

# *Elements for a Social Media Theory*

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In the last ten years more and more people have become familiar with telecommunications networks and digital content and have learned to use different messaging technologies, search engines, recommendation and reputation systems, forums, blog sites, wiki, social networks, sites for sharing photos, videos or bookmarks and so on. Using Internet, these people encounter services on an increasingly regular basis that use the adjective ‘social’ to underline the fact that they request, or perhaps we should say, assume, there will be active participation. Users of these sites are invited from time to time to share contents they have produced, to vote, comment, categorise or manipulate products created by others and to create social groups based on an affinity of tastes, interests and objectives.

This push towards social interaction in content production and distribution favours the emergence of new media models, centred on the gathering of individuals into variously articulated and distributed communities. Information and entertainment content are no longer just the fruit of the industrial production system that characterises mass media. At the same time, social media users are not merely passive recipients, but can interact and, even more importantly, be the source of new information. In this scenario, the assumption according to which listeners and readers in a certain geographic area have such similar tastes and preferences that they should be the recipients of the same contents or the same products, loses ground, or in any case, needs reassessment. Such homogeneity increasingly appears to be the result of the limits of mass production technology rather than a real characteristic of post-industrial societies. The spectator is becoming more and more the ‘interactor’ and this phenomenon has come about through a process in which the users have been personally involved and which has touched the mass media system just through association. The paradox generated from that consists of the fact that change in the world of media does not come from the media itself, but from its users and from the context in which they move.

Publisher, Tim O’Reilly, must be credited with having been amongst the first to see this evolution in context when he coined the term Web 2.0 in September 2005. Ten months later, on 9 July 2006, a stub dedicated to the term *social media* appeared in the English version of Wikipedia. In both cases, the authors described the phenomenon by using lists of examples (the same ones mentioned above) and introduced the concept of collective intelligence or wisdom of crowds.

We can use this as a departure point from which to propose a definition of social media that takes into consideration two dimensions: one that is experienced daily by individuals who use computers connected online to share digital content with their peers, and the other that

manifests itself when these users come together in systems sufficiently extensive to produce such phenomena as are commonly described as collective intelligence. I would therefore say that:

*Social media are digital media based on neutral computer networks. Locally, they assume the form of instruments and practices that individuals use to share content, often something they have generated themselves. Globally, if a sufficient number of individuals and connections are involved, they show the phenomena of self-organisation, emergence and unpredictability typical of complex systems.*

In the following pages, I will elaborate on the fundamental aspects of this definition, concentrating on the digital nature of social media, on the need for networks to be neutral and on the concept of complexity applied to the media.

### *The digital nature of social media*

The digitalisation of media is linked to the spread of the use personal computers which began in the early 1980s. It is a phenomenon that initially affected the professional media industry, facilitating more efficient content production and distribution such as electronic pagination of paper publications or digital television, which led to an exorbitant increase in the number of channels available. The progressive reduction of costs and the contemporaneous growth in calculating power of computers made it possible to transfer part of the technologies and practices used by professionals to common people, so much so that in the last decade we have seen an inexorable replacement of analogical equipment by digital instruments. Personal computers and invisible calculators like those found in digital cameras that automatically regulate exposure time and shutter aperture are instruments that we use daily in telling our stories.

Digital media have two fundamental properties: numerical representation and modularity. From the first it follows that the means of digital communication can be described in mathematical terms and that they are consequently subject to algorithmic manipulation, that is they are programmable. The second property describes the fact that media elements (images, sounds, forms and behaviour) are an organic set of discontinuous samples. These elements are assembled in larger structures but continue to maintain their own separate identity. The html pages are an example; except for text an html page calls up style sheets, images, sound and video that are archived independently.

The two properties highlighted by Lev Manovich allow automation of many operations necessary for the creation, manipulation and access to media. Let's consider, for example, a photograph taken with a digital camera. At the moment of the click, an invisible computer inside the apparatus selects the best ratio between exposure time and diaphragm aperture and focuses the subject with respect to a series of environmental inputs. It then memorises the

picture in the format chosen by the user and may apply some algorithms to reduce the file size. With a simple click, the user exploits a series of competencies that he does not directly possess and that have been codified into the instrument that he is operating. Before the arrival of digital media, he would have had to learn how to set the ratio between exposure speed and shutter aperture manually in order to produce a photo with good exposure. Now with a selector, he can choose the most suitable setting (portrait, panoramic photo, back-lit subject) and let the machine do everything by itself.

After capturing the image, the user can connect the camera to the computer to store his pictures, further process the photographs by applying automatic corrections to lighting, contrast, colour and so on. Here too, he knows he can rely on the fact that his computer contains many of the competencies that previously belonged typically to those who worked in darkrooms.

The output of the creative process is generally represented by an object that can be shared with other people and that helps to recount an experience. In the world of analogical media, everyone has at some point been the victim of an evening in which a photography-mad friend entertained his guests with his holiday snapshots. In the digital world, those with access to a network like the Internet have learned to share the fruit of their own creativity via electronic mail, eliminating the cost of reproduction and distribution of the prints.

But Internet offers other opportunities and allows the limitless widening of the circle of people with whom to share one's own creations. In the last three years, in fact, sites dedicated to the sharing of media objects have sprung up quickly, like flickr (photographs) or YouTube (videos). Through these services, users are becoming their own publishers and placing their own products together with those of so many other people who share the same passions. In these communities, anyone can comment on and enrich what other members have produced and then redistribute the content often by putting it on other sites, like his own blog.

In short, the digital nature of social media allows everyone to create and circulate new content thanks to the possibility of computerising many of the steps needed in production and distribution of media objects. This process takes place at a personal level, as we illustrated in our example, or in a vaster and more meaningful way. Search engines, for example, could not exist if the data to process were not digital. Efficient collection, conservation and the use of algorithms such as Google's PageRank to identify information relevant to the user's requests would not be possible.

However, digital nature alone is not sufficient to feed the social media dimension: what is needed is a network that allows creators, distributors and manipulators to connect.

### *The culture of the Net*

Nowadays, when people speak of the 'net', we think immediately of the Internet so that the two terms have in fact become synonyms and we often refer to Internet as the Net with a capital

letter. On the other hand, the sensational role that this network plays in our societies and the influence that the Net culture has on them is undeniable: technology helps us give concrete form to ideas, but at the very moment of doing this, it changes the way in which we think.

Manuel Castells claims that the Net culture consists of four tiers. At the base there is the techno-meritocratic culture of the academic world that developed the basic architecture of military and university networks from which Internet was born. The second tier is represented by the hacker culture: for hackers, freedom is a fundamental value, in particular the freedom to access their technology and use it as best they see fit. The third tier developed when Internet broke out of the restricted group of academics and technocrats to become accessible to everyone. The communities born thanks to the net adopted the technological values of the meritocracy and took as their own the hacker creed with its values of freedom, horizontal communication and interactive connection. Rather than cultivating technology for its own sake, they applied it all to their own social life. The last tier is represented by entrepreneurs who have built an economic value on the three earlier tiers. Fortunately, in the case of the Internet, commercial use was grafted onto forms and processes invented by the community culture, hackers and technological élite. In other words, the chronology with which the Internet developed has allowed the network to become a success that has so far remained essentially neutral.

*Net neutrality* is based on three keystones: data packets all have the same dignity and therefore cannot be slowed down or accelerated on the merits of their content; any part of the Net has the right to connect to the rest of the net and the duty to offer connection to others; any node on the net must be able to connect to any other node and any data packet must be able to be originated and received by any node.

According to Doc Searls and David Weinberger, the Net must be stupid: its only task is to connect the nodes and make sure that the communication between them is efficient, regardless of the content transmitted. The absence of a technological, organisational and administrative centre favours the initiative of each node and the free development of ideas and initiatives. Any attempt to centralise function or content can also work commercially, but it takes away value from the system as a whole. In other words, the value of the network evolves along its margins and every time someone attempts to add his *own* value, by specialising the network in one task or controlling its development, its overall value is effectively reduced.

The tightly controlled networks such as, for example, those of mobile telephone operators or the intranet of large businesses, show how centralised management or a strong specialisation effectively inhibits the development of phenomena such as those we can observe on Internet.

In a mobile network there is room for only one telephone service, one messaging service and, until not that long ago, one offering of digital content. Mobile phone operators erected walls around their own gardens and placed their own clients under supervision, offering only pre-packaged services and preventing them from creating them independently. Whereas on Internet, in the space of a few years, a great number of innovative and profitable services have been

developed, on mobile networks these so-called added value services have been one failure after another. For example, with the closure of the budget on 31st March, 2007, Vodafone had a global turnover of 28.871 billion Euros. Of this, 22.376 (77.50%) billion were for telephone calls, 3.587 (12.42%) for messages and 1.428 (4.95%) for data (an item that includes personalisation of services based on SMS and MMS). In other words, throughout the twenty years of its growth, the mobile telephone has essentially remained a telephone and the innovations in services are due more to the users' initiatives than to commercial foresightedness. In fact it was the users who identified areas unprotected by the operators' intelligence by discovering SMS and who used them in creative and unexpected ways thus creating the intelligent multitude described by Rheingold. In the Philippines on 20 January 2001, more than a million inhabitants of Manila, mobilised and coordinated by waves of text messages (SMS), gathered in the centre of the city over four days, wearing black clothes to protest against president Joseph Estrada, who was forced to step down. Bringing about the fall of a government without firing a shot represented a prime exemplary manifestation of behaviour driven by the smart mobs.

In large businesses, tightly controlled intranets have limitations very similar to the mobile phone network. Their administrators tend to inhibit unforeseen uses and only authorise the use of a few communication and collaboration instruments. This is the digital declination of the *command and control* principle that permeates most organisations. In these businesses, a model of inspiration harking back to Ford is still applied where human resources operate more or less complex machines to perform hierarchically predetermined tasks.

In these organisations, most of the communications and collaboration flows through electronic mail which is used as a messaging instrument, a filing system for work documents which are not intended for knowledge management systems, a chat room and instant messaging system surrogate, work diary and so on. Despite the efforts of departments managing corporate information technology and their suppliers who work endlessly to create unnecessarily complicated and obscenely expensive applications, people ignore instruments that they believe are of little use or not particularly usable and consequently use applications best adapted to their needs. E-mail is simple, flexible and... neutral.

On the other hand, there is the mad photographer whom we met previously. We left him uploading his photographs to a site so that he could share them with other users. In photo-sharing sites like flickr, every photograph can be tagged with key words that are inserted by the author and all the other site users. Thus every shot is enriched with more meanings than were necessarily intended by the author. At the same time, all of the key words used by the community can be aggregated to show what the prevailing interests are that members of the group express at a certain point in their common history. The use of such a simple practise as tagging allows the creation of a new social network built around the meanings that its participants assign to images: such a network is persistent because the tags are memorised in the network of the computer used to connect individuals of the community.

On one hand we have systems that inhibit the creation and sharing of information from the bottom, and in which phenomena like smart mobs cannot be anything other than episodic and exceptions to the rule. On the other hand, however, there are systems that incorporate functions structurally to allow content production with Bottom-Up Logic. In this sense, we can ascertain that as long as a computer network limits connection opportunities between users by preconditioning the type of connection, its persistence, as well as the quality and quantity of the objects which can be exchanged, it seems rather unlikely that the social system which it supports can produce phenomena that the most attentive net observers have associated with expressions of collective intelligence or wisdom of the crowds.

### *Social media as complex systems*

In order to familiarise ourselves with the concept of collective intelligence, we can have a quick look at the anthills studied by Deborah Gordon at Stanford University in the last twenty years.

Ants are very simple insects incapable of consciously creating a society, nevertheless their colonies display evidence of a social coordination and ability to resolve problems. These insects communicate amongst themselves through a set of signs based upon the secretion of chemical substances, pheromones, and the regurgitation of food. The communication between the workers of the colonies of *Solenopsis invicta*, for example, relies on a vocabulary of only ten signals, nine of which are based on pheromones.

Ants are able to decode the typology and intensity of these signals and react using a set of rules. For example, they mark the routes toward food reserves and are able to regulate the quantity gathered in proportion to the size of the colony and the reserve already accumulated. At the same time, they are able to apportion the work, assigning a suitable number of individuals to the procurement of food stocks, construction and maintenance of the anthill, defence, the nursing of larva as well as the disposal of waste and management of corpses. Gordon observed the harvest ants that constructed a cemetery in a point far away from the colony, and dumped the waste farthest away from both the colony and the cemetery.

It is obvious that none of the phenomena of social organisation that one can observe in anthills is produced consciously by individuals of the colony and no insect has an overall vision of the society of which it is a part, nor of the historic moment in which this society exists. In fact anthills have a lifespan of approximately fifteen years and they exhibit different collective behaviour throughout the course of their history. Ants interact at only a local level, nonetheless they produce a global behaviour, and the order that is created out of the interaction of thousands of individuals cannot be directly inferred by the observations of the actions of single players.

The behaviour of anthills qualifies them as complex systems. A complex system is an open system (it exchanges energy, material and information with its environment) consisting of a great variety of elements that possess specialised functions. These elements are organised by internal hierarchical levels (in the body: cells, organs, systems of organs) and are connected to a great variety of ties that produce a high density of connections. Interactions among the elements are not linear which is the same as saying that the components of the system interact amongst themselves through a network.

This definition of a complex system can be applied just as well to social media, as the following example shows. It is Google's pagerank, that is the mechanism invented by Larry Page and Sergey Brin to ascertain how important a certain web page is and to make it appear at the top of a list of search results.

We can schematise the pagerank mechanism in this way: Google interprets a link from page A to page B as a positive vote that is then assigned by page A to page B. But Google does not stop there. For example, it analyses the page that assigns the vote: If this, in turn, is an important page, the vote it assigns will be worth more and thus contributes to making the page voted more important. Using this algorithm, Google creates a ranking by assigning a score from 0 to 10 to each page. When the user runs a search, the system searches for pages that contain keywords and lists them according to their pagerank. This ranking can therefore be considered as the synthesis of a social process since it promotes the page contents of a certain user at a comparatively more important level because other users have mentioned it in their own pages. The established rules of pagerank bring about the system's self-organisation and the emergence of a state of balance synthesised in the index.

Just like an anthill, Google is a complex system. The Mountain View search engine is certainly an open system because it exchanges information with the environment (the web) and changes its behaviour in response to external stimulants. It receives input from the environment gathering data to feed its own archive, and then applies automatic data processing procedures (the algorithms that produce the ranking) and gives back an output in the form of a page with search results. Such results, in turn, produce feedback mechanisms that can be of various kinds. For example, it is likely that a blogger would insert a link to a page that he found through Google in a post; in a short space of time, this information will be archived and contribute to influence later search results.

The elements of a complex system must be connected to each other through non-linear local interaction. Google built pagerank by analysing the network of connections among the pages that it indexed and assigned a positive value to each connection. Every link implies an activity that consists of inserting a link in an html page to give the reader further information on certain topics. Whoever does it certainly does not have an overall vision of the Net and does not follow linear sequence where his action would come before some and after others of other users who operate according to an already established scheme. Even those who produce links to influence the results displayed by the search engine operate in a local context and in a non-linear way.

They are only interested in a certain number of keywords and operate on a parallel and in competition with other people who are trying to accomplish the same aim.

Ultimately in complex systems there must be so many players that we talk about critical mass, that is a quantitative minimum threshold beyond which a qualitative change occurs. If Google's index only contained a few pages and was fuelled only by the contributions of a few users, it would be practically impossible to calculate a pagerank. It is the enormous *quantity* of pages and links contained in the index that allows it to obtain a better result quality-wise compared to a search system that merely performs linguistic analyses of indexed documents. Somewhat ironically, in order for social media to become such as their name implies, they must also be mass media, but not in the sense generally attributed by the social sciences to this term. It is no longer a synonym of groupings connoted by their psychological, ethical and cultural affinities and by an identity of social behaviour, but a multitude of non-homogeneous individuals.

At the same time, social media represent a completely new paradigm as a result of their complexity. In fact, in mass media this can be seen at the industrial system level, since every sufficiently large social group is a complex system, but the medium in itself cannot be considered complex because it has a linear structure (one turns printed pages, radio and television unfold their programmes over a time line) and it does not allow any form of interaction. Instead, social media behave in an analogical way like anthills and produce self-organisation and emergence phenomena commonly described as collective intelligence.

### *The future is on the edge of chaos*

Google, like other social media, is in continual evolution, its index constantly subjected to the impact of the environment from which the search engine gathers information. Depending on the type of data, quantity and quality of the connections, the archive changes configuration and the same search, done at different times, produces different results. In other words, by applying a set of rules, the system organises itself, assumes a state and produces the emergence of new information that none of the elements present in the system possessed originally. For this reason, if today we look up *social media* with Google, the first result we will get is the Wikipedia entry: the search engine considers it the most relevant because, all things being equal, that page has a pagerank of 7 out of 10. The following page has a pagerank of 6 and the third result would have 5. It is not unlikely that a similar search done a few months later would produce different results. The network of individuals who deal with social media will have produced new content, modified or deleted that existing on the topic, and will have transformed the network of links traced by Google, by producing a new pagerank and therefore a new list of results.

This evolution is only partially predictable because different forms of social media, when they become complex, are destined to go beyond the intentions of their creators. Ten years ago when the search engine was turned on in a laboratory at Stanford University, no one could tell

the form that the index would take or in which direction it would grow most rapidly. In the ideal setting of a university laboratory, the two researchers had probably not thought that in a short time their system would be threatened and driven towards chaos by spam or pressured towards crystallisation which comes from the pre-eminence achieved by some sites. An example of such a site is Wikipedia, which has earned a pagerank of 9 and now appears as the first result in most searches.

Social media cannot stay the same for long: in order to survive they must evolve with the environment in which they are osmotically immersed and in order to do this they must situate themselves in an area between order and disorder which has suggestively been called the margin or the edge of chaos.

At this balancing point, the components of a system never reach stability but nevertheless do not succumb to turbulence. The edge of chaos is where life has found enough stability to sustain itself and enough creativity to deserve the name 'life'. The edge of chaos is where new ideas and innovative genotypes nibble away continually at the edge of the status quo and where even the most old firmly entrenched old guard will sooner or later be overturned.

### *About the author*

Nicola Mattina is the founder and director of Elastic, a managerial consulting company which designs, develops and manages relationship systems based on social media. He collaborates regularly with Nova 24 and holds courses and seminars on themes such as business communication and social media. He is an active blogger and video blogger in Italian (<http://blog.nicolamattina.it>) and in English (<http://www.spiderlessweb.com>).