

CURATING IMMATERIALITY: THE WORK OF THE CURATOR IN THE AGE OF NETWORK SYSTEMS'

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+ #!/bin/bash
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assumption="traditional curating follows a centralised network model"  
echo "$assumption"
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if [ "$assumption" ]  
    then  
    echo "what is the position of the curator within a distributed  
    network model?"  
fi
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The site of curatorial production has been expanded to include the space of the Internet and the focus of curatorial attention has been extended from the object to processes to dynamic network systems. As a result, curatorial work has become more widely distributed between multiple agents including technological networks and software. This book reflects on these changes and asserts that the practice of curating cannot be dissociated from social and technological developments.¹ It is therefore concerned with the politics of curating - with how power relations and control are expressed in the contemporary forms that curating takes and offers in the context of network technologies. Consequently, the book intends to examine the work of the curator, and the inherent structures of curatorial control in relation to the current socio-political and technological

formations. The issue, however, is not simply to engage with online curating in terms of modes of display or new objects to select, but to consider how the practice itself has been transformed by distributed networks. This evokes the statement made by Walter Benjamin in his essay 'The Work of Art in the Age of Technical Reproducibility' of 1936:

'Earlier much futile thought had been devoted to the question of whether photography is an art. The primary question - whether the very invention of photography had not transformed the nature of art - was not raised. Soon the film theoreticians asked the same ill-considered question with regard to film.'

(1999: 220)

In 1988, this was reworked by Bill Nichols in his essay 'The Work of Culture in the Age of Cybernetic Systems', stressing that our presumptions about what constitutes art and life have been radically overturned (2003). This book aims to continue this line of argument by suggesting how a similar presumption is made about a fixed, or ontologically given nature to curating, rather than discussing how it has been transformed in the age of network systems.

There have been a number of key texts that explore the link between art and developments in computational technologies, and that identify the organising principles of systems and networks. For instance, in the late 1960s, Jack Burnham's work emerged at a time when the field of digital computing and the conception of the Internet were in the early stages of development.² In particular, his 'System Esthetics' (1968) and 'Real Time Systems' (1969), used informational systems as a metaphor to describe technological culture and the changing role of the artist within the art system. His exhibition *Software* in the Jewish Museum, New York in 1970, explicitly uses the term 'software' as a metaphor for ideas, processes and systems as opposed to the 'hardware' of traditional object-based practices. In the late 1980s, Nichols considered how cybernetics transformed cultural production to emphasise a shift from mechanical reproduction (symbolised by the camera) to that of cybernetic systems (symbolised by the computer) in relation to economic and social formations, and the nature of art.

More recently again, the discussion has shifted towards art for technological networks in response to the Internet. A recent example in this field is Charlie Gere's 'Jack Burnham and the Work of Art in the Age of Real Time Systems' (2005), which explicitly draws upon its historical sources. The issue of art for technological networks and the importance of the Internet have been also well articulated in relation to museums and art institutions in general. As an example, Steve Dietz in his 1997 text 'Curating (on) the Web' considers how new media have influenced the way museums operate and the way they increasingly respond to the potential of the Web as an independent presentation and distribution platform. More significantly for this context, he asks how 'curating new media might change the practice of curating' (2004). This book extends this general line of inquiry by considering how network systems have changed the practice of curating and by situating curating in a wider socio-political context, articulated through two key issues: immateriality and network systems.

Firstly, 'immateriality' is employed with reference to the Italian autonomous Marxist tradition, as a response to the transformations undergone by labour in post-Fordist or network societies. Accordingly, it emphasises the increasingly 'immaterial' form of social relations, communications networks and information systems.³ Secondly, the book situates the work of the curator in the context of network systems. This focus reflects both an extended repertoire of what can be curated (from the art object to processes to dynamic online systems), and furthermore suggests new possibilities for the organisation of the curatorial process itself (of which software and networks are a part). Therefore the book poses a series of questions:⁴ How do curators respond to new forms of self-organising and self-replicating systems, databases, programming, code and source code, net art, software art and generative media within the wider cultural system? What new models of curatorial practice are needed to take account of the production processes, that are increasingly collaborative and distributed over technological networks and software? Consequently, the book points to emerging models of practice that use information technologies (internet, networks and software) not simply on the level of the medium or as a tool but as an integral

part of the curatorial process. This line of thinking about the curatorial process (involving other agencies and integrated with software) is developed further in a number of examples to suggest the idea of ‘software curating’ - a practice that is partially automated, dynamic, collaborative, and redistributed in terms of power relations and curatorial control. A description such as software curating suggests an engagement with instructions (the program) and the writing of these instructions (programming) but also the other processes upon which the program relies to run (that includes the wider context or operating system of art). This is both a literal and metaphorical description of software curating.

Immateriality and the work of the curator

Following the earlier assertion that curating cannot be dissociated from social and technological developments in network societies, the emphasis of the book is on the redefinition of labour and how power relations and control are currently organised. This has been identified by Maurizio Lazzarato and Antonio Negri through the concept of ‘immaterial labour’, that takes into account the increased importance of communications technologies and distributed forms of production.⁵ Importantly, as Marina Vishmidt points out, immateriality is a useful concept in current attempts to ‘index the characteristics of curatorial, critical and media sectors to the wider structural transformations in the landscape of work’ (2004, in Terranova herein). Situating curating in the context of immateriality offers an understanding of it not only as a creative and critical practice but also as a thoroughly political one. It allows discussions to develop about transformations of curatorial process and the structures of control expressed through it.

The genealogy of immateriality draws upon an older concept of ‘general intellect’, outlined in Marx’s *Grundrisse* in a section entitled ‘Fragment on Machines’ (written 1857-8, first published 1939). What Marx described as ‘general intellect’ (or in his words ‘mass intellectuality’) was an increasing investment of subjectivity and human knowledge in the work process, and the recognition that wealth is no longer the immediate work of the individual, but a general

productivity of the social body that utilises both workers and technologies. This also describes what the autonomists call the ‘social factory’, wherein wealth is socialised and can no longer be measured by money but resides in the intensive value of relations, affections, modes of expressions, and forms of life (Terranova herein). Matteo Pasquinelli (also herein) suggests that rather than talk of general intellect we should talk of ‘general intellects’ as it comes in multiple forms. He emphasises that collective intelligence can be expressed in negative forms such as ‘totalitarian systems, the military-managerial ideology of the neocons or Microsoft empire, social-democratic bureaucracies, police control, or the maths of stock market speculators’. At the same time, general intellect can be expressed in more positive forms, such as ‘international networks of cooperation including, free software developers, media activism, sharing of knowledge in universities, the Creative Commons open licenses and participative urban planning’. The concept therefore produces new contradictions.

What interests many contemporary theorists such as Lazzarato are the ways in which the concept of ‘general intellect’ can be usefully applied to explain productive activity that integrates various relations, such as those between manual and intellectual labour, between material and immaterial labour, between conception and execution, between labour and creation, and between author and public. Indeed, Lazzarato claims:

‘Immaterial labour finds itself at the crossroads (or rather, it is the interface) of a new relationship between production and consumption. The activation, both of productive cooperation and of the social relationship with the consumer, is materialised within and by the process of communication. It is immaterial labour, which continually innovates the form and the conditions of communication. [...] The particularity of the commodity produced through immaterial labour [...] consists in the fact that this is not destroyed in the act of consumption, but enlarges, transforms, creates the “ideological” and cultural environment of the consumer. This does not produce the physical capacity of the workforce, it transforms the person who uses it.’ (1997: 137)

The new qualities of labour and its organisation described by Lazzarato suggest a shift from an emphasis on technological capital to an emphasis on human subjectivity, in as much as it contributes to the technological apparatus. It also suggests a redistribution of power in such a way that it is expressed in even more intensive forms of control, 'as implied by the management mandate to be active, that is to become subjects of communication' (1997: 135). In her essay 'Of Sense and Sensibility: Immaterial Labour in Open Systems' (herein), Terranova also refers to the emergence of 'new machines of control and subjectification which reimpose hierarchical relations at the service of social reproduction and the production of surplus value'. She develops this issue to examine what she describes as the 'new diagrams of control' within open systems, and argues that this is not simply a matter of two opposite and fixed models of production, one with control and the other with the lack of it, but the organisation of control is subject to 'messy local assemblages and dynamic compositions', to processes of 'bifurcation, resonance and interference between the corporeal and the incorporeal, the material and the immaterial, dissipation and accumulation, and autoorganisation'. Thus open systems, and open cybernetic networks are 'radically open to the Outside, that is they are relentlessly traversed by a flow of matter that is informationally compressed in logarithms, organised by algorithmic code and modulated by technical machines'.

For Pasquinelli too, control and exploitation have become more immaterial, cognitive and networked, and as a result more totalitarian. In his essay 'Cultural Labour and Immaterial Machines' (herein), he describes a scenario where: 'Meta-machines are ruled by a particular kind of cognitive labour which is the administrative, political, and managerial labour that runs projects, organises and controls on a vast scale: a form of general intellect that we have never considered, and of which the central figure in the second half of the 20th century became that of the manager'.

Consequently, the increased centrality of symbolic management in the economy has contributed to a loss of measure or the inapplicability of the law of value that

characterised earlier modes of production. In the context of curating, Marina Vishmidt in her essay ‘Twilight of the Widgets’ (herein) argues that what is changed is the site of value production, that expands to include new types of art objects - adding immaterial objects and not the conditions of production - as the ‘immateriality’ displaces value from object to process and symbolic analysis in art production. Josephine Berry Slater’s ‘Unassignable Leakage’ (herein) also relates the issue of value to discuss the ‘crisis of immaterial production’. By this, she means the crisis of the categorical definitions of art and the crisis of aesthetic judgement of which art for technological networks is symptomatic. The immeasurable and unknowable quality of art in the age of immaterial production has ‘placed a properly productive thorn in the side of the whole gamut of art world practices’. She makes a parallel between the crisis of measure in the economy and the crisis of judgment in the arts, in which curators and artists have become largely indistinguishable. As a consequence she asks: ‘how can (art) value be extracted, let alone measured? As with something like free/libre open source software (FLOSS), when collaborative and creative production becomes so widespread, how is scarcity reinvented and this generalised productive power brought back under control?’

Rather than seeing free software as simply liberating, Pasquinelli regards it as symptomatic of these immaterial conditions, alongside other examples produced by cognitive labour and cultural products in general. By his use of the phrase ‘immaterial machine’, he is making an analogy to the Marxist concept of material machines - an embodiment of collective intelligence, general intellect and technology in the post-Fordist economy. In the age of network technologies, the network itself is a machine that links other machines of collective desire into a ‘meta-machine’. In the light of this, he polemically asks:

‘How can we turn the sharing of knowledge, tools and spaces, immaterial labour and cultural work, into new radical revolutionary productive machines [that once upon a time was called re-appropriation of the means of production], beyond the inflated Free Software? [...] Radical machines that are able to face the techno-managerial intelligence and imperial meta-machines lined up all around us?’

The consequences of this for cultural practices are complex. This is something Vishmidt responds to, describing curating in terms of communication and as 'immaterial' practice (herein). In this respect, 'curation registers the influence of collaboration, distributed production, "openness", community "engagement", intervention and contingency, perhaps even more strongly than other positions in the art world. These tendencies are even more apparent in curation that undertakes to deal with art that is substantively information-based and not traceable to a single authoring subjectivity, like most software and net art.'

As a result, Vishmidt asks if (distributed) curating can influence production outside of a value system based on the commodity and social reproduction - as counter-action. She is suggesting a repositioning of the curator from administrator to a manipulator of information and systems, as a direct challenge to what appears to be an increasingly functionary role in cultural management. In the context of network systems, might curating be usefully considered in terms of a distributed management system?

Systems and curating

While the previous section briefly introduced the concept of immateriality and some implications for cultural work including curating, this section focuses on the term system. A system can be understood as a collection of interrelated parts, both maintaining its internal order and also drawing the resources necessary for its survival and reproduction from the external environment (Edgar & Sedgwick 1999: 400-401). Organisation is key to this issue in what Ludwig von Bertalanffy's systems theory refers to as a 'complex of components in interaction' (in Burnham 1973: 17). Systems are of particular importance for an understanding of expanded curatorial production, referring not only to the physical site of the computer and the network but also to the technical and conceptual properties of what constitutes the curatorial object - for instance, works distributed over networks, dynamic and transformational systems. It also applies to the process of curating itself, in that it has become distributed between multiple agents, including networks and software, and to the art world as a whole. This upgraded

‘operating system’ of art presents new possibilities of collective and distributed curating - even to the extreme of a self-organising system that curates itself. The curator is part of this entire system but not central to it.

Clearly there is a longer history of systems theory applied to art, that this text does not attempt to cover.⁶ Instead the emphasis is on the concept of ‘system’ that is particularly useful as a way of discussing the issue of transformation (or reorganisation of control) in relation to changing technologies and its implication for cultural work. As mentioned, Nichols explores this in relation to cybernetic systems, arguing that this new set of conditions produces a tension between ‘the liberating potential of the cybernetic imagination and the ideological tendency to preserve the existing form of social relations’ (2003: 627). If computer systems are indeed indicative of a change in the mode of cultural production, they also indicate contradictory tendencies inherent in these systems: ‘[the] negative, currently dominant [potential], towards control, and the positive, more latent potential towards collectivity’, as Nichols puts it. He argues that:

‘if there is liberating potential in this, it clearly is not in seeing ourselves as cogs in a machine or elements of a vast simulation, but rather in seeing ourselves as part of a larger whole that is self-regulating and capable of long-term survival. At present this larger whole remains dominated by arts that achieve hegemony. But the very apperception of the cybernetic connection, where system governs parts, where the social collectivity of mind governs the autonomous ego of individualism, may also provide the adaptive concepts needed to decenter control and overturn hierarchy’. (2003: 640)

The more recent embodiment of networked computational systems - the Internet - has been explored by Alex Galloway in *Protocol* (2004), asking: ‘how control exists after decentralisation?’ He draws together the structural form of a distributed network, the technology of a networked computer, and the organisational principle of management native to computers in distributed networks - the protocol.⁷ All three factors come together to define a new apparatus of control that problematises issues of connectivity, collectivity and participation.

Galloway emphasises this issue of control in contrast to many advocates of the Internet, who regard it as a relatively free, unregulated space. Indeed control is no longer centralised or even decentralised any more and is not hierarchical but still exists in a distributed form of organisation. Like Nichols, he identifies a contradiction between two opposing tendencies: one that radically distributes control into autonomous locales and another that focuses control into rigidly defined hierarchies. He shifts emphasis from 'networks' to 'protocols' - from a generalised understanding of networks to a more specialised one in which the 'protocological' systems of TCP/IP and DNS operate as 'political technologies' (to use Foucault's terms). The political economy of protocol is that of management, modulation and control, therefore:

'power relations are being transformed in a way that is resonant with the flexibility and constraints of information technology. The Internet is not simply "open" or "closed" but above all the form that is modulated. [...] Information does flow, but it does so in a highly regulated manner. [...] Viewed as a whole, protocol is a distributed management system that allows control to exist within a heterogeneous material milieu' (2004: xix & 7-8).

Clearly this can this be applied to curating that deals with distributed technological networks and suggests a critical engagement with 'curatorial protocols'. Indeed, and reiterating the algorithm at the beginning of this introduction: if the assumption is made that traditional curating follows a centralised network model, then what is the position of the curator within a distributed network model?

Software and curating

Importantly, these ideas are not only theorised but also appear to be tested through practice. There is also a clear history to the line of thinking about curating that links it with technological networks and software. In general, the history of online curating can be seen in parallel to that of institutional attempts to respond to the emergence of the Internet and incorporate it as part of their remit.⁸ What follows is a certain redefinition of the curatorial role, and what

Dietz suggests is the increasing requirement to ‘filter’ this material. A similar point is made by Christiane Paul in her essay for this book ‘Flexible Contexts, Democratic Filtering, and Computer-Aided Curating’, in describing a shift towards the curator as a ‘filter feeder’ as part of a continuous process of selecting and filtering - describing, classifying, creating contexts and re-contextualising within the online environment. Potentially at least, this allows for ‘an increased public involvement in the curatorial process, a “public curation” that promises to construct more “democratic” and participatory forms of filtering. [...] The existence of networks has opened up new spaces both for autonomous producers and DIY culture, and the industry of market-driven media.’

The apparent proliferation of online participatory environments and models of increased collaboration is further examined by Trebor Scholz in ‘The Participatory Challenge’ (herein) that includes historical examples of online platforms, recent cooperation enhancing tools, online repositories, community sites and collaborative knowledge pools. He explores the potential of what he calls ‘extreme sharing networks’ (evoking the idea of extreme programming) as sustainable mechanisms for social change, based on intensive collaborative work. These are characterised as: ‘self-organised, technically-enabled (through listservs, message boards, friend-of-a-friend networks, mobile phones, short message service/text messaging (sms), peer-to-peer networks, and social software such as blogs), autonomous social networks. [...] Extreme sharing networks are conscious, loosely knit groups based on commonalities, bootstrap economies, and shared ethics. They offer alternative platforms of production and distribution of our practice.’

An example of this in relation to new media curating is the CRUMB discussion list (since 2001). It runs monthly themed debates with invited respondents and contributions from the general online public. Edited and annotated discussions (such as the one included in this book) are then archived online alongside other resources (interviews, bibliography, links, etc.) and made available for download. Beryl Graham, in her ‘Edits from a CRUMB Discussion List Theme’

states that the CRUMB web site cannot be considered curating as such (because it does not present art), but examines 'how media offer different forms and models of practice'. In this way, the list contributes to the development of the discourse around new media curating through encouraging active participation and knowledge sharing.⁹ Similarly, Olga Goriunova and Alexei Shulgin in 'From Art On Networks To Art On Platforms' (herein), take the issue of online collaboration further, to discuss online systems for collective production, distribution, and the presentation of works. Referring to case studies (runme.org, micromusic.net and udaff.com), their argument is that these suggest new models of knowledge sharing in the development of cultural practices. This is no longer merely a network but a platform that represents: 'a successful system for production and management of an artistic trend [...] something in-between a content management system, online web site, library and a club based on a networked platform'.

Alternative platforms for the presentation, distribution and contextualisation of emergent cultural practices have a distinct history, that relates to festivals and the reluctance of mainstream art institutions to respond to new practices (and emphasises their reactionary character). This is what Piotr Krajewski explores in his essay 'An Inventory of Media Art Festivals' (herein), emphasising their strategic importance in the presentation and distribution of emergent practices. This serves to highlight some of the transformations that festivals have since undergone in relation to festival formats, categories for submission of works, and submission formats as a reflection of wider changes in the field of media art and technological developments. Festivals are vitally important in this respect as they represent the potential to offer a 'clear alternative, if not countercultural, character in relation to the already existing traditional art institutions'.

Along with the expansion of the site of curatorial production to include online platforms, the focus of curatorial attention has also been significantly transformed from the object to dynamic network systems. Curators are presented with the problem of how to respond to works that display self-

organising and self-replicating properties that are distributed over networks such as viruses, dynamic databases, or even source code as curatorial objects. The conceptual transformations extend discussions of the materiality of the art object from ‘dematerialisation’ to immateriality. This is what Jacob Lillemose responds to in his essay ‘Conceptual Transformations of Art’, making explicit reference to Jack Burnham’s ‘system aesthetic’ and instead offering the term ‘network aesthetics’. For Lillemose, immateriality designates the new material condition that network artists are dealing with, and is exemplified in the work of artist collectives such as 0100101110101101.org (also herein) that extend ‘the aesthetics of dematerialisation with new urgency, agency and energy’.

Both materiality and agency are emphasised by Geoff Cox in his contribution ‘Software Actions’ (herein). The emphasis is on the performative character of code, its dynamism and the unpredictability of live action that undermines the end product of software and thereby commodification. The important principle here is that this allows for a deeper engagement with the rearrangement of existing materials at the level of software, and the manner in which it performs. This performative aspect lies hidden behind the surface of the software in terms of its potentiality for action - ‘in parallel to the way that a computer program breaks down the distinction between its function as a score and its performance’. This is perhaps how the self-reproducing program (or virus) ‘biennale.py’ operates by acting upon its exhibition context of the 49th Venice Biennale (created by the artist collective [epidemiC] and net art group 0100101110101101.org). If coding viruses can be seen as creative practice and viruses themselves as aesthetic systems, they can also be seen as digital objects that can be curated. At least this was the radical assumption of the *I Love You [rev.eng]* show curated by digitalcraft at the Museum of Applied Arts, Frankfurt am Main, Germany (2002). This project is annotated for this book by Franziska Nori.

Also in connection with curating computer viruses, Alexander R. Galloway and Eugene Thacker in their essay ‘On Misanthropy’ explore the biopolitical dimension of curating, and consider what it might mean to curate exhibitions

dedicated to epidemics and disease. By drawing on the Latin etymology of the term 'curate' (curare - to care) they speculate as follows:

'with the act of curating an exhibit of viruses or epidemics one is forced to "care" for the most misanthropic agents of infection and disease. One must curate that which eludes the cure. [...] Curare thus presupposes a certain, duplicitous relation to transformation. It enframes, contextualises, bounds, manages, regulates and controls. In doing so it also opens up, unbridles, and undoes the very control it seeks to establish. It is the point where control and transformation intersect.'

The tension over power relations that Nichols previously described reappears, and new strategies of resistance are evoked in the use of computer viruses much like the 19th century idea of 'sabotage'. With reference to Deleuze's comments (1990) quoted in Galloway and Thacker, sabotage is translated to 'clogging the machinery' of the network system.

Software curating

Despite this radical potential, there appears to be little evidence of software curating that explicitly refers to the reconfiguration of power relations. However, there are a number of examples that offer a challenge to the orthodoxies of curation by an engagement with software. This critical tradition, rather than emerging from the field of curating, appears to come from artists engaging with the openness of technological structures - artists essentially working like curators. For example, Alexei Shulgin's *Desktop Is* (1997-8), was an online open platform for participation with specific rules. An earlier example, presented herein, is Eva Grubinger's *C@C - Computer-Aided Curating* (1993), a prototype system for curating art works online, developed in collaboration with computer programmer Thomax Kaulmann. In this work, artists not only created a work of art but developed a context for their work by curating up to three other artists.

Referring to the work of curators engaging with technological systems, the listserv for the exhibition *PORT: Navigating Digital Culture*, organised by artnetweb MIT List Visual Arts Center (1997), was based on an open curatorial

process in which one could either propose the project to be included or simply just listen in - it created a context for itself (Dietz 1997).¹⁰ A more contemporary example is low-fi's *net-art locator* (herein), an online system for locating and curating net art projects based on an open submission database. It is structured around a current selection of net art projects made by the low-fi team, a monthly guest selection (invited guest curators and artists' selections), and a function that searches the database by category.

Referred to on a number of occasions is the software repository *Runme.org*, a system of dynamic data storage and presentation tool, that includes elements of curating.¹¹ The curatorial process is based on an open, yet moderated database that allows users to self-submit their works - an option almost embedded in the software. The inspiration for this, at least according to Alex McLean (who wrote the software for *runme.org*), is *sweetcode.org* - a repository for free software. He describes this as 'perhaps the closest thing to an art gallery for the free software community, and indeed one of the inspirations for <http://runme.org>' (in Goriunova & Shulgin 2003: 79).

These references also inform the development of the *kurator* software, a free software application programmed to perform the task of 'curating' source code. For this book, Grzesiek Sedek presents an extract from its source code (a selection of LXR library functions) that exemplify its open source model of development - both on a technical level, as modular software open to users for further modification, and on a conceptual level as an open curatorial system.

This is a point also made by Christiane Paul in imagining how the source code of any project might be made available to the public for further expansion, outside of the proprietary concerns of the curator or arts institution - as open source curating. For Marina Vishmidt (herein):

'the *kurator* project draws on an affinity between code art and curatorial praxis, to redevelop curating as a generative experiment in social relations. [...] By displacing the curatorial function from abstract subjective potential to binary

code, it reproduces the singular curator as a collective executable. In this way it preserves the curator by exceeding the curator, the perfectly consistent paradox that any art practice grounding its critique in both art-immanent and social terms is structurally bound to enact.’

Both the programmer and the curator are required to act and demonstrate their understanding of the complexity of social relations in distributed systems. What results from bringing together ideas around immateriality and systems is the potential to explore the practice and politics of curating, at a time when the ‘operating system of art’ has been radically reconfigured. It allows new formations of power and control to be conceptualised and new contradictions to be revealed. In relation to network systems, the emphasis remains on the democratic potential of technological change but at the same time the emergence of what Lazzarato identified as ‘more intensive forms of control’. The tension that Nichols previously described, between control and collectivity in cybernetic systems, is all the more apparent in distributed systems. Can the same be said of curating in the context of distributed forms? If so, what does this imply for software curating beyond the rhetoric of free software and open systems? Addressing these questions, the book presents critical texts and examples of curatorial projects that examine the politics of curating immateriality.

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NOTES:

1. This book draws on the recent conference *Curating, Immateriality, Systems* (Tate Modern, London, June 2005) where many of the chapters and examples were first presented <<http://www.tate.org.uk/onlineevents/archive/CuratingImmaterialitySystems/>>. Furthermore, some of the ideas explored in this essay have been introduced in 'Immaterial Production, Self-Replicating Systems, Re-distributed Curating', forthcoming in Christiane Paul (2006) (ed.) *Curating New Media*, Berkeley and Los Angeles: University of California Press.
2. Paul Baran began to develop ideas about the optimal structure of the Internet in 1964 and envisaged a more robust communication network using digital computers. This resulted in his pioneering idea of the distributed network model organised around the principle of dynamic routing. See Barabasi (2002: 143-147) and <<http://www.ibiblio.org/pioneers/baran.html>>.
3. The concept of immateriality has been much misunderstood and perhaps confused with other popular uses of the term, such as 'of no importance or relevance'; 'inconsequential or irrelevant', or even more commonly as 'having no material body or form or substance'. A further understanding can be found on wikipedia <<http://en.wikipedia.org/wiki/Immaterialism>>. In the context of art, the term is often used to describe 'new conditions of digitisation of artistic and cultural practices' where 'software and digitised data are replacing the traditional physical dimensions of artworks' (Lillemoose herein). In contrast to this descriptive account, Lillemoose relates the term 'immateriality' to the tradition of conceptualism and its central notion of 'dematerialisation' of the art object. He offers a thoroughly materialistic understanding of immateriality and explains that: 'dematerialisation designates a conceptual approach to materiality whereas immateriality designates the new material condition - or just the new materiality - that network artists taking such a conceptual approach are dealing with'.
4. The book does not aim to cover the field of new media curating. The emphasis is not on 'new media' or curatorial practices that deal with new media works, such as video, virtual reality, (networked) installations, wireless or locative media, etc. Rather, the emphasis is on online curating and on works that display transformative properties and are distributed over networks. In relation to new media curating there are number of publications and dedicated forums that specifically deal with this field. For instance, CRUMB is an online discussion list and a web resource for new media curators <<http://www.newmedia.sunderland.ac.uk/crumb/phase3/index.html>> and Rhizome is an online presentation platform and a discussion forum for new media <<http://www.rhizome.org/>>.
5. Immaterial labour is a key concept in theories of immateriality examined, in particular, in the work of contemporary French and Italian Marxist writers and political theorists associated with the Italian Autonomia or New Left movement that emerged in the late 1960s and 1970s, itself founded on the intellectual heritage of the Italian 'Potero Operaio' ('Worker Power') movement of the 1950s. In the early 1990s, it was mainly associated with two magazines: the Italian *Luogo Comune* and the French *Futur Antérieur*. Central to the development of ideas around immateriality have been Maurizio Lazzarato's 'Immaterial Labour' (1996), Paolo Virno's 'Notes on the General Intellect' (1996), and his edited collection *Radical Thought In Italy* (with Michael Hardt, 1996), his recent *A Grammar of the Multitude* (2003), as well as Michael Hardt & Antonio Negri's *Empire* (2000). More recently, the French magazine *Multitudes* (<<http://multitudes.samizdat.net>>) has continued discussion around these ideas. In this book, many of the essays follow this critical trajectory (see Terranova, Pasquinelli and Vishmidt in particular).
6. For instance, this has been explored by Jack Burnham in 'Systems Aesthetic' (*Artforum*, 1968) and 'Real Time Systems' (*Artforum*, 1969), Bill Nichols in 'The Work of Culture in the Age of Cybernetic Systems' (1988) and most recently in the *Open Systems* exhibition at the Tate Modern, London (2005). The work in this area in general draws upon the scientific examination and comparative study of communication and control systems formulated by Norbert Wiener in his 1948 book *Cybernetics*.

7. Galloway refers to the idea of a distributed network model of the Internet, first proposed by Paul Baran in 1964. Based on a mesh-like architecture, it is: 'a communication network which will allow several hundred major communications stations to talk with one another after an enemy attack'. In such a model there is no centralised switch, as each node is connected to several of its neighbouring nodes and thus each node has several possible routes to send data. In order to maximise the efficiency of such a system, information is divided into small packets (message blocks) and sent across the network, with unmanned nodes acting as switches, routing packets from one node to another and on to their final destinations. This process is based on the principle of the 'hot potato routing method' (a rapid store-and-forward method currently better known as dynamic routing) and in effect allows a real-time transmission. See Baran <<http://www.ibiblio.org/pioneers/baran.html>> and Barabasi (2002: 143-147).

8. A brief genealogy of this might include: online tours of existing physical exhibitions (augmented with extra information); immersive interfaces extending and re-formatting exhibitions in a gallery for the computer medium; an increasing number of exhibitions curated specifically for online platforms (Dietz 1997); dedicated online exhibition spaces hosted by museums (for example, the Walker Art Center's Gallery 9, or the Whitney Museum's artport); dedicated online platforms for presentation outside of mainstream institutional contexts (for example, low-fi's net art locator, Rhizome's ArtBase, or turbulence); online exhibitions of new media festivals (for example, Ars Electronica, or ISEA); and finally, the single independent curator (for instance the curatorial project *[R][R][F]*, *Remembering - Repressing - Forgetting, 2003-present*, by Wilhelm Agricola de Cologne).

9. For Graham (herein), focussing the discussion around 'models of curating' is an attempt to identify the most effective process for exhibiting new media artworks. As an example, in March 2003 these models included 'curator as producer'; in April 2005 they included 'curator as co-producer' or even 'curator as multitasking maniac'; and in June 2005 they included 'curator as editor' and 'curator as filter'. Artist/curator models are also under debate: Yara Guasque recently pointed out that in Brazil the aesthetics of curating are necessarily DIY or 'construct by yourself' and Luis Silva linked to the debate with the notion of blogging as curating. The CRUMB website is <<http://www.newmedia.sunderland.ac.uk/crumb/>>.

10. Dietz points to other historical examples: the idea of 'automatic curating', citing the example of *Arts Wire Web* which allowed users to input some key criteria and get results from an existing database of Internet projects; and a 'virtual curator' program called *The Intelligent Labelling Explorer (ILEX)*, a system that generated textual descriptions of objects encountered during a guided tour of a museum gallery <<http://www.cogsci.ed.ac.uk/~alik/ilex.html>>. Dietz states that the 'computing challenge of *ILEX* is being able to generate text dynamically based on tracking what the user has already viewed and her level of interest. To create the text-base, the *ILEX* researchers interviewed the collection curator passing her knowledge from guided tours' (1997). The references to other projects are also from Dietz's essay 'Curating (on) the Web' (1997): *Desktop IS* by Alexei Shulgin <<http://www.easylife.org/desktop/>>, and *PORT: Navigating Digital Culture* <<http://www.artnetweb.com/port/>>.

11. The Runme.org project emerged from the *Readme* festival (organised by Goriunova and Shulgin), and was first held in Moscow in 2002 <<http://www.runme.org/>>. The repository is structured through a taxonomy of categories such as 'code art', 'conceptual software', 'games', 'generative art', etc., and more intuitively, through keywords that provide further descriptions of submitted projects. Both the 'category list' and the 'keywords cloud' are open for public modification through the identification and proposal of new terms. In this case, curatorial control is exerted only on the level of setting initial parameters of categories and through a review system that allows editors or so-called 'experts' to highlight 'best works'.

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