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PROFILE

Interview with Thomas W. Malone on "Collective Intelligence, Climate Change, and the Future of Work"

Henner Gimpel

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Prof. Thomas W. Malone
Patrick J. McGovern Professor of Management
MIT Sloan School of Management
50 Memorial Dr.
Cambridge, MA 02142
USA

Thomas W. Malone is the Patrick J. McGovern Professor of Management at the MIT Sloan School of Management and the founding director of the MIT Center for Collective Intelligence. He was also the founder and director of the MIT Center for Coordination Science and one of the two founding co-directors of the MIT Initiative on "Inventing the Organizations of the 21st Century." Professor Malone teaches classes on organizational design, information technology, and leadership, and his research focuses on how work can be organized in new ways to take advantage of the possibilities provided by information technology.

Prof. Dr. H. Gimpel (✉)
Research Center Finance and Information Management, University of Augsburg, Universitätsstr. 12, 86159 Augsburg, Germany
e-mail: henner.gimpel@fim-rc.de

BISE: Collective intelligence is groups of individuals collectively acting in ways that seem intelligent. How do you apply this concept to climate change?

Malone: Many people would say that global climate change is one of the most important – and most complex – problems currently facing humanity. Like nothing else, the climate problem calls upon us to engage collectively on a global scale. Fortunately, in the last decade or so, a new way of approaching such complicated global problems has become possible: groups of people and computers – connected by the Internet – collectively doing intelligent things. At the MIT Center for Collective Intelligence, we believe that we can harness this new kind of collective intelligence of thousands of people from all around the world to address global climate change. To do this, we created the Climate CoLab, a crowdsourcing platform and community where anyone can join and work with experts and each other to create, analyze, and select detailed proposals for what to do about climate change (http://www.climatecolab.org). We run contests on topics like how to generate electricity with fewer emissions, how to adapt to sea level rise in cities, and how to change cultural attitudes about climate change.

BISE: The Climate CoLab is fascinating and sophisticated, with, for example, an elaborate role concept, interaction patterns, and a balance of competitive and collaborative elements. How did you design this platform? How did you engineer it?

Malone: You framed it well. We did design it. In a certain sense, we did engineer it. Much of the research in our field is studying things others have done and coming up

with empirical results or theories to explain or guide these things. For Climate CoLab, we were taking an approach that is more like the typical approach in an engineering discipline, which is to say: let's try to create something that will accomplish certain goals. We based our choices in doing that on as much knowledge as we had about the literature and the empirical results that other people had – but in many cases, our choices had to be based on our design intuitions and on our experience as we went along.

Just like when you are trying to build a new airplane wing. You'd have some theory of aerodynamics that allows you to rule out certain classes of things that would not even be worth trying, but those theories generally would not tell you any single optimal strategy or design. Instead, designers and engineers have to rely on their own intuitions in many cases. And then you try it out and see what happens and modify over time.

BISE: What did you learn in this design and engineering process?

Malone: When we started out, we had a bunch of design ideas that we thought were really cool and we spent quite a long time implementing a system that had many of those ideas in it. What we ended up realizing pretty early in the process was that if we put all of our good design ideas in the system it would be extremely hard to explain it to users. We had some cool ideas about things like proxy voting and online argumentation that I still think would be worth trying. Originally, we thought these would be some of the early things we implemented. In reality, now five years into the project, I still don't think our community is ready for these things.

The other big lesson we learned: I think that many people in the information systems design field have the idea that if you build a good system, users will come: the size of the audience you have is roughly proportional to how good your system is. So, one of the big lessons we learned was how *not* true that is. Certainly, you need to have a system that has some level of functionality and usability before you have any hope of getting much of an audience. But past that point, the size of the audience depends on an awful lot of other things that you do besides building the system. We ended up devoting a great deal of our effort to building a community for the Climate CoLab with citizens, governments, non-governmental organizations, and businesses that are important in this domain. In retrospect, these lessons seem obvious, but they are often not obvious when you are doing it.

BISE: From which examples or models did you learn most for the design of Climate CoLab?

Malone: In the very early days, we were strongly influenced by Wikipedia as a model and we had this idea that we would build this site and have some simulation tools and some proposal writing software and maybe some argumentation and some voting. And we would have it all just there and people would use it and it would get better and better over time. We ended up concluding that such an unstructured ad hoc community building process was not as likely to be as successful as something that had more structure to it. In particular, what we realized was that coming up with good solutions of what to do about climate change was more like what happens on Innocentive than Wikipedia. Wikipedia is a collection of lots and lots of articles on lots and lots of topics. It is useful to have almost as many articles as you can come up with. Whereas on Innocentive, if a company has a problem, such as how to synthesize a chemical compound, once you have one good solution to the problem you don't need many others. You may need two or three good solutions, but not thousands. For climate change, it seemed closer to Innocentive than Wikipedia. Even if there are many elements to a good solution, the world can only do one combined set of things. That's what led us to use the contest approach rather than the collection approach that Wikipedia uses. By contest and collection, I'm referring to concepts from our Genome of Collective Intelligence (Malone et al. 2010). We used that in part because it was appropriate to the problem domain, but also because it had some other advantages for building and synchronizing the community. If you just have a site that is going to be there indefinitely and you are hoping people will come, it is not clear what will get them there at any particular moment. If you have a contest with a deadline people know, they have to act by that deadline. That gave us a big opportunity for promoting the site, encouraging people to come, encouraging them to come at the same time, see other people, and be stimulated by each other's activities. It also then gave us a natural punctuation to announce winners, get publicity, and so forth.

BISE: What role does information technology, compared to humans, play in such collectively intelligent systems?

Malone: There are two important roles information technology can play: One way it helps create collectively intelligent combinations of things is "merely" by providing tools for humans to communicate and collaborate more effectively. Wikipedia is an example of this technology-enabled collective intelligence. The Wikipedia software is extremely useful in helping humans communicate with each other and collaborate in creating this new informational artifact we call Wikipedia. But with a few exceptions like the suggest bots, for instance, the Wikipedia software is not anything you want to call intelligent. It is just a communication and collaboration medium for humans who are intelligent. Increasingly, however, we will see cases where computers are playing roles that you might want to call intelligent. Perhaps the best example of that so far is Google. In a certain sense, Google is just connecting

humans to knowledge that other humans have created. But the way the algorithms do that is so sophisticated that you could in many cases legitimately call it intelligent. Google is an example of what I might call "cyber-human intelligence", where both the humans and the computers are doing something you might want to call intelligent.

BISE: Computers becoming increasingly intelligent is a basic theme in the book "The Second Machine Age" by Brynjolfsson and McAfee (2014). They argue that machines not only replace our muscle power but ever more our brainpower. In their view, humans might for a large part become obsolete in the workplace. What does the future of work look like and what role will humans play in collectively intelligent cyber-human systems?

Malone: It's correct to say that computers will be doing more and more of the intelligent work that needs to be done. When I think about what will happen I don't like to say that computers will take away human jobs. To me it is more useful to say people and computers together will be able to do more and better things. In other words, yes, computers will do some things that used to require people to do them. But I think people and computers together will be able to do those things better and faster. Then they will be able to do new things we could never do before. It is the combination of humans and computers that is important, not the substitution.

There are a lot of very interesting possibilities for what this will mean for business, for people, and for work. In my book on the future of work (Malone 2004), I focused primarily on the implications of cheap communication allowing intelligent humans to work together in new ways, especially ways that gave much more decentralized power to many more humans. The other possibility is that computers are doing more of what you might call the intelligent part of work. If we present this as "people versus computers," first of all, I think that is not a good way of getting people to happily move into the new world. Second, I think it is not even the best way of understanding what the new world will be like. If we look at the history of automation and technology over the last several hundred years, there have been many times where people feared that machines would take away their jobs. Even as recently as the 1960s, and maybe the 1990s, there were worries about this. Every time people have worried about machines – whether it's factory machines or computers – it is true that some jobs have been eliminated and some individuals certainly suffered because of that. But in the long run, there have always been more jobs created than destroyed. I still haven't seen any argument to convince me that this won't happen here as well. The problem may often be that we may not be able to imagine the new jobs that will be created.

BISE: What does this imply for teaching? The obvious things are you teach students flexibility of thinking and how to solve problems. Beyond that, what do students need to be prepared for this emerging world of collectively intelligent cyber-human systems?

Malone: One thing that people talk a lot about is developing cognitive skills. I think that in the intermediate term, it will perhaps be just as important or more important to help people develop their social and interpersonal skills. One of the things that we probably want people to do long after computers can do much of the cognitive work is the interpersonal work with other humans. In our research, we have seen that humans' social skills play a very large role in making teams collectively intelligent, at least as much as their cognitive skills (Woolley et al. 2010).

Another aspect is certain kinds of creativity that will likely be done by people for a while. Not that computers can't do anything you would consider creative but certain kinds of deep creativity are likely to be better done by humans than computers for quite some time.

BISE: How do you see the role of information systems (IS) research in the context of collective intelligence?

Malone: In a certain sense, collective intelligence is just a perspective from which one can view what IS researchers have been doing all along. I think this perspective provides us with new ideas and new approaches for how to proceed. One thing the perspective of collective intelligence does is suggest some new questions; for instance, how can we measure the intelligence not just of a team but a whole company. Another benefit of the collective intelligence perspective is that it opens us up to a much broader range of analogies that can help us understand and measure in new ways what is happening in businesses. Analogies with insects, fish, and other biological systems may suggest processes that we can use to better understand what goes on in human organizations. One might ask questions like, how do human organizations swarm across new ideas and how do they find new ideas by swarming through a space of possibilities? That suggests a way of reframing questions we might have already had.

Another very important result in this perspective is that traditional IS research as of 30 years ago was all about what happened inside the boundaries of a single organization. The field widened to inter-organizational systems in the 1980s and 90s. But even in those days, it was often about how to connect two big companies to each other electronically. The perspective of collective intelligence makes very clear to us that many kinds of collective intelligence arise from groups that go far beyond the boundaries of any single company or small number of companies. If you think of examples like Innocentive, Threadless, or Wikipedia, those are collectively intelligent entities whose collective intelligence arises from communities of thousands of individuals far beyond the boundaries of any formal organization. More and more things that used

to be done inside individual organizations will now be done by large electronically connected communities of people all over the world. I think, more and more people now begin to realize that this will be a critical part of organizational design in the 21st century.

BISE: Prof. Malone, we thank you very much for this interview.

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