a medium of exchange"*.[78] Currencies are therefore no more than tools optimized to facilitate the economic exchange. That *"something"* in the definition is voluntarily vague and ranges from commodities to virtual currencies,[79] and overwhelmingly, to traditional banknotes and money. Because currencies are versatile in nature, they have defining attributes. Most currencies share the following attributes: unit of value, medium of exchange, and store of value. Changing one or more of these attributes change the effect of the currency. For instance, the *"store of value"* attribute is expressed by a positive interest rate on the currency. The incentive is therefore to hoard money. By applying a negative interest rate to the currency, the store of value function disappears while the activation of the economic exchange is promoted because keeping the currency idle has a cost. One single type of currency alone would always favor one type of economic behavior and, as a result, produce an imbalance in the economy.[80]

Similarly, if we remove the *"unit of value"* attribute, we remove the quantitative aspect of the currency. Currency and current share the same Latin root *"Currere"*, meaning to run, to flow. Similar to the electrical current, currencies (*i.e.* the economic current) flow in the monetary zone. With electricity and therefore with magnetism in mind, we may broaden the idea of currency from a means of payment that buys things to a force field that attracts resources. Within the limits of the analogy, an increased reputation would equal to an increased magnetic force, and to an increased capacity to mobilize resources. In the IoC, reputation is seen as a current that facilitates the exchange not as a currency that buys things. Instead of digital tokens that are transferable even though reputation cannot be given away, the symbolic value of the *"reputational current"* is expressed through social recognition (translated by the wheel of recognized qualities) and through the trusted social fabric individuals have access to (the social portfolio). The higher the current, the higher the resonance, and thus an increased capacity to exert leadership. This exotic understanding of reputation currencies could help to further acknowledge the immaterial wealth that lies in the quality of our relationships, and to give more substance to the idea of social capital.

[78] https://www.merriam-webster.com/dictionary/currency

[79] The European Central Bank sees virtual currencies *"as a type of unregulated, digital money, which can be issued and controlled by its developers or by its users, and used and accepted among the members of a specific virtual community".* (ECB, 2012:5). This innovation conceptually creates new means of payment.

[80] Ideally, an ecosystem of currencies that have different attributes would keep the economy more resilient as a basket of diverse types of currencies would promote as many diverse types of economic behaviors. See Lietaer, B., Ulanowicz, R. E., Goerner, S. J., McLaren, N., *Is our Monetary Structure a Systemic Cause for Financial Instability? Evidence and Remedies from Nature*, Union International Associations, Global Action Plan, 2010.

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