INSTITUTE OF TECHNOLOGY ASSESSMENT

manu:script

Indicators for Engagement

Thoughts on ICT Assessment in a World of Social Media

Leah A. Lievrouw

OAW
Austrian Academy of Sciences

Vienna, 12/2009
ITA-09-04
ISSN 1681-9187

http://epub.oeaw.ac.at/ita/ita-manuscript/ita_09_04.pdf

December/2009
(ITA-09-04)

Indicators for Engagement

Thoughts on ICT Assessment in a World of Social Media

Leah A. Lievrouw

Department of Information Studies, University of California, Los Angeles

Keywords

Engagement, e-participation, social media, technology assessment, ICT, new media, social network analysis

Abstract

Media, telecommunications, and computing/information systems (commonly referred to as information and communication technology, or ICT) have long been associated with economic development and social/cultural change. Historically, analyses of ICT and social change have relied on measures of the ownership, availability, access, and use (diffusion and adoption) of various technological systems to evaluate their significance and social impact. However, this approach implicitly equates the use and significance of media and information technologies with the production and *consumption* of ICT and media 'products', consistent with the industrial-era logic of mass media. Technology assessment of today's new media and ICT requires measures that more closely reflect their fundamentally social, interactive, expressive, and performative character. Here, past studies of ICTs and social change related to development research and technology assessment are briefly reviewed. Contemporary ICTs and digital culture are contrasted with mass media forms and institutions, and tentative directions are suggested for developing *indicators for engagement* that may be more suitable to the assessment of contemporary social media.

Inhalt

Article based on a presentation given at the Institute of Technology Assessment of the Austrian Academy of Sciences (ITA), Vienna, May 25, 2009.

MASTHEAD

Media owner:
Austrian Academy of Sciences (OAW)
Legal person under public law (BGBl 569/1921 idF BGBl I 130/2003)
Dr. Ignaz Seipel-Platz 2, A-1010 Vienna

Editor:
Institute of Technology Assessment (ITA)
Austrian Academy of Sciences
Strohgasse 45/5, A-1030 Vienna
http://www.oeaw.ac.at/ita

ITA manu:scripts appear at irregular intervals and publish working papers and talks from staff members as well as guests. ITA manu:scripts are exclusively made available to the public via the Internet portal "epub.oeaw":
http://epub.oeaw.ac.at/ita/ita-manuscript

ITA manu:script: Nr. ITA-09-04 (December/2009)
ISSN-online: 1818-6556
http://epub.oeaw.ac.at/ita/ita-manuscript/ita_09_04.pdf

1 Introduction

'Few technologies exemplify more fully the central problems of technology assessment than telecommunications. Technology assessment must go beyond cost-effectiveness and cost-benefit analysis of specific investment projects in a given socioeconomic context to the exploration of a wide range of scenarios that comprehend not only radical interrelated changes in technology and institutions but notions of sequentiality and continuity in those processes of change' (Lamberton, 1982, p. 210).

As a class of technologies, media, telecommunications, and computing/information systems – commonly referred to as information and communication technology, or ICT – has long been associated with economic development and with social and cultural change. For decades, ICT has been a centerpiece of analyses of modernization, technology forecasting, and technology assessment (TA). Historically, analysts of ICT and social change have relied on measures of the ownership, availability, access, and use of various technological systems, ordinarily conceptualized in terms of technology diffusion and adoption. This approach reflects the technological and institutional character of mass media and telecommunications, the dominant ICT systems of the late 20th century.

Obviously, this approach has been an extraordinarily useful method for assessing the geographic distribution and uses of ICTs over time. It is still a necessary baseline for any sectoral study of the media and IT industries, for example, or national or regional comparisons of access to infrastructure and information resources and digital divides, or policy debates about ICT regulation and governance, whether at the local or global level.

However, I want to suggest that such an approach also implicitly equates the use and significance of media and information technologies – and indeed, communication processes in general – with the production and especially the *consumption* of ICT and media 'products', consistent with the industrial-era logic of mass production and consumption associated with mass media. Although it may be a necessary first step, framing engagement with media as consumption may be insufficient for observing and assessing the social significance and consequences of today's relational, *social* media, which merge the global reach and cultural influence of mass media with the immediacy, intimacy, responsiveness, and involvement of interpersonal and group interaction in complex social and technical networks. A consumption-driven view may also contribute to the development of policy tools and interventions that are poorly suited to rapidly changing social and technological conditions (for example, increasingly extensive and punitive intellectual property regimes that penalize interactive, 'remix' forms of engagement with media culture online).

Therefore, in addition to conventional measures of distribution, adoption and access, metrics for technology assessment are needed that more closely reflect the fundamentally social, interactive, expressive, and performative character of today's new media and ICTs. By rethinking some basic assumptions about the nature of the technologies and how people use and understand them, analysts may find new ways to characterize their consequences and implications for decision-making and policy.

In the following sections I begin with a brief overview of past studies of ICTs and social change in the areas of development research and technology assessment. I move to a discussion of the ways that contemporary ICTs and digital culture contrast with the technical systems and social conditions associated with mass media forms and institutions. I suggest some tentative directions for developing measures/indicators that may be more relevant to the assessment of contemporary social media, including the challenges that such new indicators may present for analysts.

2 ICT and Social Change: Development Research, Technology Assessment

ICT and Development. Development researchers have long recognized a link between ICT and social change. Along with adequate health care, agriculture, and education, communication technologies have been considered essential prerequisites for social and economic advancement. Indeed, by the 1960s and 70s, because media and ICTs were widely assumed to be culturally powerful and socially destabilizing, development researchers had begun to 'shift from economics to communication as a source of policy thinking about development' (Lerner, 1977, p. 151). American policy-makers were especially convinced that greater access to media and telecommunications would encourage less-developed, traditional or authoritarian societies to become more open, democratic, and market-oriented. Lerner's book, *The Passing of Traditional Society: Modernizing the Middle East* (1958), and Schramm's *Mass Media and National Development* (1964) helped set the postwar agenda for 'development communication' as a research specialization that explicitly linked economic and political modernization with the spread of ICT.

However, many early development projects failed to fulfill researchers' and policy-makers' expectations for change and modernization. Some scholars, especially those on the political left, became increasingly critical of development research in the 1970s. Critics (such as Herbert I. Schiller, Dallas Smythe, Armand Mattelart, George Gerbner and others) viewed diffusion studies, and development research as a whole, as thinly-veiled attempts to open new markets for Western (i.e., American) media and entertainment industries and goods. Communication technologies introduced by Western development agencies and interests, they said, were little more than channels for conservative political ideas, and threatened local customs and culture. This critique, which was quickly taken up by developing and non-aligned nations themselves, led to a reconsideration of the role of communication and media in development (Rogers, 1976). By the late 1970s the early, optimistic vision of widespread diffusion of media and ICTs leading to increased democracy and the embrace of enlightenment values had largely been abandoned. In its place, development researchers focused more on the priorities, needs and cultures of local populations and communities than on the deliberate 'push' of new technologies into remote or under-developed areas.

ICT and Technology Assessment. Just as development scholars sought to understand the relationship between ICTs and modernization, the growing social 'impacts' of ICT in more affluent societies became a pivotal topic within the technology assessment movement from the 1960s onward (Bimber & Guston, 1998). Indeed, there has been a degree of overlap between the two research communities for some years (see, e.g., ITU, 1979; Lamberton, 1982). Influential early studies of ICT with a broad TA perspective include Ithiel Pool's so-called retrospective technology assessment of the telephone system in the United States (Pool, 1983); studies of rural telecommunications by Edwin Parker, Heather Hudson, and their associates at Stanford University (Hudson, 1984, 1987; Parker, 1981); and reports on the electronic delivery of government documents, and the transition to a digital communications infrastructure by the U.S. Office of Technology Assessment (OTA, 1988, 1990). It also includes studies of telecommunications and urban development, such as those by Herbert Dordick and his colleagues at RAND in Santa Monica, California, the Office of Telecommunications in New York City, and in Los Angeles at the Annenberg School for Communication at the University of Southern California (Dordick et al., 1969; Chesler & Dordick, 1968; see also Light, 2003).

In both development research and technology assessment, diffusion of innovations theory, particularly as elaborated by Everett M. Rogers (Rogers, 1962; 2003), has been a key influence on thinking about technology and society. Rogers defines diffusion of innovations as 'the process in which

an innovation is communicated through certain channels over time among members of a social system', and stresses interpersonal communication as the primary mechanism of influence in the process (Rogers, 2003, p. 5). Communication is thus the key to development, not only in the form of new systems and services, but also as the 'general process of attitude formation and attitude change' (Lerner, 1977, p. 151).

Despite diffusion theory's emphasis on local community networks, interpersonal relations, and interaction, however, early analysts tended to focus on *adoption* – the individual's decision to accept and use a new practice or device – as a clear, concrete measure of technology 'impact' in both developing and advanced societies. National and international indicators for modernization and economic development used ICT adoption rates and prevalence as proxies for more complex social and cultural changes. As with development research generally, diffusion theory drew fire from critics who believed that it favors the interests and agendas of change agents (those introducing an innovation into a social system) over those of the people and communities in the society itself. Rogers (2003) acknowledges that this perceived 'pro-innovation bias' is one of the most serious problems of diffusion theory and research.

Clearly, indicators for development and the prevalence of technology have become more sophisticated over time. Measures of wellbeing and literacy are now routine components of development indices used by major policy organizations like UNESCO and the OECD. Nonetheless, adoption-type statistics, such as the percentage of households with televisions or personal computers, or the number of mobile telephone subscribers as a proportion of a country's population, are still collected and employed in influential development databases and reports, such as the *World Telecommunication/ICT Indicators* database maintained by the International Telecommunications Union and the annual *OECD Factbook* reports published by the Organization for Economic Co-Operation and Development (OECD, 2009) [1]. Similarly, the development of new 'web metrics' has flourished since the 1990s, as analysts seeking to establish the commercial value of online sites and services have devised measures for website traffic and visitor value, methods for tracking visitor transactions and user data, and for evaluating website performance (i.e., page load and query response times), such as those offered by Google Analytics or the marketing website ClickZ.[2]

The clarity and utility of these types of metrics gives them considerable pragmatic appeal, even among policy analysts and researchers with widely divergent political, economic, and geographic interests. Still, implicitly they suggest that the myriad uses, meanings, impacts, social significance and consequences of ICT are adequately represented by simple measurements of the transfer, diffusion, and consumption of technological systems and media products. The increasingly contingent, socialized, diversified, 'always-on' character of ICT and digital culture may be obscured by a persistent tendency to frame engagement with media solely in terms of the production and consumption of discrete informational or communication 'goods' – despite the fact that this traditional vision has shifted in recent decades.

[1] For the World Telecommunication/ICT Indicators, see http://www.itu.int/ITU-D/ict/publications/world/world.html. The OECD Factbook is available at http://puck.sourceoecd.org/vl=3819297/cl=19/nw=1/rpsv/factbook.

[2] See http://www.google.com/analytics and http://www.clickz.com.

3 New Media Ecology: Two Visions

By any measure, the social, cultural and economic consequences of new media and information technologies over the last few decades have been monumental, and have generated a correspondingly large body of research and scholarship. That literature is obviously too extensive to be encapsulated here.[3] But it is worth noting that, as with any far-reaching technological shift, different 'visions' or metaphors for the technology, its purposes, and its consequences are advanced by different communities, institutions, and stakeholders. Visions and metaphors are powerful because they encourage certain ways of understanding and governing technologies, and discourage others. In the early 1990s, browsers and the World Wide Web made the Internet broadly accessible beyond the workplace and the academy for the first time, and two main visions, the *pipline* and *frontier* (or *commons*) perspectives, came to dominate public debate about how new media and information technologies should be understood and regulated (Lievrouw, 2008). In many ways the two visions still persist today (see Table 1).

Table 1: Characteristics of Mass Media vs. Social Media

	Mass media	Social media
Governing metaphor	'Pipeline'	'Frontier'
Communication processes	Linear, cumulative, informative	Recombinant, reflexive, interactive
Socio-technical structures	Hierarchies: Top-down, few-to-many	Networks: Point-to-point, flexible, self-organizing
Distribution	Scarce, limited	Ubiquitous, pervasive
Value derived from	Property, gatekeeping, rents	System scope, utility, connectivity
Meaning derived from	Production, distribution, consumption	Interaction, relations, play, performance, expression, participation
Economic model	Economies of scale, 'normal' distribution	Network externalities, cumulative advantage, 'long tail' distribution
Ownership pattern	Concentrated: few 'voices'	Distributed: many 'voices'
Power located in	Center, top	Edges, intersections
Access defined as	Availability, consumption	Affordances, opportunities, capabilities
Gatekeeping model	Institutional: agenda-setting, spin control	Interpersonal: etiquette, relational mediation

The pipeline view of ICTs is based in the traditional understanding of mass media as highly centralized, powerful, culturally homogeneous factories for the manufacture and distribution of cultural products that are consumed on a mass scale. The economic logic of the pipeline vision, in keeping with its industrial-era roots, is based in mass production and economies of scale. Revenue

[3] Sonia Livingstone and I have edited broad surveys and a collection of classic works in new media studies; see Lievrouw & Livingstone, 2002, 2006, 2009.

is generated by the mass sales of media products (e.g., books, newspapers, music recordings, movie ticket sales, software packages), as well as advertising, whose value is also largely determined by the size of the potential audience. Profitability depends on capturing the greatest market share in particular product categories, maximizing income, and slashing production and personnel costs; market domination is often achieved by so-called synergies associated with mergers, increased concentration of ownership, and reduced competition. This trajectory of increasing industry concentration has dominated the entertainment and media industries for decades, and is seen by some as a major factor in the ongoing decline of mainstream corporate news organizations (print and broadcast) (Massing, 2009a, 2009b).

In the face of challenges by upstart online services in the 1990s, traditional media industries rebranded themselves as 'content industries' and pushed for a vastly expanded, rigid new policy regime for protecting their intellectual property rights, including the U.S. Digital Millennium Copyright Act (1998) and attempts to make other nations' intellectual property laws conform to the provisions of the DMCA. Even today, the basic business model of mass production and consumption of tightly-controlled, proprietary products remains the archetype in the traditional media and entertainment industries. They have sought to reproduce the mass media model in their online enterprises, viewing the Internet as essentially a global-scale delivery service for industry products. Any features or uses of new ICTs that threaten this model (e.g., low marginal costs and ease of copying; users' abilities to anonymize their communications, evade copy protection schemes, block advertising, or prevent the collection of personal data) have been lobbied against, co-opted, and even criminalized by industries intent on maintaining their market power and profitability.

The frontier/commons model of new communication technologies, on the other hand, arose among technology advocates in the 1980s who insisted that the Internet would ultimately deliver on the 'information utility' and 'wired cities' visions promoted by progressive policy researchers in the 1960s and 70s, including those involved in technology assessment for ICT (e.g., Dutton, Blumler & Kraemer, 1987; Greenberger, 1964, 1985; Moss, 1986; see also Light, 2003). Because the architecture of the Internet, and subsequently the World Wide Web, was essentially decentralized and networked, advocates saw it as inherently democratic, with the potential to provide a forum for the interests and concerns of communities and groups that had been marginalized in mainstream, mass media culture. The frontier vision was popular among technologists who had embraced the libertarian values of 1960s counter-cultural movements (Turner, 2006), as well as the 'hacker culture' of pranking, DIY technology, and technological mastery that flourished in elite engineering schools from the 1960s onward (Himanen, 2001; Nissenbaum, 2004; Thomas, 2002). Prominent figures from these movements led the way in creating advocacy organizations and community services (e.g., the Electronic Frontier Foundation, the Free Software Foundation, the WELL in Sausalito, CA, and Community Memory in Berkeley), as well as articulating philosophical and political manifestoes about communication rights, information as a resource, and free and equitable access to ICTs (Stallman, 2002; Turner, 2006).

Thus, from the frontier or commons viewpoint, the main value of the Internet and related ICT is not as a delivery conduit for products (or 'shut up and shop,' as critics of corporate media put it). Rather, it is a new type of public sphere with possibilities for grass-roots community building and interaction, political participation and activism, the expression and performance of identity, collaborative work and peer production, increased self-sufficiency and social capital, and creativity and play – as well as consumption. The economic logic of the frontier view is better described by network externalities and 'long tail' or power distributions (a pattern that economists and policymakers have long recognized as hallmarks of telecommunications networks). In this model, legions of diverse, local, and specialized interests, resources, relationships, and events, linked in ex-

tensive social and technical networks, vastly outnumber and have greater cumulative influence than a few so-called blockbuster products or hits.[4] In recent years a number of analysts have proposed frameworks for assessing the cultural, economic, and legal implications of the turn towards commons-based collective action online (e.g., Benkler, 2006; Levy, 1997; Shirky, 2008; Tapscott & Williams, 2008).

As Table 1 shows, the contrasting logics of the pipeline and frontier views parallel the technical and institutional characteristics of mass media and social media, respectively. Obviously, this binary scheme oversimplifies some aspects of the two forms, and tends to emphasize their differences rather than their similarities. Nonetheless, such a simplification can be a helpful heuristic. For example, both mass media and social media are global in scale. However, where mass media systems are suited to linear, one-way communication processes between a few major sources and heterogeneous mass audiences, social media support and enhance relationships and interaction among individuals and cultivate the formation of social groups with diverse, specialized interests. Thus mass media systems and institutions have been organized mainly as hierarchies that facilitate top-down, few-to-many transmission of information, and which concentrate power at the top or center of the organizational structure. With social media, in contrast, power tends to be more diffused, and systems tend to be structured as broad, decentered or multi-centered, self-organizing networks that allow interaction between any point in the network and any other.

Access to mass media is equated with the availability, distribution and consumption of devices, products, or services that are relatively scarce, expensive to produce, and limited in supply. With social media, on the other hand, the system itself is considered to be more or less ubiquitous and pervasively distributed, so access depends on the system's technical affordances for use, and users' opportunities and capabilities for adapting the technology according to their needs and interests.[5] As already noted, the economic model of mass media tends to focus on the broad center of the normal distribution's bell curve. The economic model of social media, in contrast, exploits positive network externalities (i.e., they become more valuable as they link greater numbers of more diversified people, resources, and organizations). This process can be conceived as highly skewed, long-tail distributions or so-called power laws, which have been observed in all kinds of social processes, from citation patterns within highly specialized scientific literatures, to the relative contributions of participants in collective projects like Wikipedia, to global patterns of email and telephone traffic (Huberman, 2001; Shirky, 2008; Watts, 2003).

[4] Recently, some observers have noted the enduring power of hits or so-called blockbusters to drive sales in the film and music industries. They argue that rather than a simple shift toward the long tail, a bifurcation has emerged in which 'both the hits and the tail are doing well' while middle-market media, such as newspapers and television programs, are collapsing (*Economist*, 2009b).

[5] Obviously, serious inequities in the geographic, cultural, and economic distribution of ICT are a persistent problem, although gaps are narrowing for some groups in some regions. In addition to these traditional barriers, an increasingly important contributor to inequities is an increasing reliance on 'walled garden' business models online, where providers erect technical and legal barriers that restrict users' access to competitors' services (a classic example is the requirement that American mobile telephone subscribers enter into exclusive, long-term service contracts with service providers). Taking their cue from telecommunications, media industries are now seeking ways to implement analogous 'pay walls' around their content that would restrict access to news and public affairs coverage, as well as entertainment, to those able and willing to pay.

4 New Media, New Metrics?

What are the implications of these contrasting visions, metaphors and logics for technology assessment? What indicators might be formulated to help evaluate not only the production, distribution, and consumption of social media, but also their uses, meanings, appropriations, reconfigurations, and potential consequences, risks and benefits?

First, at the most basic level, if social media are assumed to be interactive, performative, and participatory, it seems clear that relational network measures may be important tools to help characterize how people appropriate and use these technologies. Social network analysis is a powerful way to describe the shape, strength, and diversity of relationships among people who are users of social media, the roles of network members, and how their roles and relationships change over time. Monge and Contractor (2003), for example, describe at least five levels of analysis of network metrics, ranging from measures that relate individuals to the larger network, to dyads and triads within the network, to subgroups and cliques, to the global (whole-network) level (a list of network measures is shown in Table 2). In addition, it may be useful to determine the types of social conventions and cultural practices that generate links (such as imitation or modeling, validation, the assertion of authority or power, exchange processes, or the performance of social roles), as well as the dynamics that influence the generation of various types of links (e.g., link homogeneity vs. heterogeneity, social integration vs. differentiation, organization vs. disorganization, or structuration-style mutual shaping of structure and action) (Lievrouw & Nguyen, 2007).

Table 2: Selected Social Network Measures (source: Monge & Contractor, 2003)

	Definition
Link-Level Measures:	
Frequency	How often link occurs
Stability	Persistence of link over time
Strength	Intensity of link (e.g., time investment, personal closeness)
Direction	Influence or 'pointed' link from one node to another
Symmetry	Degree of link reciprocity
Node-Level Measures:	
Degree	Node's number of direct links with other nodes
Range	Number of links to diverse others (those not directly linked to each other, or having different social characteristics)
Betweenness	Node's location between any other two nodes on shortest path between them
Centrality	Node's location at the center of the network, based on number of links to other nodes
Prestige/Prominence	Number of links directed from others in the network
Network-Level Measures:	
Size	Number of nodes in network
Component/Clique	Connected subset of network nodes and links, more connected with each other than with whole network
Connectivity	Degree to which network nodes are linked directly or indirectly
Density	Ratio of pairs of nodes that are mutually connected to the total number of node pairs
Symmetry	Ratio of symmetric to non-symmetric links in network

Whatever measures are used, any effective analytic scheme should also be based on a conceptual framework that facilitates interpretation and comparison across cases or settings. For example, in a 1979 report the International Telecommunications Union argued that although the direct benefits of telecommunications technologies (e.g., sales of telecommunications equipment, volume of services used and paid for, return on investment) might seem to be the most important considerations in policy decisions about ICT, in fact their indirect benefits may be of more long-term significance (ITU, 1979). The ITU suggests that three indirect benefits of telecommunications should be particularly important to policy analysts. The first is the *complementarity* of ICT, that is, the extent to which the technology increases the power or effectiveness of other infrastructures that are articulated with it. The second characteristic is the presence of positive and/or negative *externalities* associated with ICT, i.e., the advantages or disadvantages, benefits or costs that accrue across the system as it grows or diminishes in size. The third distinctive characteristic of telecommunications is its *public good qualities*. This is the extent to which an ICT system, once it is implemented, is both non-rival in consumption (i.e., one person's use does not diminish its availability for others), and non-excludable (i.e., it is not possible or practical to prohibit some people from using the system).

Although the ITU report focused on voice telephony, this framework is just as applicable to utilities such as the Google search engine. The complementarity of Google and similar search algorithms is extraordinary. Although extensive databases, document repositories, email archives, and so on existed online well before search engines became widely available, the introduction of a simple, powerful, natural-language search tool (combined with the hypertext transfer protocol, or http, conventions of the World Wide Web) made those dispersed, disorganized resources available in a way that had previously been unthinkable. It also seems clear that the externalities of Google are the very source of its power, for good and ill. Search algorithms are only as useful as the scope of the resources they can locate and index: an algorithm that can only search among a few thousand documents is obviously not as valuable to most users as one with access to the contents of all the major libraries and archives of the world – which is Google's stated objective. Moreover, the results of every Google search are comprehensively collected and analyzed, and used recursively to adjust and sharpen the results of every subsequent search (this is the basic strategy of Google's Page Rank algorithm). At the same time, precisely because its reach is so extensive, critics worry that Google is increasingly capable of exerting a monopolistic stranglehold on culture (Darnton, 2009).

Finally, although it is privately-owned, Google's search engine has pronounced public good qualities: no matter how many people are using it at a given time, the algorithm is not 'used up'. It is always available for the next user, and the next. And Google search is available online to any user for free: indeed, its business model is built on the assumption that no searcher or search is excluded.[6]

In previous work I have suggested three general dimensions for a policy framework that might be used to assess the use and value of ICT and new media: *scope*, *connectivity*, and *utility*. The *scope* of a given ICT resource is the *variety* of users and sources made available via the technology. Scope goes beyond the simple volume or number of sources, to consider the heterogeneity of con-

[6] Recently, publishers and other critics of the Google Books project have insisted that Google should introduce artificial limitations on user access to the books in its collection, such as arbitrarily limiting the number of page views available for a given title, or excluding some page views entirely, in order to create artificial scarcities and make the service more similar to traditional private goods that are both rivalrous and excludable. Critics also note that Google has cooperated with authoritarian governments that have sought to block their citizens from finding or retrieving materials that the authorities consider objectionable. Google's cooperation has led left-progressive critics to accuse Google of capitulating to oppressive regimes and thus betraying its motto, 'Don't be evil'.

nections and resources available. A defining attribute of Internet-based information resources, especially compared to mass media, is the enormous diversity of documentary and interpersonal resources that they make available via hyperlink structures, which allow users to follow any number of possible paths to locate and retrieve information according to their interests and inclinations at the moment.

Connectivity is how well a technology *links* users to each other and information resources, services, and so on. This attribute is borrowed from network analysis, where it is also called 'reachability' and defined as the degree to which nodes in a network are linked via direct and indirect ties (see Monge & Contractor, 2003, p. 33). A more-saturated or interlinked network can be considered more valuable to network members because the paths of connection and access within it are multiplex and robust. However, the main limitation on connectivity is network size: it becomes much harder to achieve and sustain connectivity as network size increases. That is, small networks (such as the set of one's Facebook 'friends') are more likely to have higher degrees of connectivity than large ones (such as the network of all customers of a particular mobile telephone operator in a large city).

A third dimension, *utility*, is how well the technology helps people do what matters to them. A good example can be seen in the current surge of mobile telephone adoption and use in Africa. Observers argue that mobile telephones are much more likely than personal computers to provide the main gateway to Internet access in developing regions (*Economist*, 2009a). First, the technology is both cheap and powerful, providing services that users want (from conversations to microfinance transactions), at prices they can afford. Second, the platform is mobile by definition, which suits the circumstances and needs of many users. Third, the interface, which relies heavily on audio and graphics and does not require complex setup and maintenance, is well suited to communities where literacy may be limited and interpersonal interaction is highly valued.

Clearly, the ITU framework and the concepts proposed here share some broad similarities. Table 3 shows how these elements might be combined into a technology assessment framework for social media and ICT, including the features of systems and their corresponding benefits. For example, scope, connectivity and utility can be considered preconditions for the indirect benefits of complementarity, externalities, and public goods qualities, respectively.

Table 3: Technology Assessment Framework For Social Media/ICT

Features	→	Benefits
Scope	→	Complementarity
Connectivity	→	Externalities
Utility	→	Public goods qualities

Using such a scheme, we might propose the broad outlines of an assessment framework for a social media/microblogging site that has recently become part of everyday discourse: Twitter (http://www.twitter.com). Although it began as a diversion, similar to texting on a mobile phone but with messages distributed universally via the Internet, Twitter has grown into a global phenomenon with millions of individual, group, and organizational users. Its short-form, 140-character message format, the *tweet*, has unexpectedly been one of its most powerful features. Tweets are adaptable to a variety of users and uses, from idle 'thinking aloud', to fan clubs, to news reporting, to political uprisings (for example, the protests in Iran following the 2009 national elections). In addition, Twitter users have expanded the power of the system by creating a set of shorthand codes and keywords that allow writers of tweets to reach the most potentially interested readers and to

reorganize and improvise topics and interests. Twitter's scope has generated a strong degree of complementarity or enmeshment with a diverse range of other activities. Its connectivity has produced powerful positive externalities for both continuing and new users as the system has grown. The utility of Twitter for so many people and purposes, in so many places and situations, has given it the character of a public good (although, like Google, it is privately owned). As a free, worldwide service it has been designed so that it is difficult to exclude users; and it is not exhausted as a resource, no matter how much or how frequently it is used.[7]

[7] As Twitter's popularity and traffic have grown, occasional overloads and system crashes have occurred during periods of intense posting activity. The system's capacity has subsequently been expanded so that such episodes are increasingly rare.

5 Concluding Thoughts

Social media pose new social challenges and require new approaches to technology assessment. As we have seen, given its focus on the production and consumption of media products, the pipeline model that has dominated thinking about the social consequences of mass media entails different sorts of evaluative frameworks and metrics than the frontier/commons model of social media, with its focus on relationships, participation, and voice. For example, where the prevalence and influence of mass media can be estimated using industrial-style measures of inputs and outputs, sales, ratings, exposures, viewership, and so on, the social media assessment framework outlined above suggests that measures of the scale, quality, and dynamics of interpersonal and technological networks are needed to assess the value and potential benefits of social media systems and services.

The *scope* and diversity of people and resources accessible through social media like Twitter, Google, Facebook, or Wikipedia might be measured as the *range* of different types of nodes (people and resources) that are linked, the presence and diversity of distinct *clique* or *subcomponent* structures within the network, as well as the degree of articulation and mutual reinforcement between the network and other services and platforms (e.g., Wikipedia's links to YouTube videos, Twitter and Google applications for mobile telephone platforms and interlinking with Facebook). Together, these measures might serve as indicators of the network's potential complementarity. A social medium's *connectivity*, measured by the number or *density* of actual links among network nodes, the degree of node *betweenness* present in the network, as well as by simple measures of network *size* (number of nodes), could suggest a social medium's potential for positive or negative externalities. Likewise, the *utility* of a social medium might be measured in terms of the *strength*, *stability*, or *persistence* of links, or the *density* or *symmetry* of the network as a whole. The more stable and persistent the links within a social medium, or the more dense and symmetrical the network, the more likely it may be to develop the characteristics of a public good. The point here is that measures of production and consumption may be necessary, but are no longer sufficient, metrics for understanding the role that social media play in society, how people understand and engage with them, or the ways that new media systems draw together or even subsume other institutions, activities, and practices over time – what might be called *indicators for engagement*.

If the interactive quality of the contemporary media landscape makes it a far richer and more engaging arena for social action and development, it also presents analysts with a variety of new policy challenges. Perhaps the most complex consequence of the transition from mass to social media has arisen as media industries sought to preserve and extend the market models and regulatory frameworks of the past, e.g., traditional concepts of intellectual property ownership and rights originating in the era of print which were subsequently adapted to cinema, sound recording, and broadcasting. The 'property' metaphor has come to dominate media policy discussions and to overshadow concerns about speech and press freedoms that were once the centerpiece of media law, particularly in the U.S. Indeed, the property metaphor itself has been extended to cover new kinds of property rights, activities, and expressions where property was once considered an inappropriate model (e.g., identity claims, ideas, everyday 'common knowledge', methods of performing everyday tasks).

In many ways this 'proprietization' recapitulates and extends the policy debates surrounding the commodification of information that were associated with the rise of 'information society' forecasts between the 1960s and 1980s. However, as early as 1986, Tessa Morris-Suzuki predicted not just the expansion of existing commercial markets for and commodification of familiar products like documents, publications, entertainment programs, and technical information – a trend that had already been well-documented by numerous analysts of information society and economy, from Fritz Machlup and Marc Porat to Daniel Bell, Charles Jonscher, and Kenneth Arrow. She also fore-

saw the 'private appropriation of accumulated social knowledge' (Morris-Suzuki, 1986, p. 89), both in the form of informal social knowledge, such as cultural practices, traditions, folkways and language, or formal social knowledge that historically has been collected, organized, and shared through public and cultural institutions with strong knowledge-sharing values, such as schools and universities, research institutes, libraries, museums, public media, and so on.

It could be argued that this very process of the private appropriation of social knowledge is the most important contemporary policy challenge of social media. Facebook, Twitter, YouTube, Google, and other privately-owned firms not only provide online places for sociality, discourse, and the cultivation of relationships (as well as the circulation of media products); such sites also harvest users' expressions and relationships and compile them into databases of information to be sold to advertisers, surrendered to law enforcement authorities on demand, or used to attract investors and further the sites' own commercial viability. Today, it is no exaggeration to say that friendships, romantic attachments, identity, artistic and cultural interests and activities, play, and so on have been effectively redefined as 'property' subject to commodification and market dynamics just as musical and dramatic performances, fiction writing, or paintings have been in the past.

Other policy issues that have long been associated with digital technology, but are becoming more acute in the context of social media, include the authenticity and provenance of cultural expressions, works, and resources, given the mutability of digital formats; the (possibly eroding) possibilities for privacy, autonomy, and intellectual freedom in pervasively mediated social contexts in which self-disclosure about one's interests, background, and relationships is both expected and normative; and increasing expectations of the total capture and collection of all types of information about individuals and everyday life that override the important benefits of forgetting, exclusion, and selection (Blanchette & Johnson, 2002). Social media also raise the issue of technology itself as discourse, that is, what is being collectively produced is not just content to be transmitted through a system, as with traditional pipeline media, but that the very system itself is being reconfigured and rebuilt in the process of being used. As Kelty (2008) puts it, increasingly people do not argue about technology; they argue with and through it, in an ongoing cycle of reappropriation and reinvention.

These are just a selection of the problems, potentials, and opportunities associated with the transition from mass to social media. The ideas and frameworks presented here are exploratory, and require further elaboration and empirical application. However, by developing innovative conceptual frameworks and metrics, technology assessment certainly has the potential to take a central role in helping society understand the conditions and consequences of engagement with new social media.

6 References

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. New Haven, CT: Yale University Press.

Bimber, B. and Guston, D. H. (1997). Introduction: The end of OTA and the future of technology assessment. *Technological Forecasting and Social Change*, 54, 125-130.

Blanchette, J.-F., and Johnson, D.G. (2002). Data retention and the panoptic society: The social benefits of forgetfulness. *The Information Society*, 18, 33-45.

Chesler, L.G., and Dordick, H.S. (1968, June). *Communication Goals for Los Angeles – A Working Paper for the Los Angeles Goals Program.* Rand Paper P-3769-1. Santa Monica, CA: The Rand Corporation.

Darnton, R. (2009). *The Case for Books: Past, Present and Future*. New York: Public Affairs.

Dordick, H.S., Chesler, L.G., Firstman, S.I., and Bretz, R. (1969, July). *Telecommunications in Urban Development*. Rand Research Memorandum RM-6069-RC. Santa Monica, CA: The Rand Corporation.

Dutton, W.H., Blumler, J.G., and Kraemer, K.L. (Eds.) (1987). *Wired Cities: Shaping the Future of Communications.* Boston, MA: G.K. Hall, for the Washington Program, Annenberg Schools of Communication.

Economist (2009a). Mobile marvels. Special report on telecommunications in developing markets. September 24.

Economist (2009b). A world of hits. November 28, 79-81.

Greenberger, M. (Ed.) (1985). *Electronic Publishing Plus: Media for a Technological Future*. White Plains, NY: Knowledge Industry Publications, for the Washington Program, Annenberg Schools of Communication.

Greenberger, M. (1964). The computers of tomorrow. *The Atlantic Monthly*, 213(5), 63-66.

Himanen, P. (2001). *The Hacker Ethic and the Spirit of the Information Age*. New York: Random House.

Huberman, B.A. (2001). *The Laws of the Web: Patterns in the Ecology of Information*. Cambridge, MA: MIT Press.

Hudson, H.E. (1987). Ending the tyranny of distance: The impact of new communications technologies in rural North America. In J.R. Schement and L.A. Lievrouw (Eds.), *Competing Visions, Complex Realities: Social Aspects of the Information Society*, pp. 91-105. Norwood, NJ: Ablex.

Hudson, H.E. (1984). *When Telephones Reach the Village: The Role of Telecommunications in Rural Development*. Norwood, NJ: Ablex.

International Telecommunications Union (ITU) (1979). The application of telecommunication technology to development. In K.-H. Standke and M. Anandakrishan (Eds.), *Science, Technology and Society: Needs, Challenges and Limitations*, Proceedings of the International Colloquium, pp. 207-238. Organized under the auspices of the United Nations Advisory Committee on the Application of Science and Technology to Development, International Telecommunications Union, Vienna, Austria, 13-17 August 1979. New York and Oxford: Pergamon Press.

Kelty, C.M. (2008). *Two Bits: The Cultural Significance of Free Software*. Durham, NC and London: Duke University Press.

Lamberton, D.M. (1982). Telecommunications in the development process. In M. Srinivasan (Ed.), *Technology Assessment and Development*, pp. 210-227. New York: Praeger.

Lerner, D. (1977). Communication and development. In D. Lerner and L.M. Nelson (Eds.), *Communication Research – A Half-Century Appraisal*, pp. 148-166. Honolulu: University of Hawaii Press, for the East-West Center.

Lerner, D. (1963). Toward a communication theory of modernization: A set of considerations. In L.W. Pye (Ed.), *Communications and Political Development*, pp. 327-350. Princeton, NJ: Princeton University Press.

Lerner, D. (1958). *The Passing of Traditional Society: Modernizing the Middle East*. New York: Free Press.

Lessig, L. (2001). *The Future of Ideas*. New York: Random House.

Levy, P. (1997). *Collective Intelligence: Mankind's Emerging World in Cyberspace*. New York and London: Plenum Trade.

Lievrouw, L.A. (2008). Oppositional new media, ownership, and access: From consumption to reconfiguration and remediation. In R.E. Rice (Ed.), *Media Ownership: Research and Regulation*, pp. 391-416. Cresskill, NJ: Hampton Press.

Lievrouw, L.A. and Livingstone, S. (Eds.) (2002). *The Handbook of New Media: Social Shaping and Consequences of ICTs*. London: Sage.

Lievrouw, L.A. and Livingstone, S. (Eds.) (2006). *The Handbook of New Media* (Updated Student Edition). London: Sage.

Lievrouw, L.A. and Livingstone, S. (Eds.) (2009). *Sage Benchmarks in Communication: New Media* (4 vols.). London: Sage.

Lievrouw, L.A. and Nguyen, L.U. (2007). Linking and the network imaginary. Paper presented at *New Network Theory*, an international conference organized by the Amsterdam School for Cultural Analysis and the Institute of Network Cultures (Amsterdam Polytechnic, HvA), and the Media Studies program of the University of Amsterdam, The Netherlands, June 28-30.

Light, J.S. (2003). *From Warfare to Welfare: Defense Intellectuals and Urban Problems in Cold War America*. Baltimore, MD and London: Johns Hopkins University Press.

Massing, M. (2009a). The news about the Internet./*New York Review of Books*/, 56(13), 29-32.

Massing, M. (2009b). A new horizon for the news./*New York Review of Books*/, 56(14), 31-34.

Monge, P.R. and Contractor, N.S. (2003). *Theories of Communication Networks*. Oxford and New York: Oxford University Press.

Morris-Suzuki, T. (1986). Capitalism in the computer age. *New Left Review*, I/160, November-December, 81-91.

Moss, M.L. (1986). A new agenda for telecommunications policy. *New York Affairs*, 9(3).

Nissenbaum, H. (2004). Hackers and the contested ontology of cyberspace. *New Media & Society*, 6(2), 195-217.

Organization for Economic Co-Operation and Development (OECD) (2009). *Society at a Glance 2009 – OECD Social Indicators*. Paris: Organization for Economic Co-Operation and Development. Available: http://www.oecd.org/els/social/indicators/SAG.

Parker, E.B. (1981). Communication satellites for rural service: Problems and potentials. *Telecommunications Policy*, 5, 12-17.

Pool, I. de S. (1983). *Forecasting the Telephone: A Retrospective Technology Assessment of the Telephone*. Norwood, NJ: Ablex.

Rogers, E.M. (1962). *Diffusion of Innovations*. Glencoe, IL: Free Press.

Rogers, E.M. (1976). The passing of the dominant paradigm. *Communication Research*, 3(2), 213-240.

Rogers, E.M. (2003). *Diffusion of Innovations* (5th ed.). New York: Free Press.

Schramm, W. (1964). *Mass Media and National Development*. Stanford, CA: Stanford University Press.

Shirky, C. (2008). *Here Comes Everybody: The Power of Organizing without Organizations*. New York: Penguin Press.

Stallman, R.M. (2002). The GNU Project. In J. Gay (Ed.), *Free Software, Free Society: Selected Essays of Richard M. Stallman*, pp. 15-30. Boston, MA: Free Software Foundation.

Tapscott, D. and Williams, A.D. (2008). *Wikinomics: How Mass Collaboration Changes Everything*. New York: Portfolio.

Thomas, D. (2002). *Hacker Culture*. Minneapolis: University of Minnesota Press.

Turner, F. (2006). *From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism.* Chicago, IL: University of Chicago Press.

U.S. Office of Technology Assessment (1990, February). *Critical Connections: Communication for the Future*. Washington, D.C.: U.S. Congress, Office of Technology Assessment.

U.S. Office of Technology Assessment (1988, October). *Informing the Nation: Federal Information Dissemination in an Electronic Age*. Washington, D.C.: U.S. Congress, Office of Technology Assessment.

Watts, D.J. (2003). *Six Degrees: The Science of a Connected Age*. New York: W.W. Norton.

Previously published manu:scripts

ITA-01-01 Gunther Tichy, Walter Peissl (12/2001): Beeinträchtigung der Privatsphäre in der Informationsgesellschaft. <www.oeaw.ac.at/ita/pdf/ita_01_01.pdf>

ITA-01-02 Georg Aichholzer(12/2001): Delphi Austria: An Example of Tailoring Foresight to the Needs of a Small Country. <www.oeaw.ac.at/ita/pdf/ita_01_02.pdf>

ITA-01-03 Helge Torgersen, Jürgen Hampel (12/2001): The Gate-Resonance Model: The Interface of Policy, Media and the Public in Technology Conflicts. <www.oeaw.ac.at/ita/pdf/ita_01_03.pdf>

ITA-02-01 Georg Aichholzer (01/2002): Das ExpertInnen-Delphi: Methodische Grundlagen und Anwendungsfeld „Technology Foresight". <www.oeaw.ac.at/ita/pdf/ita_02_01.pdf>

ITA-02-02 Walter Peissl (01/2002): Surveillance and Security – A Dodgy Relationship. <www.oeaw.ac.at/ita/pdf/ita_02_02.pdf>

ITA-02-03 Gunther Tichy (02/2002): Informationsgesellschaft und flexiblere Arbeitsmärkte. <www.oeaw.ac.at/ita/pdf/ita_02_03.pdf>

ITA-02-04 Andreas Diekmann (06/2002): Diagnose von Fehlerquellen und methodische Qualität in der sozialwissenschaftlichen Forschung. <www.oeaw.ac.at/ita/pdf/ita_02_04.pdf>

ITA-02-05 Gunther Tichy (10/2002): Over-optimism Among Experts in Assessment and Foresight. <www.oeaw.ac.at/ita/pdf/ita_02_05.pdf>

ITA-02-06 Hilmar Westholm (12/2002): Mit eDemocracy zu deliberativer Politik? Zur Praxis und Anschlussfähigkeit eines neuen Mediums. <www.oeaw.ac.at/ita/pdf/ita_02_06.pdf>

ITA-03-01 Jörg Flecker und Sabine Kirschenhofer (01/2003): IT verleiht Flügel? Aktuelle Tendenzen der räumlichen Verlagerung von Arbeit. <www.oeaw.ac.at/ita/pdf/ita_03_01.pdf>

ITA-03-02 Gunther Tichy (11/2003): Die Risikogesellschaft – Ein vernachlässigtes Konzept in der europäischen Stagnationsdiskussion. <www.oeaw.ac.at/ita/pdf/ita_03_02.pdf>

ITA-03-03 Michael Nentwich (11/2003): Neue Kommunikationstechnologien und Wissenschaft – Veränderungspotentiale und Handlungsoptionen auf dem Weg zur Cyber-Wissenschaft. <www.oeaw.ac.at/ita/pdf/ita_03_03.pdf>

ITA-04-01 Gerd Schienstock (1/2004): Finnland auf dem Weg zur Wissensökonomie – Von Pfadabhängigkeit zu Pfadentwicklung. <www.oeaw.ac.at/ita/pdf/ita_04_01.pdf>

ITA-04-02 Gunther Tichy (6/2004): Technikfolgen-Abschätzung: Entscheidungshilfe in einer komplexen Welt. <www.oeaw.ac.at/ita/pdf/ita_04_02.pdf>

ITA-04-03 Johannes M. Bauer (11/2004): Governing the Networks of the Information Society – Prospects and limits of policy in a complex technical system. <www.oeaw.ac.at/ita/pdf/ita_04_03.pdf>

ITA-04-04 Ronald Leenes (12/2004): Local e-Government in the Netherlands: From Ambitious Policy Goals to Harsh Reality. <www.oeaw.ac.at/ita/pdf/ita_04_04.pdf>

ITA-05-01 Andreas Krisch (01/2005): Die Veröffentlichung des Privaten – Mit intelligenten Etiketten vom grundsätzlichen Schutz der Privatsphäre zum Selbstschutz-Prinzip. <www.oeaw.ac.at/ita/pdf/ita_05_01.pdf>

ITA-05-02 Petra Grabner (12/2005): Ein Subsidiaritätstest – Die Errichtung gentechnikfreier Regionen in Österreich zwischen Anspruch und Wirklichkeit. <www.oeaw.ac.at/ita/pdf/ita_05_02.pdf>

ITA-05-03 Eva Buchinger (12/2005): Innovationspolitik aus systemtheoretischer Sicht – Ein zyklisches Modell der politischen Steuerung technologischer Innovation. <www.oeaw.ac.at/ita/pdf/ita_05_03.pdf>

ITA-06-01 Michael Latzer (06/2006): Medien- und Telekommunikationspolitik: Unordnung durch Konvergenz – Ordnung durch Mediamatikpolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_01.pdf>

ITA-06-02 Natascha Just, Michael Latzer, Florian Saurwein (09/2006): Communications Governance: Entscheidungshilfe für die Wahl des Regulierungsarrangements am Beispiel Spam. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_02.pdf>

ITA-06-03 Veronika Gaube, Helmut Haberl (10/2006): Sozial-ökologische Konzepte, Modelle und Indikatoren nachhaltiger Entwicklung: Trends im Ressourcenverbrauch in Österreich. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_03.pdf>

ITA-06-04 Maximilian Fochler, Annina Müller (11/2006): Vom Defizit zum Dialog? Zum Verhältnis von Wissenschaft und Öffentlichkeit in der europäischen und österreichischen Forschungspolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_04.pdf>

ITA-06-05 Holger Floeting (11/2006): Sicherheitstechnologien und neue urbane Sicherheitsregimes. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_05.pdf>

ITA-06-06 Armin Spök (12/2006): From Farming to „Pharming" – Risks and Policy Challenges of Third Generation GM Crops. <epub.oeaw.ac.at/ita/ita-manuscript/ita_06_06.pdf>

ITA-07-01 Volker Stelzer, Christine Rösch, Konrad Raab (3/2007): Ein integratives Konzept zur Messung von Nachhaltigkeit – das Beispiel Energiegewinnung aus Grünland. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_01.pdf>

ITA-07-02 Elisabeth Katzlinger (3/2007): Big Brother beim Lernen: Privatsphäre und Datenschutz in Lernplattformen. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_02.pdf>

ITA-07-03 Astrid Engel, Martina Erlemann (4/2007): Kartierte Risikokonflikte als Instrument reflexiver Wissenspolitik. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_03.pdf>

ITA-07-04 Peter Parycek (5/2007): Gläserne Bürger − transparenter Staat? Risiken und Reformpotenziale des öffentlichen Sektors in der Wissensgesellschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_04.pdf>

ITA-07-05 Helge Torgersen (7/2007): Sicherheitsansprüche an neue Technologien – das Beispiel Nanotechnologie. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_05.pdf>

ITA-07-06 Karen Kastenhofer (9/2007): Zwischen „schwacher" und „starker" Interdisziplinarität. Die Notwendigkeit der Balance epistemischer Kulturen in der Sicherheitsforschung zu neuen Technologien. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_06.pdf>

ITA-07-07 Ralf Lindner, Michael Friedewald (9/2007): Gesellschaftliche Herausforderungen durch „intelligente Umgebungen. Dunkle Szenarien als TA-Werkzeug. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_07.pdf>

ITA-07-08 Alfons Bora (11/2007): Die disziplinären Grundlagen der Wissenschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_07_08.pdf>

ITA-08-01 Alexander Degelsegger (5/2008): „Frames" in sozialwissenschaftlichen Theorieansätzen. Ein Vergleich aus der Perspektive der Technikforschung. <epub.oeaw.ac.at/ita/ita-manuscript/ita_08_01.pdf>

ITA-08-02 Jens Hoff (11/2008): Can The Internet Swing The Vote? Results from a study of the 2007 Danish parliamentary election. <epub.oeaw.ac.at/ita/ita-manuscript/ita_08_02.pdf>

ITA-09-01 Georg Aichholzer, Doris Allhutter (2/2009): e-Participation in Austria: Trends and Public Policies. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_01.pdf>

ITA-09-02 Michael Nentwich (11/2009): Cyberscience 2.0 oder 1.2? Das Web 2.0 und die Wissenschaft. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_02.pdf>

ITA-09-03 Hilmar Westholm (12/2009): Wandel der Formen politischer Partizipation und der Beitrag des Internet. Schlussfolgerungen aus Bevölkerungsbefragungen in Deutschland. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_03.pdf>

ITA-09-04 Leah A. Lievrouw (12/2009): Indicators for Engagement. Thoughts on ICT Assessment in a World of Social Media. <epub.oeaw.ac.at/ita/ita-manuscript/ita_09_04.pdf>