Article

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Facebook and the engineering of connectivity: A multi-layered approach to social media platforms

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Abstract
This article aims to explain how Web 2.0 platforms in general, and Facebook in particular, engineers online connections. Connectivity has become the material and metaphorical wiring of our culture, a culture in which technologies shape and are shaped not only by economic and legal frames, but also by users and content. The emergence of social media platforms is at the heart of a shifting dynamic, where various actors (technology, users, content, legal and economic actors) are building a connective space for communication and information. In order to comprehend this interwovenness, Bruno Latour's actor-network theory will be invoked to explore how social media platforms can be analysed as techno-socio-cultural artefacts; this theoretical framework will be complemented by Castells' political-economy approach to arrive at a fuller understanding of how social media operate. The documentary *Catfish* (2010) serves as an illustration to explore social media platforms in their multiple dimensions.

Keywords
Actor-network theory (ANT), convergence culture, digital culture, Facebook, participatory culture, social constructivism, social media, Web 2.0

Introduction

When the documentary *Catfish* (Henry Joost and Ariel Schulman, 2010) hit the art movie scene, just a few weeks before *The Social Network* (David Fincher, USA, 2010) was released, it was quickly labelled 'the real Facebook movie'.[1] The documentary relates how 23-year-old New York

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photographer Nev Schulman becomes friends on Facebook with Abby Pierce, an 8-year-old fan from rural Michigan. They start corresponding after Abby sends him a painting of one of his photographs. Nev quickly becomes part of Abby's Facebook circle, which includes Abby's mother Angela, some 20 friends, and Abby's 19-year-old half-sister Megan, an attractive looking girl who is a singer–songwriter. Nev starts a romantic long-distance relationship with Megan, who sends him MP3 files of her songs, and he gradually becomes a virtual member of the Pierce Facebook family. After phone calls and SMS contact, Nev and Megan are planning to meet in person, when Nev discovers that the songs Megan sent him are performed by other people on YouTube. Nev's brother Ariel and his friend Henry, who have started filming his escapades with a handheld camera and mobile phones, persuade Nev to continue the romantic affair after he finds out that Abby and Megan have posted several deceptive claims. When the three young men travel to Michigan together to pay an unannounced visit to their Facebook friends, it quickly turns out that Abby's mother Angela made all the paintings that Nev received. It takes some time for Angela to confess, in front of the camera, that she also invented and impersonated the lovely Megan in phone calls and short messages; she stole the photograph from a young Canadian woman on Facebook.[2] In real life, Angela is a middle-aged housewife who cares for her husband and two seriously disabled stepsons. The trio documents Angela's apologetic explanation of how she manufactured a complete Facebook reality – including 20 friends' profiles and several mobile phone connections – to help her escape from her disappointing real life situation.

Catfish is an interesting illustration of how Facebook's technology constructs connectivity: how it facilitates the cultivation of 'weak ties' as well as the fabrication of 'strong ties'. The home-movie-turned-documentary focuses on the role of social media's technologies, featuring actual Facebook users cast in their respective roles as compliant content generator and subversive user. In addition, the documentary focuses on (cultural) content as an important part of social media's lure. The attraction of this medium is based on communicative exchange (social network services or SNS) and the sharing of user generated content (UGC): pictures, songs, paintings, and so on. Social media appear to accommodate some profound users' needs: the need to be connected to (anonymous) others, the need to be constantly updated on the status of others, the need to build one's presence online, and the need to express oneself creatively and exchange cultural content online. However directive the hardware and software of social media, human users' interactions with technologies may be predictable but can also be seditious.

This article aims to explain how Web 2.0 platforms are active *mediators* between users, technologies and content. Connectivity has become the material and metaphorical wiring of our culture, a culture in which technologies shape and are shaped not only by economic and legal frames, but also by users and content. A society rooted in norms of connectivity wields platforms that simultaneously construct and reflect the value of cultivating weak ties and of formalizing informal communication and self-expression – a complex and layered process that is constantly modulated. The emergence of social media platforms is at the heart of a shifting dynamic, where agents of different nature (human and non-human, material and immaterial) and varied size (individuals, groups, collectives, societies) are building a connective space for communication and information. In order to comprehend this interwovenness, Bruno Latour's actor-network theory (ANT) will be invoked to explore how social media platforms can be analysed as techno-socio-cultural artefacts. In the concluding section of this article, I will argue that we need to expand the social-constructivist prism with a political-economy approach such as Manuel Castells' to arrive at a fuller understanding of how social media operate in a culture of connectivity.

Engineering connectivity

The documentary *Catfish* could be considered the product of a UGC praxis – a praxis where everyone can create cultural content with the help of ubiquitously available, easy-to-use equipment. The only hardware involved in making this documentary was a camcorder, a laptop, several mobile phones and a few microphones. The three young men use these tools to assemble all footage necessary to make a 90-minute documentary, relying on professional editing tools only in the film's final production stage. Social media, particularly SNSs, form the pivotal focus of the film. We see extensive footage of how Nev deploys Facebook and mobile phones to contact the Michigan family. Later on, when Angela admits her piteous fabrication, she displays particular pride in explaining her technological ingenuity while handling several mobile phones as well as Facebook cut-and-paste skills. Technology, as it appears, is a double-edged sword for Angela Pierce: she uses it to create and fake content, to make and forge connections. Angela cultivates connectivity at the same time and by the same means as she adapts to the dominant culture of connectivity surrounding her. By aggrandizing her presence online she builds her own circle of 'siblings' and 'friends' – a world in which she feels appreciated and loved.

What exactly is the role of technology in the construction of online connectivity? From a strictly technological perspective, connectivity can be defined as Internet Protocol (IP): the (unbiased) transport of packets between two endpoints. A network's ability to link with other computers and devices defines the quality of its connectivity. We say a computer network has 'good connectivity' when a program can import data from a wide variety of other programs and can export data in many different formats. Data connectivity can be compared with utilities, such as drinking water and electricity. Whereas charged particles form the elementary parts of electricity, and drops contribute to a water flow, data are the rudimentary components of connectivity. Just like water and electricity, connectivity is at the heart of an intricate web of forces through which digital data are managed – that is, generated, shaped, channelled, distributed, filtered and delivered. It is a basic resource upon which general utility applications are built, for example telephony, television, SMS, radio, the World Wide Web, as well as a number of proprietary platforms, such as Facebook, Wikipedia or Blogger. These platforms provide convenient access to specific applied uses of resource and utilities. Just like thirst, a yearning for online connection can be regulated as a human need to be fulfilled or as a resource to be capitalized. Just as electricity in the 19th and 20th centuries transformed societies by penetrating every fibre of people's personal and professional lives, network connectivity is probably the most powerful transformative force in early 21st-century cultures.

If we accept the Internet as the basic computational infrastructure on which applications are built, we can regard connectivity as the resource to be managed by a complex of (public and private) organizations. The Internet, since 1969, arose out of a pragmatic desire to link the various small proprietary networks into a *generative* information technology environment, regulated by simple protocols to deliver incoming and outgoing data accurately (Carr, 2008). The basic principles of making connections and exchanging data, as Jonathan Zittrain (2008: 102–107) has pointed out, were rooted in an all-purpose Internet that guaranteed equal distribution and access. Yet as the Internet expanded into a widespread utility infrastructure, data were increasingly transported through 'tethered applications' or 'applied services', such as Apple's iTunes to download songs or Facebook to channel social contacts. If connectivity were water, the change away from generativity towards tethered appliances represents the shift away from water running through public pipes and private taps towards drinking water delivered in larger and smaller bottles which

are rented and paid for – a *service* that is extremely convenient and user-friendly, but which also transfers considerable power to the companies handling and packaging the water. In the context of communication or media technologies, tethered appliances promise convenient, free and secure delivery of data to their users, while their owners in return have exclusive access to those data and meta-data as well as to the interfaces controlling data traffic. Connectivity is premised on a double logic of empowerment *and* exploitation. While the original architecture of the Internet (ARPANET) fostered empowerment through open access and innovation potential, incorporated applications now control access to this valuable utility and human need. Barbara van Schewick (2010) convincingly argues that in this evolution, platform technologies cannot be seen apart from the broader cultures in which they evolve.

Even if the denotation of connectivity is a technological one, its connotations expand into the realm of the social and the cultural. Three useful concepts to theorize the technological dimension of connectivity are *platform*, *protocol* and *interface*, precisely because these terms' meanings carry beyond the technological realm into the social and the cultural. Platforms are usually either hardware, software or services (or combinations thereof) that help code social activities into formatted protocols and present these processes through user-friendly interfaces. For instance, Facebook provides the software interface to channel communicative traffic between people; Flickr codes the social activity of exchanging pictures; eBay provides a protocolized environment for selling and buying goods; and JobLink codes professional connections between job seekers and employers. The word 'platform' is an inherently ambiguous term, according to Tarlton Gillespie (2010), because it links the computational and the architectural to the social, the political and the cultural. Web 2.0 platforms, such as YouTube and Facebook, present themselves as meeting places as well as performative stages: YouTube, for instance, is both a meeting space for videosharing communities and a space to showcase your creative products or, alternatively, a site to look at videos posted by others. A platform's architecture – its interface design, code, algorithms – is always the temporary outcome of its owner's attempt to steer users' activities in a certain direction. As we learn from *Catfish*, Facebook's interface and protocols push users towards making connections with unknown people and turning them into 'friends' – a concept grounded in the exchange of small talk, self-made content and informal updates (e.g. Facebook's feature 'the Wall').

Any platform's connective structure is mediated by protocols: formal descriptions of digital message formats complemented by rules for regulating those messages in or between computing systems. On the one hand, protocols are technical sets of rules that 'encapsulate information inside various wrappers, while remaining relatively indifferent to the content of information contained within' (Galloway, 2004: 52); on the other hand, protocols gain their usability from how they are programmed and how they are governed or 'managed' by their owners (2004: 121). Their logic, then, is determined *through* interfaces and *by* institutions – governmental, communal, or corporate – even if these sites appear to be operated by individual users or user communities. Protocols hide behind simple, user-friendly and often symbolic interface features; the complex technology or 'internal interface' is kept hidden from the user who can only see the front end or the 'visible interface'. A visible interface has technical features (e.g. buttons, scroll bars, stars) and regulatory features (e.g. the rule that a personal profile is required before entering the site) that help steer connections between users and content. The principles behind these algorithms and the connective traffic they regulate remain largely obscure to the ordinary user who probably considers the site to be merely a facilitator of a pre-existing social activity.

However, connectivity is increasingly a co-production of humans and machines, with a more prominent, albeit mostly hidden, role for technology. David Beer (2009) calls the powerful,

oblique information apparatus that comes to produce everyday life the 'technological unconscious'. He points at the potent technological environments that operate 'without the knowledge of those upon whom they are taking an effect' (2009: 990). Algorithms and protocols trigger and channel the visual, auditory and cultural experiences of people active on social media platforms. Virtually all UGC and SNS platforms rely on protocols that are predicated upon social practices. For instance, while 'sharing pictures' sounds like a typical interaction performed by human beings, photo sharing via Flickr is a virtually automated process mediated by sophisticated protocols. Human preferences, tastes, desires and interests are profoundly manoeuvred by the interface features that direct online behaviour, while users' behavioural metadata in turn help to reconfigure the very algorithms steering the site.

Platforms, protocols and interfaces aptly illustrate the convoluted connection between the technological and the social. Social practices are increasingly mediated by platforms that affect people's daily interactions and reciprocal relationships. More precisely, platforms run on account of coded protocols that appear to 'mediate' people's social activities, while in fact *steering* social traffic. Andrew Feenberg (2009) considers Internet technologies not as things but as unfinished processes: as the Internet is still evolving, its owners and users are engaged in constant struggles to define a platform's social meaning. The power to change a platform's interface rests largely with its owners, who also control how much users get to see of the complex automated apparatus hidden behind the screen's features. Langlois et al. (2009) rightly point at the potential of users to intervene in the platform's coding strategies at various levels: first, at the level of application programming interfaces (APIs) when platform owners allow external developers to use the platform's metadata or code to build applications; and second, at the level of user communities forcing platform owners to explicate social norms behind obscure technological protocols or clarify intentions implicit in interface changes.[3] The history of Facebook's interface adjustments, then, may be interpreted either as an attempt by engineers and owners to make the platform serviceable to a maximal number of users, or as the corporation's attempt to manoeuvre its users into commercially exploitable terrain. Regarded as part of the culture of connectivity, the history of Facebook's interface changes illustrates the intense negotiations between platform owners and user groups to divide and conquer specific niches in communication traffic.

While the Internet is still in flux, and social media platforms are being developed to demarcate their specific share of this newly created social space, the subtle and not-so-subtle encounters among the different agents involved in the making of these platforms may appear transient, yet mapping this process is not as easy as it may seem. By scrutinizing particular platforms, we may learn more about the process of one platform owner in relation to users and user groups. On an abstract level, though, we may try to identify the principles underpinning social media platforms in general. How are connections created, promoted, modulated and controlled by which algorithms and interfaces? How does interface design consciously play into the 'technological unconscious' of users? How is usage inscribed through technology and can users actually influence a platform's directive interface and protocols?

Engineering sociality: Users and usage

Let us return for a moment to the protagonists of *Catfish* and regard them as actual Facebook users. Both Nev Schulman and Angela Pierce used the site as a means to contact unknown strangers and turn them into 'friends'. Nev deployed the social network site the way it is intended to be used; he relied on its technological and social presumptions and complied with the site's protocols, such as

its 'real name policy', which is part of Facebook's user guidelines.[4] Angela, contrastingly, violated Facebook's policy and not only fabricated her identity, but also undermined the site's directive usage rules by stealing profiles and photographs from other members. Facebook's system for recognizing authentic profiles is obviously far from perfect if ordinary users like Angela can subvert Facebook's automatic detection engines and undermine their coercive protocols. By the same token, Angela created not only a fake identity but a fake community, cutting and pasting together a circle of friends. Nev thus involuntarily became part of an imagined community that sprouted from Angela's imagination. From this example we learn that *usage* is not the same as *users*. On the one hand, human users are engaged in the social shaping of technology: they comply with the engine's inscribed use or effectively undermine it (Bijker, 1995). Actual and implied users are pivotal agents in the shaping process. On the other hand, though, users and technology mutually affect each other in the technological shaping of sociality and connectivity: social network sites engineer predetermined sets of categories through which users supposedly build identities and communities (Baym, 2010: 110). If human sociality turns out to be different from the machine-inscribed sociality, users may adapt their technical environment to support their social situation. In Nev's case, he refused to 'de-friend' Angela after finding out about her fraud, but relisted her as his friend after she decided to post her art on Facebook under her real name and picture. Technology shapes sociality as much as sociality shapes technology – a process in which humans and machines have their own distinctive but mutually shaping roles.

The study of user agency, in relation to social media, is quite often restricted to human agents only. Some sociologists and media scholars have investigated the behaviour of actual users to find out how they deploy SNSs to construct individual identities and social circles of networked connections (Boyd and Ellison, 2007). Along similar lines, communication experts have investigated the way Facebook helps individual users to maintain relations as people move from one place or community to another (Ellison et al., 2007), while others have examined how teenagers interact with unfamiliar others as they develop their social identities through positioning themselves vis-a-vis their peers (Boyd, 2008). On a normative level, some specialists have theorized how actual Facebook users interact with each other in order to form groups or communities (Kaplan and Haenlein, 2010). Most of these empirical studies regard human users as autonomous agents and social media platforms as auxiliary means to support online sociality. From an empiricist sociological perspective, human social behaviour is purportedly enhanced by technology, and technology is generally viewed as an *intermediary* between users.

By means of counterpoint, a number of media and communication researchers consider user agency not as an exclusively human activity facilitated by online tools, but as the coalescence of human activity and platform architecture. In her comparative analysis of three SNSs – Facebook, LinkedIn and ASmallWorld – Zizi Papacharissi (2009) found that the action radius of individual users in terms of self-presentation and socio-cultural organization is tightly controlled by each site's architecture – that is, by a platform's interface and protocols. Whereas Facebook is the 'architectural equivalent of a glass house', LinkedIn and ASmallWorld have more tightly administered default settings, thus restricting a person's performative space. Papacharissi concludes that technology-as-architecture 'communicates the inherent promise and predisposition of online spaces' (2009: 216). From a similar point of view, David Beer (2009: 998) stresses that user's agency is a driving force of each platform's 'performative infrastructure'. People express their tastes and preferences, while algorithms translate them into relational databases that, in turn, inform user behaviour. This does not mean that human agents are taken hostage by a platform's architecture; users are not uniform groups that are either empowered or exploited by social media

apparatuses. On the contrary, users may shape their profiles and behaviour so as to anticipate the effects of certain acts and steer things into a direction they deem more desirable – think of Angela's mashed-up profiles concatenated into a circle of 'friends'. Human and technical agents, rather than being hierarchically ordered entities, are mutually intertwined in determining a platform's *usage*.

Cultural theorists, for their part, also show a tendency to interpret user agency exclusively in terms of human activity when they talk about social media embodying 'participatory culture'. The 'active participant', cast ideally as someone who is well-versed in the skills of new media, serves to contrast the idea of a 'passive consumer' of old media. Henry Jenkins (2006: 24), for instance, applauds active users as the defining feature of what he calls participatory culture: 'Audiences, empowered by these new technologies, occupying a space at the intersection between old and new media, are demanding the right to participate within culture.' Jenkins, along with Mark Deuze (2007), hails the technological opportunities seized by grassroots movements and individuals to express their creativity and provide a diverse palette of voices. However, social media sites do not automatically turn all users into active participants. In fact, the term 'user' rather than previous terms such as 'audience', 'viewer' or 'customer' conceals the fact that the large majority of users are anything but active participants. As evidenced by various surveys, user agency comprises different levels of participation, varying from creators and spectators to inactives or 'lurkers' (Li, 2007; van Dijck, 2009). More significantly, the concept of active users seems to be invented by media producers as a tool for expansion (Schanke and Ytreberg, 2009). Media industries often adopt the term to emphasize user empowerment while downplaying user exploitation. Users are invited as 'participants', while platform interfaces effectively hide the fact that *all* user activity, whether active posting or passive viewing of content, contribute to a site's worth. The number of connections users make through a platform raises its monetary value, so that is why a site's architecture pushes users to constantly connect to others, to promote the formation of new groups and communities.

By the same token, social media are often narrowly defined as tools for community formation: online communities strengthen offline ties established in real life, and Web 2.0 platforms are thus seen as facilitators of both offline and virtual communities. What is casually called community formation, then, is often a product not exclusively of human collectivity but also of technical connectivity. Sites such as Facebook direct their users towards sharing their posts with as many people as possible and actively encourage them to join groups that appear to be of interest to an individual, based on an automatic detection of shared taste or contacts. Profiles of members that show vague connections are automatically invited to join one another's group. Terms such as 'community' and 'communality' have become inflated notions as more networks of strangers start calling every invitee a friend and every clicker a follower. On a more abstract level, platforms are regarded as potent instruments for enhancing citizenship and collective engagement (Benkler, 2006; Jenkins, 2006; Shirky, 2008). Frequently used notions such as 'collective intelligence' and 'collective memory', though, appear to overstate the impact of human agents in developing user agency, while understating the influence of technological and commercial agents. For one thing, technical affordances inscribed in two different platform architectures may create quite different bases for identity and group formation (Haythornwaite and Kendall, 2010). If one platform strictly prohibits the use of fake names or anonymous identities while another site encourages the use of aliases and multiple identities, the resulting notions of community and engagement will be quite different. Mutatis mutandis, commercial motives for bringing people together, such as Lady Gaga's Twitter page or CNN's Facebook page, result in quite different 'communities' of followers and fans. The connotation of community, in other words, has been transferred from a context of

human connectivity to a context of engineered connectivity while keeping its human-centric meaning, even though technology is now the determining factor in defining sociality.

In sum, user agency is a complex concept, involving both human and technical agents as well as institutional and societal agents steering user activities. Therefore, user agency can hardly be assessed from a mono-disciplinary angle, as the technological, social, and cultural aspects of SNS and UGC sites are inextricably intertwined (van Dijck, 2009). Such a multi-disciplinary approach to user agency should yield a model that accounts for users' multiple roles, while concurrently accounting for technologies and site operators-owners as actors who direct usage. In the last section, I will return to such a theoretical model, but first we need to account for one more important aspect of social media: its (cultural) content.

The role of content

Web 2.0 platforms may be technically indifferent to the content they transport, but they are not socially or culturally indifferent. In a technological sense, connectivity is about the quality of *connections*, rather than about the nature or quality of content. In order to guarantee good connectivity, content has to be standardized in terms of form and quantity. Compare data connectivity, once again, with water distribution. Drinking water is not offered in ponds or basins, but is distributed through (public) water mains and (private) taps. If drinking water is distributed in bottles, though, its packaging and distribution has to meet different standards of usability. At the same time, its content is no longer simply 'water' but a certain *brand* of water: its content has changed as a result of its packaging and distribution and drinking bottled water becomes part of someone's identity and daily routine. Similarly, data distributed through the Internet have fewer pre-packaged forms than data distributed through social media platforms; there is no such thing as a 'blank page' offered by a platform. Every platform offers processed data coded in recognizable shapes and forms that carry a specific branded meaning in the social practices of everyday life; a platform has to meet certain standards of convenience and expectations of usability. By virtue of its coding, a platform pre-packages its content (data) in different modalities – text, picture or sound – and sometimes in specified quantities (e.g. a tweet is 140 characters maximum, a YouTube video is 10 minutes maximum). Standard forms guarantee a constant flow and require less technical ingenuity from its users.

Regardless of the importance of the quality of connections, the nature and quality of content are part and parcel of a platform's ability to provide good connectivity. Quality of content is inherently part of a platform's concern: if the wires get clogged with sexually explicit messages or spam, the site will quickly become unfit for the purposes it was designed for. Protocols – both technical and regulatory – are thus put in place to keep platforms clean from polluting traffic. This is why Facebook sustains its 'real name' policy, even when for instance human rights activists have warned Facebook that this policy may endanger people's lives in countries where police or militias closely monitor citizens. Cultural or national differences may lead to local adjustments of interface features or user policies. For instance, YouTube not only deploys algorithmic spiders to detect forbidden content but also keeps up a system of human vigilance to filter out inappropriate messages. Norms with regard to what counts as appropriate content, e.g. forms of sexuality or religious expression, are very much culturally defined, which is why most platforms deploy national filters. These filters of course can also be imposed on platforms by national governments, as illustrated in China and Iran, forcing a platform owner to either censor a site's content or modulate its protocols. The nature and quality of content – whether communicative traffic or creative content – is thus controlled primary to guarantee 'good connectivity' to its users.

The interest of platform owners to promise good connectivity ideally converges with the interest of users to generate and distribute (good) content. In reality, their interests also widely diverge. When the term 'user-generated content' first emerged, it suggested that most platforms were about creative content garnered from a collective of users who would and could manage themselves online with the help of software. That is why UGC platforms, when they first evolved between 2000 and 2005, were generally welcomed as vehicles for participatory culture driven by an ideology of users collaborating to pursue common goals of expansive *creativity*, whereas social network sites thrived on the ideals of expansive *communicability* (van Dijck and Nieborg, 2009). Yet as user bases of these new media channels grew exponentially, notably after 2005, professional organizers and entrepreneurs taking over community platforms were less interested in generating creative or communicative content than in utilizing the sites' potential as connective resources. For instance, when Google took over YouTube in 2006, it never aimed at making a profit on the exchange of home videos; instead, Google was predominantly interested in YouTube's (meta-)data revealing patterns of user's interests and behaviour, in order to connect these patterns to other Google databases and sell relevant information and space to advertisers. Put differently: rather than being after co-creating content with its users, Google has always been keenly interested in people using cultural content or personal expression as vehicles for making connections.

More than anything, cultural content – whether text, music, or videos – draws out opinions on what people like or dislike, what they covet or loathe, what interests them and what does not interest them. In the specific case of *Catfish*, Nev Schulman was lured by little Abby's artwork as well as by the original products of 'singer–songwriter' Megan. Personal and creative expressions exposing people's inner drives and unconscious desires are hardly isolated articulations, as they are commonly deployed to harness bonds and discover group affiliations. Expressive content and taste evaluations structure the connective sphere, and these expressions are tacitly translated into patterns that in turn help optimize a platform's connective functionality. Such patterns not only reflect common tastes and shared preferences for content; users are actually steered towards content they might also like, based on their previously divulged interests. Just as Amazon.com has become better than your best friend in predicting your interests in books and music, algorithms suggesting which friends will suit you based on communal taste and preferences have now become a common denominator buttressing social media's automated engines. In the huge maze of videos uploaded on YouTube, users are *directed to* content by the algorithms and protocols hiding behind the site's visible interface features: buttons to view 'most popular' videos, buttons to choose content categories and 'like' buttons to express one's fondness. Preferences for certain music, videos or texts literally connect individuals to content, individuals to groups and content to groups. As more and more people chat in real time about their favourite TV shows on Facebook and Twitter, television networks are trying to figure out how to capitalize on user's tendency to share their views online in real time and how to connect them to advertiser's interests. Connectivity thrives by the instruments of measuring personalized taste and aggregated preferences. As Eli Pariser (2011) argues, personalization filters lead to indoctrinating us with our own ideas ('autopropaganda'), thus amplifying our desire for things we are not even aware of.

Social media platforms are thus intricate convolutions of technology, social practice and cultural content built around the various connective needs of people in terms of communication and information. Since these platforms increasingly pervade our everyday social practices and shape cultural content, we have more than one reason to examine them as techno-socio-cultural manifestations of connectivity. Humans are not exclusive creators of content. Automated bots, for

instance, are increasingly deployed in sites such as Wikipedia to generate content culled from government databases (Niederer and van Dijck, 2010). This 'technicity' of content, in particular, is difficult to comprehend if you have little access to the invisible interfaces behind a site's observable features. Content is never simply 'there', created voluntarily by active human users; content is generated, triggered and controlled by collaborating humans and machines, consciously and unconsciously. For this reason the question arises how we can understand systems whose constitutive code is virtually closed off from public scrutiny and second, how code connects users to content in ways that remain imperceptible to outsiders. Or, as Langlois et al. (2009) poignantly phrase it: 'How can we understand, map and otherwise critique emergent forms of connectivity and articulation among Web 2.0 sites, users and content, especially when the architecture and technical processes shaping communicational dynamics are black-boxed, opaque and secretive?' According to Langlois et al., this is not only a technological challenge, but also 'an invitation to reassess the shaping of power dynamics in online spaces'. In the next section, I will explore the question of how to meet this challenge.

Actor-network theory and social media platforms

To understand how social media platforms channel connectivity and sociality, it is necessary to analyse individual platforms in order to clarify the common principles underpinning their formation. Over the past 5 years, social media platforms may have been overstudied in terms of their specific manifestations and understudied in terms of their (common) structuring principles. Several scholars have focused on specific social media platforms to examine their technological architecture, to analyse their users' behaviour, to categorize and describe its content, or to explicate their business models (Burgess and Green, 2009; Snickars and Vonderau, 2009). The approach of singling out a specific aspect of social media – be it user behaviour, economics or content evaluation – or a specific platform – YouTube, Facebook, Google – is highly valuable when it comes to grasping the complex interrelation of all factors constituting such platforms both as objects and as processes. Deconstructing social media platforms to allow a detailed exegesis of their constituting parts may yield insight into the culture in which they thrive. However, we need to also look beyond individual platforms, approaching them as dynamic structures that evolve in close connection to each other and to culture at large.

The question arises whether there is a comprehensive approach that allows us to theorize and analyse how social media platforms engineer connectivity. The term connectivity is naturally related to, and arguably rooted in, the concept of networks, yet it is also distinctly different. Networks are both infrastructural and social *organizations* – systems of technologies and people – made up of 'ties' and 'nodes' that render conduits for connectivity. As stated above, I do not subscribe to an approach of social media as intermediaries of social action; platforms such as Facebook are not transmitters but rather producers of sociality, enabling connections as well as forging them. Platforms are therefore socio-technical and cultural-ideological constructs that are built to create and mediate a new type of social capital: connectivity. An approach that departs from the notion of networks as socio-technical ensembles is Bruno Latour's actor-network theory (ANT). Counted as a special branch of social constructivism, ANT does not intend to examine 'the social' as such, but aims to map relations between technologies and people, and tries to explain how these relations are both material and semiotic. Social media platforms, in Latour's vocabulary, would not be intermediaries that simply transport forces without transforming them; they are *mediators* that translate meaning and transform the elements they are supposed to carry (Latour,

2005: 108). Networks, as performative infrastructures, and actors – both human and non-human – are thus inextricably intertwined in the shaping of interactive processes.

Why is ANT potentially helpful in elucidating the principles underlying the construction of connectivity and sociality in social media platforms? For one thing, ANT focuses on *agency* – agency that is variable and changes depending on what it is used *for*. Social media platforms introduce new types of agency in online communities that help shape the technologically inscribed social norms for interaction and communication in the connective sphere, and vice versa, platform owners deploy agency to calibrate technological architecture and interface design, for instance to accommodate advertisers. According to ANT principles, the study of social media platforms prompts questions such as: 'Which agencies are invoked? Which figurations are they endowed with? Through which modes of action are they engaged? Are we talking about causes and their intermediaries or about a concatenation of mediators?' (Latour, 2005: 62). People have agency, but objects have agency too: non-human elements, like algorithms, affect how people act and how they are controlled. Another important reason why ANT is helpful in exploring social media is through its focus on technologies as *processes*: a technology never simply *is*, but is part of a larger evolving scheme of invention, development, acceptance, implementation, resistance and rejection – in short, a process of constant reconfiguration. This process, according to social constructivists, is characterized by contingency and 'interpretative flexibility'. The Internet, as the larger technological infrastructure on which social media platforms are built, is still very much in flux, and few, if any, platforms have attained a stabilized meaning or standardized use (Feenberg, 2009). Various modalities of communication introduced in the 1990s (email, listservs, blogs) are now modified or even replaced as a result of the emergence of social media platforms – a process that is still ongoing.

Still, ANT has also drawn criticism in terms of its usefulness for analysing *digital* networks. For example, ANT is said to overemphasize the relation between human and nonhuman forms of agency, while the complexity of Web 2.0 platforms forces its analysts to move beyond this binary configuration (Rossiter and Lovink, 2010). Although I agree that there might be too much weight on the human versus non-human actor in ANT, this criticism ignores the fact that ANT is explicitly levelled at the fluid relationships between humans, technologies and ideas, as explained by Latour.[5] However, there are two more profound drawbacks to using ANT for our purpose. First, Latour's ANT is strong in that it acknowledges the interwovenness of technology and its users/usage, but it generally disregards cultural aspects of content and form. If we want to analyse the social construction of social media platforms, we cannot discount the cultural forms and contents they produce, as these are in integral part of the shaping of technology and sociality. ANT appears to be open enough as a theory to include cultural forms and content as an actor in the process of shaping technology and sociality, so it is relatively easy to take it into consideration when analysing a particular platform.

Second, ANT hardly accounts for pre-existing power structures, but only regards these structures when emerging from activity within the network. It is impossible to disregard existing power relations through which new platforms emerge, and neither can we ignore the economic and legal matrix from which they arise – even if their emergence affects these larger schemes by changing their very conditions. Manuel Castells' (2009) political economy of networks approach could constitute a necessary complement to the larger political and economic implications of currently evolving social media platforms. After all, social media platforms, such as Facebook, operate in the same economical, political and legal space as interpersonal media and mass media – a space dominated by powerful telecom and media industries. New commercial enterprises such as Facebook have to compete with mass media conglomerates and telecom operators for a share of

this yet unregulated domain. Mass self-communication, according to Castells, 'multiplies and diversifies the entry points in the communication process' giving rise to an 'unprecedented autonomy for communicative subjects to communicate at large', even if this autonomy is 'shaped, controlled, and curtailed by the growing concentration and interlocking of corporate media and network operators around the world' (Castells, 2009: 136).

Castells' approach, for all its insights into aspects of political economy, also has its limitations when it comes to theorizing social media platforms; at his own suggestion, ANT offers better analytical tools to understand how technology and users interact (Castells, 2009: 45–47). In other words, both approaches may be complementary in that one focuses on the techno-social-cultural layer and the other on the economic-legal-political layer of social media platforms. What Castells' and Latour's theories have in common is that they are both open frameworks that invite practical analytical tasks. While Castells' emphasizes socio-political and economic actors, he pays scant attention to legal issues – copyrights, intellectual property, privacy – not to mention technology or cultural content. However, these are not sins of omission: they are rather blanks that could easily be filled in. Mutatis mutandis, Latour's ANT is strong in that it acknowledges the interwovenness of technology and its users/usage, but he generally disregards cultural aspects of content and form. Moreover, ANT is weak in its focus on economical or legal aspects of technological innovation; and although Latour has shown himself to be keenly interested in machinations of political power and their affect on the technological, ANT is not geared towards analysing the political economy of networks.

Conclusion: Connecting theories?

A comprehensive approach, which combines and recognizes the connectedness between these two layers of analysis, is essential in uncovering the principles scaffolding social media platforms. These principles may be assessed initially from an economic perspective or from a primarily technological point of view, but the technological or the economic can never be fully disconnected from the legal or the social. To return to our example displayed by *Catfish*: if we want to study Facebook's real and fake content as a socio-cultural phenomenon, it is hard to ignore the site's specific engineering by means of protocols and interfaces, but it is equally important to study the site's legal terms of use (e.g. Facebook's 'real name policy') in relation to its business model and use of metadata. Questions concerning specific aspects of social media platforms, even if they seem one-dimensional or straightforward, inevitably usher in the complex dynamics of how they operate on various levels. By connecting ANT's recognition of the interdependence of technical, social and cultural aspects, and Castells' political analysis of the economic-legal-political stratum, we may find a comprehensive way to understand the principles underpinning that culture as well as its many specific manifestations.

We still know very little about the 'codes' underlying digitized processes of connectivity. Understandably, we tend to concentrate first on specific manifestations (platforms) or their specific aspects (users or content) or their political economy. The larger culture in which these platforms arise espouses a particular logic – a logic rooted in social needs and cultural norms – and supports technological systems striving to infiltrate practical social routines, so these routines become ensconced in economic models and legal schemes. Arguing from a combined actor-network and networked economy approach, Facebook is not a product, but a constantly evolving process whose changing manifestation is the result of a negotiation between owners, users, content producers, lawmakers, engineers and marketers about the control of data and technology. ANT partially

supports the multi-faceted analytical framework needed to better comprehend this connected, networked culture. However, it is not complete as an analytical instrument, as it does not fully cover the cultural dimensions and economic-political implications of social media in an emerging culture of connectivity. If we include ANT in a more expansive analytical approach that encompasses both layers (the techno-socio-cultural as wells as the political-legal-economic), this could provide a strong approach for developing a more comprehensive analytical frame. This article intends to be a first step towards such a multi-layered approach.

Notes

1. The documentary *Catfish* was directed by Henry Joost and Ariel Schulman and produced by Andrew Jarecki, who previously produced *Capturing the Friedmans*, another documentary made out of home movie and video fragments. *Catfish* won the 2010 Sundance Festival and was released in American movie theatres 17 September 2010.
2. Stealing photographs and identity information from Facebook is very easy, despite Facebook's 'stringent policies'. In February 2011, artists Paolo Cirio and Alessandro Ludovico mined photographs of 250,000 Facebook users for their art project *Lovely Faces* in order to create the same number of fake profiles on their own 'dating site'. The Facebook company was not amused and accused the artists of privacy invasion and identity theft (see: Lovely Faces Increases Facebook Privacy Fears http://www.suite101.com/content/lovely-faces-increases-facebook-privacy-fears-a344731#ixzz1Dknsna1D).
3. When Facebook, in 2007, inserted the Beacon function into its interface – a function that allowed commercial websites to track the purchases of Facebook members on certain sites – fierce protests from active users forced Facebook to turn the feature off (Cohen, 2008). Introduction of the Newsfeed feature in Facebook's interface, for instance, can be considered both a response to advertiser's demands as well as a reaction to Twitter's success as a microblogging service.
4. In order to sign up for Facebook, you must provide your real first name and last name; it is a violation of Facebook policy to maintain more than one account on the site. Nancy K. Baym (2010: 110), quoting Gross and Acquisti (2005), observed that 89% of all Facebook users appeared to be real.
5. About the fluidity of the (human/non-human) actor, Latour (1998) explains: 'There is no model of (human) actor in ANT nor any basic list of competences that have to be set at the beginning because the human, the self and the social actor of traditional social theory is not on its agenda. So what is on its agenda? The attribution of human, unhuman, non-human, inhuman, characteristics; the distribution of properties among these entities; the connections established between them; the circulation entailed by these attributions, distributions and connections; the transformation of those attributions, distributions and connections, of the many elements that circulates and of the few ways through which they are sent.' It is exactly this notion of fluidity between various actors that I am looking for in defining the culture of connectivity.

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