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Fragmented Collectives

On the Politics of “Collective Intelligence” in Electronic Networks

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The term “collective intelligence,” particularly within leftist discourses, leads one to expect a certain obvious and direct connection to discussions on collectivity, general intellect, the emancipatory potential of cooperation, etc. The term comes up time and again, be it in the work of Virno,[1] Negri/Hardt,[2] Rancière,[3] or on the website of the platform UniNomade, which once described itself as an “adventure in collective intelligence.”[4] Despite the overwhelmingly positive and even euphoric responses to it,[5] however, it remains marginal.

Searching for further uses of the term can lead one to very peculiar topics, ranging from neoliberal business models, to naïve communitarianism, and even esotericism and parapsychology, and the question soon arises if the term can even be used within leftist contexts at all. Here, I will take a closer look at the use of the term within discourses surrounding current production forms and labor realities,[6] primarily in the context of electronic networks.

My analysis begins at the dawn of the 21st century, as the technical and conceptual developments of the Internet are intensifying to the point that a qualitatively new situation emerges, which quickly falls under the buzzword "Web 2.0" and later more broadly under "social media."

The Effective Individual

The story leading up to this, however, goes back at least forty more years. The expression "collective intelligence" was presumably first used in the mid-1970s, in connection with communication and cooperation using networked computers,[7] in the context of the research and praxis of what is known as "Computer Supported Cooperative Work" (CSCW)[8], which was just being formed at the time.

Its pioneer, Douglas Engelbart, created a research center in California in the early 1960s, which examined the augmentation of the human intellect using computers. On the one hand, the *Augmentation Research Center* still worked in the tradition of Taylorist time and motion studies, using these means of optimizing assembly-line work in order to determine the ergonomic advantages of the computer mouse in comparison to other pointing tools, for instance.[9]

By the same token, however, it also went far beyond this to questions of labor organization and teamwork. They not only developed communication and cooperation tools that were incorporated into the online-system NLS, but also initiated an experiment in which the research team itself was the object of examination, which Engelbart later described as "a behavioral science experiment as well as a computer systems experiment."[10]

Approaches that were rooted in the protest movements of the 1960s were also integrated into the experiment, ranging from yoga to New Age personality development seminars, to consulting Mao's Red Book for concepts of revolutionization/innovation.[11] Just as the group was finally about to become the focal point of the research work, the Research Center broke up. This was due, on the one hand, to the contradiction between the reactionary institutional backing through military funds and the collaboration with corporations, and, on the other, to the growing political radicalization among the young staff members.[12]

What's interesting about this pioneer endeavor in cooperation and teamwork using computers is that the individual is placed at its starting point, at the center of a new knowledge order, more or less the "invention of the user."[13] Engelbart explained this in a lecture at a documentation and information science conference in 1960, where he demanded that in addition to the objectivist systematization of knowledge, such as bibliographic systems and the like, research on the organization of information should include a perspective that considered the individual.[14]

Ten years later, Engelbart sets in relation to the "individual" the term "knowledge worker," drawing on management theorist Peter Drucker's definition: "the person who creates and applies knowledge to productive ends, in contrast to an 'intellectual' for whom information and concepts may only have importance because they interest him."[15] In many areas of the later discourses surrounding "collective intelligence," the orientation of knowledge toward "productive goals" is at the core of the definition of "intelligence."

The individual—as variety and as the essential horizon of all collectivity—is also found in the first major publication within the

humanities on the topic. In his book *Collective Intelligence, Mankind's Emerging World in Cyberspace*, published in 1994, Pierre Lévy states: "the basis and goal of collective intelligence is the mutual recognition and enrichment of individuals rather than the cult of fetishized or hypostatized communities."[16]

"Bottom-up Revolution"

Back in the 21st century: the most obvious focal points in the debate on "collective intelligence" were the developments related to the Internet, which also led to a rapid increase in participatory possibilities. When Tim O'Reilly, in a text from 2005 that brought the term Web 2.0 into circulation, declares that the main strength of those Internet corporations, which continued to boom despite the crash of 2001, lies in harnessing "collective intelligence", and therefore in exploiting a new resource, through which the software industry was able to reconsolidate itself,[17] then the significance of "collective intelligence" as an exploitable resource becomes perfectly obvious.

In the literature on the subject, a canon of famous examples for "collective intelligence" soon developed, covering a range of methods, from ones based mainly on statistic aggregation models, such as Google's PageRank algorithm (which views every link pointing to a website as a voting for its relevance and—weighted according to incoming links on the original website—uses this as a main criterion for the sequence of search results[18]), to models largely defined by conscious decisions made by the users, such as Wikipedia.

Organizational theory and management praxis are also key reference points. The rapidly improving possibilities for "automating" the

coordination of cooperation with the help of software and the construction of electronic networks reduce the necessity within a corporation to integrate them into rigid hierarchies and tendentially also serve to open up the organization's boundaries.

The aspect that theories of post-Fordism and cognitive capitalism have critically examined, namely that this "automation" heavily relies on the employees' potential to self-organize, vanishes behind undifferentiated notions of a general "bottom-up revolution"[19]. At the same time, technology and methodology are constantly developing and newer solutions are emerging that make coordinating comparatively simple tasks possible exclusively through software, especially if they are outsourced to the Internet.

The most fundamental condition that teamwork organization must create—namely breaking up the task into rational, practical parts that can then easily be aggregated again—has been optimized to such a point within specific IT fields that the tasks have been pulverized into the tiniest elements, thereby creating the conditions for people with very different capacities and available time resources to contribute to completing the overall task.

The concepts and practices of "collective intelligence" are expanded through and parallel to "Web 2.0" and "social media," not only because many users are involved in Web-offers of this kind within the "participatory Web," but also because the ways these models are disseminated explicitly calls for them to be copied. A paper from the "Center for Collective Intelligence," which came out of the Management School at the renowned MIT, explicitly analyzes different models using a modular system of genes and genomes, in order to facilitate their reproduction.[20]

I would like to briefly elaborate on two areas: first, on the concept of crowdsourcing, i.e. outsourcing tasks to the Internet, whereby "collective intelligence" becomes intricately connected to developments that are also being theorized under the term "immaterial labor," and second, the prediction market hype within postmodern management that strongly links it to neoliberal ideology.

From "Business by Accident" to the "Home Sweatshop"

The strength of the open source movement was already visible in the 1990s. While one competing company after another foundered on Microsoft's near-monopoly position, open source projects proved absolutely capable of surviving–the Linux operating system and the later, highly successful Apache Web server are perhaps the most prominent examples.

Two different conclusions could be drawn here. There is the tendentially anti-capitalist interpretation—which, however, in pracitce is commonly argued in a way that conforms to the system—that sees a new logic of social production emerging, which does not adhere to the laws of competition, proprietorship and profit orientation. On the other hand, the phenomenon could also be interpreted and employed completely in terms of capitalism, namely, as a form of organizing production in a way that is potentially more efficient than that of a enterprise.

The term "crowdsourcing," which supposedly first appeared in 2006, represents the latter pro-capitalist position through its primary emphasis on profit-oriented aspects. The term, however, is not only restricted to this aspect, as it also attempts to embrace the phenomenon in its entirety. In this way and through its "outside

perspective" on the "crowd" or "community," the term carries much more meaning than its mere relation to profit orientation.

Particularly early on in the open source and free software movements, the online community was the source of the perspective, so to speak. This was the perspective from which decisions concerning the usefulness of certain tools, developments, etc. were made, and their reputation system did not simply fulfill a function in the production process, but served as a key horizon in regards to the participants' involvement.

In contrast, simply the fact that crowdsourcing alludes to "outsourcing" is a clear indication that the intended action perspective greatly differs from the crowd/community as a production site, thus shifting the perspective from content-related self-organization toward management.

In a "status update" in the 2009 edition of his book, Jeff Howe, who presumably coined the term, views the implications of the concept much more dismally than in the first edition from the year before. In the meantime, the financial crisis had prompted corporations to further cut costs, and had simultaneously increased the scores of unemployed, thus prominently highlighting the negative aspects of crowdsourcing.

The picture is no longer characterized by the dazzling stories of multi-million IT-companies that emerged more or less by accident from the ideas of a few clever young graduates who just wanted to do something cool for their community, but instead by the bitter realities of harsher working conditions: "We could well be seeing the emergence of the home sweatshop, with people's productivity and work habits closely monitored via their computers. Two years

ago such a vision seemed ridiculous on its face. Now it strikes me as inescapable."[21]

In his book, Howe views the emergence of a new kind of amateur as one of the four conditions of crowdsourcing,[22] which he attributes to the broader access to education after World War II. What Carlo Vercellone deems to be a working-class victory and takes as the starting point for his analysis of cognitive capitalism, [23] Howe views as the "overeducation of the middle class."[24] There are plenty of examples for this new kind of amateur with a field-related education and sometimes also work experience that parallels that of professionals:[25] from the over-abundance of art students considering the corresponding labor markets to chemists working as financial consultants, and to scientists who, after a dull day at the laboratory, hope to find a tricky question on InnoCentive.[26]

In a manner that reflects Virno's analysis—that realizing the general intellect merely in production and not in political self-organization leads to the uncontrollable spread of hierarchies[27]—Howe views the problems in certain labor markets on a general level, while solution strategies can only be employed on an individual level. For Howe, there are no solidary/collective solutions for the unemployed artist and for the chemist who is frustrated by the daily lab routine, only isolated and individual ways.

In crowdsourcing, many elements that fall under the term "immaterial labor" appear in more concentrated forms: incorporation of the "whole person," the exploitation of self-organization, and the full deregulation of work hours and places. At the same time, this exploitation model is not connected with the image of overcoming the factory system, but instead it

represents more a generalization of the (self-)exploitation mechanisms commonly found in art and in the creative industries: self-realization, enjoying work, interesting assignments in exchange for otherwise utterly unacceptable working conditions.

Neoliberal Oracles

Generally, there is a broad scope of methods for aggregating information and predictions developed in conjunction with concepts of "collective intelligence," ranging from the successful use of simple averaging in specific contexts to complex nonlinear functions.

Prediction markets generally mimic stock markets for this purpose, as the following example of predicting the outcome of the presidential elections briefly explains:

> "Consider a contract that pays $1 if Candidate X wins the presidential election [...]. If the market price of an X contract is currently 53 cents, an interpretation is that the market 'believes' X has a 53% chance of winning. Prediction markets reflect a fundamental principle underlying the value of market-based pricing: Because information is often widely dispersed among economic actors, it is highly desirable to find a mechanism to collect and aggregate that information. Free markets usually manage this process well because almost anyone can participate, and the potential for profit (and loss) creates strong incentives to search for better information."[28]

Principally, this form is applied on two levels, namely, in publically accessible Internet platforms where, for instance, the outcomes of

elections are predicted, as in the example cited above, and in various areas within companies, particularly in conjunction with new products, from choosing ideas for products with the best chances on the market, to assessing opportune moments for introducing a product to the market and estimating sales figures.

On the one hand, prediction markets emerged as one of the most prominent examples of "collective intelligence" because various corporations have been applying and testing them within their companies since the 1990s, and not least, because there are several examples that can easily be conveyed, such as the Iowa Electronic Markets' (IEM) successful election predictions.[29]

Employing these methods within companies tends to trigger effects of "immaterial labor," such as individual breaches—made possible by the relative anonymity on a collective level—of disclosing otherwise "hidden" information, ranging from the head office's pessimistic outlook on being able to keep a production date, to knowing a colleague's private plans to quit. The secrets don't have to be "revealed," but they are incorporated into the predictions. Then again, there are structural "threats" to a company's hierarchies that range from the necessity to reveal crucial data, to the problems that high-paid managers face when working with methods that are ultimately based on the assumption that collectives make better decisions.

While in practice the initial euphoria fizzled out into the mundane integration of prediction markets into the standard repertoire of advanced management, on a broader level, the ideological effects of a method that is still acclaimed as a cutting-edge management method remain. Prediction markets can be portrayed as an innovative method that responds to how financial markets operate. They tend to outshine conventional social, economic and political

methods, such as group discussions,[30] meetings and opinion polls, and represent neoliberal economic ideology in its purest form. It's no coincidence that the often very rudimentary depiction of the conceptual basis invokes the idealization of market mechanisms found in Hayek's classic formulations of neoliberal ideologies. Especially in terms of "collective intelligence," this means that the collectivization of information and intellectual work can only be conceived of in relation to the market.

Diversity Instead of Collectivity

I will now briefly go into the components "intelligence" and "collective." Certain approaches to "collective intelligence" break down the term intelligence very specifically, as is the case in the neuro-/cognitive sciences[31] or within the context of artificial intelligence research. In the management and organizational theory discourses examined here, the term is basically understood and used as a metaphor[32] for the knowledge resources within an organization for instance or, as already indicated above in relation to Douglas Engelbart's work, for "problem solving" and "task completion."

Within the context of the Web-oriented concepts discussed here, distinguishing between "user generated content" and "collective intelligence" appears instructive. In some projects, they both appear to be on the same level (Wikipedia appears as an encyclopedia and simultaneously as "collective intelligence" in terms of constant knowledge aggregation, as is reflected in the ceaseless process of verifying, revising, editing the articles), though these aspects diverge more widely in other areas. For instance, the production of "user generated content"—like designing T-shirts on threadless.com, (which, unlike Wikipedia, is a process of revision

that eventually comes to an end, as decisions must be made time and again, in order to physically produce the actual T-shirt)—seems to be quite different from the prediction market context where the emphasis is more strongly placed on the knowledge aggregation process.

In this sense, we can speak of a broader definition of "collective intelligence" that focuses on the cooperation perspective and comprises both aspects mentioned above and equates "collective intelligence," for instance, with "peer production."[33] In contrast, a more concise definition of "collective intelligence" foregrounds the aspect of knowledge aggregation and sets it apart from "user generated content." For instance, in James Surowiecki's bestseller *The Wisdom of Crowds*, perhaps the most influential book on "collective intelligence" to date, hardly touches upon "user generated content" at all.

"Collective": while in the early 1990s, Pierre Lévy may have deemed it important to distinguish "collective intelligence" from the fetishization of communities, at the dawn of the 21st century "collective" appears to long since have been devoid of political connotations. There were merely a handful of authors who, when faced with such concepts, fell for the misconception and felt the need to sound the alarm and come to the defense of the individual.

In the end, for the most part, the term "collective" is consciously used as a nondescript umbrella term, quite differently from how, for instance, the term "group" is used—i.e. often in association with specific common characteristics, such as that the members know each other. Within the context of "collective intelligence," the term commonly refers to one of four empirical forms of collective contexts: online community, small groups (work teams),[34] organization/company, and the "anonymous crowd" of

Internet users[35]. (Their navigation data is rigourously analyzed within the commercial sphere, while their "vast numbers" are just as important for understanding certain aspects of "collective intelligence" as is the recurrence of the power-law distribution that specifically draws attention to the collective[36].)

"Online community" is mainly defined by the fact that the orientation towards a common interest and/or a long-term goal is the main focus. In this way, it differs both from the traditional concept of community, which is defined by geographic proximity, and it also differs from online social networks, which are not based on one member's relation to the collective interests, but rather on the relation between two individuals.[37]

Both viewpoints—the nature of the task/problem and the form of collectivity—are closely related and have been analyzed in terms of their relation to one another. Jeff Howe, for instance, states:

> "The mechanics of crowdsourcing content differ greatly from those that rely on collective intelligence. In a prediction market or a crowdcasting network, the task is to aggregate widely dispersed information and put it to good use. This presents its own set of challenges. The crowd must be diverse, and nominally versed in the relevant field, be it the sciences or the stock market. But the crowd needn't, generally speaking, interact with one another. In fact, [...] interaction leads to deliberation, which in turn reduces the diversity of thought through which collective intelligence thrives.
> Crowdsourcing creative work, by contrast, usually involves cultivating a robust community composed of people with a deep and ongoing commitment to their craft and, most important, to one another."[38]

While this definition is not able to take the fine differences into account, it does distinguish two basic models for exploiting collectivity. In relation to "user generated content"—a less central element within the broader definition of "collective intelligence"—in the form of the online community, where what is interesting are the elements through which it emerges and which give it stability and substance, namely the members' long-term involvement, their identification with the common goals, and the consolidation of relationships among the members. At the same time, managers and more specifically "[d]esigners and architects of communities"[39] regard the online community—designable in detail using technical tools, where each filtering option diversifies individual perceptions and each added level of communication means that more complex tasks can be completed, etc.—from an outside perspective, and the elements through which the communities emerge do not enhance their self-determination, but instead their instrumentality, thereby rendering the two modes indistinguishable from one another.

At the center of a more narrow definition of "collective intelligence," with an emphasis on knowledge processes and information aggregation, lies a clearly contrary model, where only one of the aspects of collectivity is deemed absolute: diversity. The necessity of including diversity in considering "collective intelligence" has by no means only been identified by Howe,[40] moreover it is a widely recognized fact. James Surowiecki, for instance, in *The Wisdom of Crowds*, lists three requirements that must be fulfilled in order for a collective to be considered "intelligent," and the capacity to guarantee and sustain them is far more fundamental than the desire to develop specific methods: diversity, independence and decentralization.[41]

A scientific basis for this can be found in the work of Scott E. Page, who outlines these aspects of "collective intelligence" using

methods from complexity research. Already in the 1990s, while experimenting with agent-based systems (software programs that each follow different heuristics/problem-solving strategies), Page and his colleagues discovered connections that brought about the so-called "diversity trumps ability" theorem.[42] One example for this is: a main unit of 1000 agents, from which a group of the twenty best individual problem solvers and an equally large, randomly selected, comparison group are compiled. The frequent repetition of such experiments has confirmed that the comparison group regularly "outperforms" the group of the twenty best individual problem solvers. Three years after Surowiecki's *Wisdom of Crowds*, Page published a book in which he describes and explains in detail the mechanisms based on diversity that lead to this kind of outcome,[43] and, in the meantime, has also presented a more comprehensive account of the connections between diversity and complexity.[44]

This concept of diversity, which is reduced to its functionality, tends to "extract" aspects of collectivity that can be exploited in capitalist production, without activating the other levels—solidarity, development of common goals, etc.—thus enabling collective individuation.

To return to the initial question: Is the term "collective intelligence" really useful for leftist contexts? Yes. On the one hand, the term is more complex than just this one area of discourse examined here. Also, we can expect terms like "global brain" and "noopolitics"—despite all the problems that arise with these concepts, such as the linear claim of the "global"—to be capable of conceptualizing collectivity in an entirely different way, and that the concept "collective intelligence" will increase both in its complexity and content by combining diverse approaches.

As far as the area from the discourse examined here is concerned, the main focus is on the possibilities of utilizing the concept of "collective intelligence" as a means to critique net capitalism—both its exploitation mechanisms as well as the fragmented forms of collectivities that have come to inform society. A further focus here is on what appropriations become possible by this "negation", and how this can directly be connected to a critique of the phenomena in question.

In this regard, an examination of these detailed studies of "diversity," especially in terms of what can be done with them, would certainly be interesting. The fact that only fragmented forms of collectivity, which quickly come into contradiction with one another, emerge within the models examined here must be seen as situated within a context that seeks to exploit or instrumentalize these collectivities. On the other hand, leftist movements use concepts such as multitude/commons and precarity, both in theory and practice, to develop complex forms of collective individuation and therefore also fully different conditions for dealing with elements of collectivity.

If one is able to avoid making the fatal mistake of mixing complexity research models and "collective intelligence" concepts with critical engagements with diversity, these insights could be used as a pool of micro-tools to be used on both an organizational and tactical level to tease out the strengths of diversity, particularly on these levels.

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A longer version of this text [in German] will soon be available as part of the "Resources" from Creating Worlds *(http://eipcp.net/projects/creatingworlds/files/resources).*

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[1] E.g. in Alexei Penzin "The Soviets of the Multitude: On Collectivity and Collective Work: An Interview with Paolo Virno," in: *Mediations 25.1* (Fall 2010), pp. 81-92; http://www.mediationsjournal.org/articles/the-soviets-of-the-multitude (All listed links were last updated on 17 February 2012.)

[2] This argument is also thematically embedded in the short subchapter on "Swarm Intelligence" in: Michael Hardt, Antonio Negri, *Multitude. War and Democracy in the Age of Empire.* New York: Penguin Press 2004, pp. 91-92

[3] Jacques Rancière, "Communists without Communism?" in: Slavoj Žižek, Costas Douzinas (eds.), *The Idea of Communism*, Verso Books 2010

[4] "Il progetto UniNomade", http://uninomade.org/progetto/.

[5] More differentiated in Rancière, ibid.

[6] I examine further terms, such as "global brain" and "noopolitics," as well as approaches based on neuroscience models in subsequent texts.

[7] Cf. e.g. the Murray-Turoff quote from 1976 in: Howard Rheingold, *The Virtual Community. Homesteading the Electronic Frontier*, Addison-Wesley 1993, pp. 113-114.

[8] Cf. http://cscw2012.org/.

[9] Cf. Jens Schröter, *Das Netz und die Virtuelle Realität. Zur Selbstprogrammierung der Gesellschaft durch die universelle Maschine*, Bielefeld: transcript 2004, pp. 69-70.

[10] Howard Rheingold, *Tools for Thought. The History and Future of Mind-Expanding Technology*, Cambridge, MA; London: MIT Press 2000 [First printing: New York: Simon & Schuster 1985], p. 193.

[11] Cf.. John Markoff, *What the Dormouse Said. How the Sixites Counterculture Shaped the Personal Computer Industry*, London: Penguin 2006, p. 206ff.

[12] After all, largely because of the Vietnam War, it became quite clear that the ARC was situated in the context of military funding. The computers were used to coordinate the bombings in Vietnam, among other things, and laser-guided bombs were being developed in a laboratory next to the ARC. (Cf. Schröter, *Das Netz und die virtuelle Realität*, ibid., p. 77; Markoff, *What the Dormouse Said,* ibid. p. 211.)

[13] Cf. also Vannevar Bush's infamous text, published in 1945 „As We May Think", in: *Atlantic Monthly*, July 1945, pp. 101-108; http://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/3881/, which Engelbart also attaches importance to on an autobiographical level.

[14] Douglas C. Engelbart, "Special Considerations of the Individual as a User, Generator, and Retriever of Information" in: *American Documentation*, Vol. 12, No. 2, April 1961, pp. 121-125; http://sloan.stanford.edu/mousesite/Archive/Post68/Special1961.html.

[15] Douglas C. Engelbart, Richard W. Watson, and James C. Norton, “The Augmented Knowledge Workshop”, in: *AFIPS Conference Proceedings*, Vol. 42, National Computer Conference, 4-8 June 1973, S. 9-21, cited in: http://www.dougengelbart.org/pubs/augment-14724.html, paragraph 1b.

[16] Pierre Lévy, *Collective Intelligence. Mankind’s Emerging World in Cyberspace*, translated by Robert Bononno, Cambridge, MA: Helix Books 1997, p 13.

[17] Tim O'Reilly, “What Is Web 2.0. Design Patterns and Business Models for the Next Generation of Software.”, 30 September 2005, http://oreilly.com/lpt/a/6228.

[18] For more on PageRank within a larger networking and epistemological context, see: Martin Donner, “Rekursion und Wissen. Zur Emergenz technosozialer Netze” in: Ana Ofak, Philipp von Hilgers (eds.), *Rekursionen. Von Faltungen des Wissens*, München: Fink 2010, p. 77 – 113. On the “politics of search,” see: Konrad Becker, Felix Stalder (eds.), *Deep Search: The Politics of Search beyond Google*, Innsbruck, Vienna, Bozen: Studienverlag 2009.

[19] Cf. Steven Johnson, *Emergence. The Connected Lives of Ants, Brains, Cities and Software*, The Penguin Press 2001

[20] Thomas W. Malone, Robert Laubacher, Chrysanthos Dellarocas, "Harnessing Crowds: Mapping the Genome of Collective Intelligence", MIT Center for Collective Intelligence, Working Paper No. 2009-001, Februar 2009; http://cci.mit.edu/publications/CCIwp2009-01.pdf.

[21] Jeff Howe: *Crowdsourcing. Why the Power of the Crowd is Driving the Future of Business*, New York: Three Rivers Press 2009,

p. XI. On the one hand—especially when used within a discourse so void of criticism—the expression “home sweatshop” appears pleasingly bold. On the other hand, it is a poor comparison and has the problematic potential to trivialize the situation in “real” sweatshops.

[22] In this context, Howe also mentions a mode of production behind open source software, the development of the technical tools, most notably the Internet, and as the fourth element, “that transformed the first three phenomena into an irrevocable force,” the online communities. (Cf. Howe, Crowdsourcing, ibid., p. 99.)

[23] Carlo Vercellone, "The Crisis of the Law of Value and the Becoming-Rent of Profit", in: Andrea Fumagalli, Sandro Mezzadra (eds.), *Crisis in the Global Economy: Financial Markets, Social Struggles, and New Political Scenarios*, Los Angeles: Semiotext(e) 2010, pp. 85-118.

[24] This is also a heading of a subchapter in Howe, Crowdsourcing, ibid., p. 37.

[25] And there are two areas—two mechanisms of how professionally apprenticed/working people reach the status of amateurs—which are mentioned at least briefly in the book, that Howe doesn’t mention in this context: besides the somewhat euphemistically depicted structural unemployment in sectors such as the art field, the general increase in unemployment, e.g. through the financial crisis, that is briefly mentioned in the ”Status Update” of 2009, and in addition, a field that is mentioned only once, probably because it can far too easily be connected to “classical” outsourcing: professionals from the Global South, appearing more or less as amateurs, whose chances for a regular employment are withheld primarily due to the international division of labor.

[26] http://www.innocentive.com is a frequently cited example. Companies post assignments and technical questions that their research departments are unable to solve, come across a community of researchers, engineers, self-taught experts, etc., who (not collectively, but each in individual projects) who search for further solutions.

[27] Paolo Virno, *A Grammar of the Multitude: For an Analysis of Contemporary Forms of Life*, translated by Isabella Bertoletti, James Cascaito, Andrea Casson, Los Angeles, New York: Semiotext(e) 2004, p. 41; http://www.generation-online.org/c/fcmultitude3.htm.

[28] Kenneth J. Arrow et al, "The Promise of Prediction Markets", in: Science, Vol. 320 (16 May 2008), p. 877-878,

http://bpp.wharton.upenn.edu/jwolfers/Papers/PromiseofPredictionMarkets.pdf.

[29] http://tippie.uiowa.edu/iem/. The IEM were established by at the University of Iowa in the late 1980s for research and educational purposes and, among other things, used for predictions of the outcomes of various elections, and, in 75% of cases, have supposedly delivered better predictions of presidential elections in the US than the large polling institutes.

[30] Cf. Cass Sunstein, *Infotopia. How Many Minds Produce Knowledge,* New York: Oxford University Press 2006.

[31] Cf. Deborah Hauptmann, Warren Neidich (eds.), *Cognitive Architecture. From Biopolitics to Noopolitics. Architecture & Mind in the Age of Communication and Information*, Rotterdam: 010 Publishers 2010, or on the concept of "Distributed Cognition": Edwin Hutchins, „Distributed Cognition", 2002, http://

files.meetup.com/410989/DistributedCognition.pdf and idem, *Cognition in the Wild*, Cambridge, Massachusetts, London: MIT Press 1995.

[32] Cf.: http://scripts.mit.edu/~cci/HCI/index.php?title=What_is_collective_intelligence%3F

[33] Cf. Malone et al., Harnessing Crowds, ibid., p. 2.

[34] "This is important for two reasons. First, small groups are ubiquitous in American life, and their decisions are consequential. Juries decide whether or not people will go to prison. Boards of directors shape, at least in theory, corporate strategy. And more and more of our work lives are spent on teams or, at the very least, in meetings. Whether small groups can do a good job of solving complex problems is hardly an academic question. Second, small groups are different in important ways from groups such as markets or betting pools or television audiences. Those groups are as much statistical realities as experiential ones. Bettors do get feedback from each other in the form of the point spread, and investors get feedback from each other in the stock market, but the nature in the relationship between people in a small group is qualitatively different." (James Surowiecki, *The Wisdom of Crowds. Why the Many Are Smarter Than the Few*, London: Abacus 2006 [First publication: 2004], p. 217)

[35] And market participants etc., respectively.

[36] Cf. Clay Shirky, *Here Comes Everybody*, Penguin Books ^{2}2009 (^{1}2008), p. 128.

[37] Cf. e.g.: Tharon W. Howard, *Design to Thrive. Creating Social Networks and Online Communities That Last*, Morgan Kaufmann Publishers 2010, p. 13ff.

[38] Howe, Crowdsourcing, ibid., p. 180.

[39] Tharon W. Howard, Design to Thrive, ibid., p. 23.

[40] Who also elaborates on the topic, cf. Howe, Crowdsourcing, ibid., p. 131-145.

[41] Cf. Surowiecki, *The Wisdom of* Crowds, ibid., p. 27.

[42] Scott E. Page, *The Difference. How the Power of Diversity Creates Better Groups, Firms, Schools, and Societies*, Princeton, Oxford: Princeton University Press 2007, p. 131-235.

[43] Page, *The Difference*, ibid. In Page's work, the term intelligence is, on the one hand, absolutely characterized primarily in the above-mentioned sense by its problem-solving capacities, however it doesn't remain a metaphor, but instead is elaborated on in great detail.

[44] Scott E. Page, *Diversity and Complexity*, Princeton: Princeton University Press 2011.