

Communication Research after the Mediasaurus?

Digital Convergence, Digital Divergence

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Today's mass media is tomorrow's fossil fuel
Michael Crichton

In an article entitled *Mediasaurus*, Michael Crichton, author of *Jurassic Park*, compares contemporary mass media with the dinosaurs (Crichton 1993). The mass media, he writes, have become gigantic, clumsy creatures, ill suited and unable to adapt to the demands of the new environment of information technology with its flexible mini-media and computer networks. Consequently, they are obsolete, in short, on their way toward extinction. Crichton's conclusion: "Today's mass media is tomorrow's fossil fuel."

If Crichton is right, the next question is: What are the implications for mass communication research? And where does that leave us media researchers?

George Gilder, another commentator with a gift for the drastic, speaks of "life after television" (Gilder 1994). Gilder's scenario resembles Crichton's in many respects. He claims, for example, that television, in technical terms is dead, that just as the 'centralistic mainframe computer' and IBM collapsed in the 1980s, superseded by the PC, the centralistic television structures will now collapse, so that "in coming years, the very words 'telephone' and 'television' will ring as quaintly as the words 'horseless carriage', 'icebox', 'talking telegraph' or 'picture radio' ring today" (1994:12).

Is there a life after television?, is Gilder's question. And, one is tempted to add, for the mass com-

munication researcher? Gilder's answer to the first question is, Yes, it's the PC and 'telecomputer'. But what is the answer to the second question?

The editors of the trend-setting computer and lifestyle journal, *Wired*, do not predict the out-and-out demise of television as we know it today, but they expect broadcast television will be but one of many different channels in a new network of converging media: "As everything gets wired, media of all kinds are moving to the decentralized matrix known as the Net. While the traditional forms – broadcast, print – show few signs of vanishing, the Net is being invaded by new media species" (Kelly et al. 1997:12). The prime characteristic of this new fauna of network-based species of media is their diversity, ranging from mastodon media to micro-media. "The most revolutionary advance", *Wired* continues, "may be the creation of a whole universe of small-scale (and not-so-small-scale) broadcast networks.... Networked media... can create broadcasting networks of any size and shape, especially the intermediate size between TV and, say, personal mailing lists. You can push-pull broadcast to Llama keepers or home schoolers... [The Net will be] a Net of push-laden networks, a world of nichecasting – thousands of mini-networks, ranging from micro-TV stations to totally customized personal programming. ... Let a thousand media types bloom" (Ibid.: 21-22).

Digital guru Nicholas Negroponte, finally, speaks of the changing media landscape in a similar vein: "The economic models of media today are

based almost exclusively on ‘pushing’ the information and entertainment out into the public. Tomorrow’s will have as much or more to do with ‘pulling’, where you and I reach into the network and check out something the way we do in a library or video-rental store today” (1995:170). Thus, Negroponte expects the media to be “redefined by systems for transmitting and receiving personalized information and entertainment” (Ibid.:6). The critical factors in Negroponte’s scenario are digitization and the ‘great information superhighway’: “Being digital will change the nature of mass media from a process of pushing bits at people to one of allowing people (or their computers) to pull at them. This is a radical change, because our entire concept of media is one of successive layers of filtering, which reduce information and entertainment to a collection of ‘top stories’ or ‘best-sellers’ to be thrown at different ‘audiences’. As media companies go more and more toward narrowcasting, like the magazine business, they are still pushing bits at a special-interest group, like car fanatics, Alpine skiers, or wine enthusiasts. ... The information industry will become more of a boutique business. Its marketplace is the global information highway” (1995:84-85). The implications of what Negroponte says here for economic models and the radical changes that confront them may well have relevance for other scientific models of the sector, as well.

Each in his own way, all – Crichton, Gilder, the editors of *Wired* and Negroponte – are saying: “No dinosaurs on the information superhighway. No Dinos on the net!”. But what, we may ask, is the role of mass communication research and the media scholar in this new media landscape, after the evolutionary quantum leap?

The foregoing is one possible elaboration on the theme, *The changing media landscape: Research on new media technology*. Put in more polemical terms: Communication research after the Media-saurus?

‘The Changing Media Landscape’ and ‘New Media Technology’

‘The changing media landscape’ and ‘new media technology’ are oft-heard phrases these days. Not infrequently they are used without much clarification as to what they stand for.

One might object that ‘the changing media landscape’ is nothing new in itself. The media landscape has always been changing, and will hardly stop now. Just consider the impact television has had on family life, leisure, entertainment and pat-

terns of consumption these past 40 years. Or what the telephone has meant with regard to the establishment and maintenance of social relations and social interaction. Or, in a somewhat longer perspective, what print media have meant with respect to how information is distributed, stored and made accessible.

So there is nothing new about the media landscape changing. The novelty does not reside in ‘new information technology’. Novelty is nothing new.

Therefore, I should like to start by saying a few words about what I mean when I use the words ‘new information technology’ and ‘changes in the media landscape’. And about why it is important to consider these phenomena just now.

Digitization and Convergence

The keys to what is new about ‘new information technology’ and the significant changes in a constantly ‘changing media landscape’ are to be found in the terms ‘digitization’ and ‘convergence’, not only in their precise significations, but also as focal points, puzzle picture, which change appearance when viewed from different perspectives. What from one point of view looks like convergence may, viewed from another point of view, appear to be divergence. Hence the kaleidoscopic title of this article.

The term ‘digital’ is primarily a contrast to the term ‘analogue’. Analogue media are – very simply put – based on signals which consist of continuously varying values. By measuring these values one can derive information. Digital media, on the other hand, are based on discrete information. They break down the real world’s continuous and constant flow of data into a series of discrete ‘samples’, which are taken at even intervals (the more frequent the samples, the higher the quality). A digital signal can only have one of two possible values: 0/1, off/on, absent/present. This binary or digital code is the computer’s language. ‘Digitization’ and ‘the digital revolution’ refer to the conversion from analogue to digital media and technologies: the translation of information in a variety of forms – letters, speech, sound, images – to a universal language of 0’s and 1’s, to a sequence of manipulable, computer-readable cyphers.

This very basic technological change in how signals are coded has a number of far-reaching consequences for the characteristics and character of media.

Digital information can represent many different forms of expression and underlying types of in-

formation, all of which are handled in essentially the same way. Consequently, it also becomes possible to transfer information from one medium to another, thus liberating it from dependence on any given medium. Digitization makes all media interchangeable, and the computer becomes a kind of universal medium or meta-medium, which can simulate other media, technologies and systems of expression (cf. Finnemann 1998). Moreover, the transport, processing, storage and retrieval of information – i.e., all of the vital aspects of communication and information processing – are currently being digitized.

Digital information is easier to process and manipulate; in principle, one can do almost anything with it. The information may be processed at any and all stages: in production, i.e., in the translation into digital form, in the transfer of information, or in the user's reception and use of the product.

Digital information can contain meta-information, information about information, bits about bits, which increases flexibility, the variety of ways in which information can be processed and the 'intelligence' in the information.

These last two features – the possibility of processing information in reception and use and the ability to contain information about information – give digital media a special capacity for interactivity.

Digital information offers a number of other advantages, as well: it can be copied and processed an infinite number of times; it is not as susceptible to 'noise' and misinterpretation; it is more robust in the face of malfunctions and lends itself better to error searches and corrections; it can be excerpted and exchanged between countless members of a network; it is amenable to encryption; it requires less space and is therefore easier and more economical to transport and store; and, in contrast to analogue information, it can be radically compressed. Thus, digitization makes it possible to deliver traditional, linear and non-interactive information and media more economically. In many cases digitization will be used to allow the established media industry to distribute conventional products and content (digital broadcasting) in new, more economical and efficient forms.

The term 'convergence' refers to several concurrent and partly interrelated developments in the media landscape today.

On the level of technology, it refers to the fact that – thanks to digitization – previously separate media (print, broadcasting, telephony, cable, etc.) have come to obey the same technological prin-

ciples and share the same base; all converge in the computer. Thus, in terms of technology, convergence and digitization may be said to be two aspects of the same thing.

On the level of products, it signifies that previously separate modes of expression and kinds of information – text, sound, still and moving images, etc. – can now be readily combined and thus converge in multimedial expression, referred to as multimedia. In a similar fashion, then, convergence and multimedia may be seen to be two sides of the same floppy-disk.

Turning to distribution, convergence refers to the fact that formerly separate services and media systems can now be combined in the same distribution channels and integrated services or networks, so-called full service networks. Here, too, convergence means digital networking, and vice versa.¹

Finally, on the level of the industry convergence means that previously separate branches within the media-information-entertainment sector now collaborate in a variety of ways – because medial, technological and product convergence imply corresponding multimedial knowledge and skills; because individual actors and businesses wish to secure themselves a place in an uncertain and hard-to-predict technological and commercial future; and, finally, because the branches are increasingly operating in each other's domains. The many fusions, strategic alliances, acquisitions and partnerships announced in recent years, particularly in the fields of telecom, computers and audio-visual media, are concrete expressions of this comprehensive industrial convergence. On this level, then, we find convergence and industrial alliances to be two sides of the same golden coin.

On this latter, macro-industrial level we find that Crichton's prediction misses the mark. There is not much evidence that mass media, seen as an industry or group of enterprises, are in any way nearing extinction. On the contrary. Never before have media companies been so vigorous and large – like mastodons (or dinosaurs?).

The term 'convergence', like 'digitization', has become a real buzzword lately. The question is, however, whether it really captures the whole of the dynamic in what we see happening before us today. If, that is, we take it to signify a tendency that takes the form of bringing together, limitation and concentration. Its opposite – divergence – is perhaps equally applicable as a descriptor.

Take, for example, the actors and output on the market. Here it is hardly a question of concentration or limits on the number of actors or products –

that is, on actual competition. On the contrary, individual companies and industries are expanding their operations into new fields and thus come to overlap one another. The result: a growing number of players and products, hence, a dramatic increase in competition.

We find that the same is true on the level of technology, as well. For, even if digitization means that media old and new melt together, and that many technologies and media converge in the computer, the result is far from a single, uniform technology or product. On the contrary, the result seems to be a broad spectrum of diverse media, technologies and products. Thus, on the one hand the media seem to converge; on the other, they are diverging into a wide array of new media and products. Meanwhile, individual media are adapting to be able to offer a growing number of diverse functions. Convergence and divergence.

And it applies, finally, when we consider services and distribution. For, even if the digital networks assemble many services in full service networks, the number and kinds of services seem to be multiplying. Nor does the much-touted 'information superhighway' look like it will be a single, integrated system, but rather a network of networks which can exchange information and services in a consistent fashion. Thus, on the one hand, distribution networks and services are fusing; on the other hand, these networks and services seem to be proliferating wildly.

Behind the convergence process on all these levels, there is a diversity of actors, technologies, products and services. What, seen from one point of view, appears to be convergence, seen from another angle looks more like divergence. Like a kind of puzzle picture, the situation changes according to one's perspective. Convergence and divergence in the same digital trend.

Media Revolution?

The significance of these events has been the subject of some controversy. People like Crichton and Gilder have perhaps overestimated the radicality of the change and, as we say in Scandinavia, 'sold the pelt before the animal (in this case a mediasaurus) was caught'. More cool-headed 'mediasaurologists' have, in the midst of all the technological turbulence, not seen anything really new at hand, and have cautioned us to 'hold our horses' – or paleohippuses, as the case may be.

At the moment, however, the danger of underestimating the change may be greater. The speed and

depth of the changes are tremendous, and (mass) media researchers have – on the whole – been relatively slow to confront the challenges the changes pose.

Digitization is no longer something ahead of us. The so-called 'digital future' is already with us, and has been for some time. A great number of technologies and media have been, or are in the process of being digitized. Computer media, multimedia and network media like Internet have been digital from the start; they were born digital. The PC has only existed a little over fifteen years, and it is already to be found in a majority of Danish households. This makes the PC one of the fastest-growing media technologies in history. The growth of Internet has been unparalleled.

At the same time, it is not only 'new media' and 'new information technology' which represent the changes digitization brings with it. Conventional media, too, are 'going digital'.

The process is already completed in the case of print media with the advent of word processing, desktop publishing, on-line publishing, on-line services and on-line newspapers. It occurred astoundingly quickly in music distribution with the overnight conversion from the LP to the CD. Telephone and telecom networks have been digitized over the past few years. With the coming of voice-response systems, interactive telephone services, etc., this development may be expected to change our very idea of what the telephone is and can be. Digital images and digital video have become accepted as the standard of the future, which will affect the production of images profoundly. Finally, the major conventional media – radio, television and film – are at this moment facing and taking the step into their 'digital futures'.

What is more, new and old media are combining – converging – in digital versions: television and computers, newspapers and computers, telephone-based on-line services, computer and fax and e-mail and telephone. On the one hand, the media are becoming interlinked; on the other, we find individual media assuming a growing number of communication functions. Once again: convergence and divergence.

In addition, we find the computer, in the sense of the microprocessor (which we have known some 40 years now), everywhere in everyday technologies: wristwatches, washing machines, microwave ovens, toasters, telephone answering machines, thermostats, CD-players, toys, musical greeting cards, cars, etc., etc.

So, it is not only the new information technologies which constitute the 'revolution'. Old media and conventional consumer goods, too, are part of the change in the media landscape. We can in fact say that all the principal media which have been invented from the fifteenth century until today are now – on different levels and to varying degrees – in the process of being digitized. Digitization is omnipresent and omnipotent.

The changes have been surprisingly swift. As late as the first years of the decade, some European observers argued that digital video would become a reality some years into the new millennium. And one occasionally runs across 'future-oriented' research from the early 1990s which makes no mention whatsoever of digitization as a relevant factor in the 'next decade of development' of electronic media. Consequently, if the concepts 'media revolution' or 'communication revolution' have ever been justified, it must be in connection with the phenomena of computerization and digitization. This, relative to other profound changes in the media which have earned such status, such as the Gutenberg press or mechanization, a process of several centuries, or electrification or the advent of electronic media, which spans most of the present century.

Some has pointed to digitization as the central theme of the media developments of the 1990s. Some have claimed – perhaps exaggerating a bit – that the current digital revolution and emergence of network media are of fully the same magnitude as Gutenberg's invention of book printing. "The computer is a new kind of medium. Gutenberg has come, and we haven't recognized him yet," exclaims 'new media' guru Allan Kay. "Internet will have a greater impact on civilization than Gutenberg's invention of the press," says Bill Gates.

Whatever epoch-making points of comparison we choose, we have good reason, as scientists, to pay attention to these processes of change right now, as they are taking off. If it is true that the digital revolution will be as profound as Gutenberg's invention, posterity may well be able to say that we – like the monastic calligraphers in European scriptoria of Gutenberg's day – did not notice the revolution, as we were occupied with more pressing tasks.

Mediasaurus Research

The question, then, is what are the implications for media research? Does traditional mass communication (or mediasaurus) research have adequate con-

cepts, theories and methods to deal with current changes in the media landscape, and to analyze new and upcoming varieties of media? Or will our science find itself increasingly ill equipped to understand and explain its objects of study? In short: Does the revolution in the media require a corresponding revolution in media research? And if so, what does such a 'new' – digital, convergent – media research look like? Post-mediasaurus.

So far, most media research has been mediasaurus research in the sense that it has derived its concepts, models, theories and insights from the study of 'broadcast' media – mainly television, radio, newspapers and film – i.e., one-way communication from one to many. This is mainly a consequence of the dominant role mass media have played in western societies this past half-century – and the consequent dominance of mass communication research among studies of the media and communication.² With this orientation comes a set of assumptions and basic concepts, like sender, receiver, intention, effect, channel, medium, etc., and implications regarding the relationships between active senders, passive receivers, information transport, etc. The current emergence of new digital, computer-based media is, however, more or less synonymous with a shift away from mass communication of the broadcast type toward other forms. In that sense, Crichton may be right in saying, "Today's mass media is tomorrow's fossil fuel."

The current developments and 'the changing media landscape' may be approached and described in a number of ways. In the following I shall present five sketches of a landscape in the process of change – of necessity painted in broad strokes.

Interpersonal Communication vs. Mass Communication

One way to characterize current developments in the media sector takes its point of departure in the way studies of communication traditionally have been organized.

One of the most fundamental and best patrolled frontiers in communication research is the distinction between mass communication and interpersonal communication. This line of demarcation – for reasons more historical-institutional than scientific – has assumed such a constitutive character that research in the respective areas has become divided between two separate sets of institutions and scientific traditions. The distinction is constitutive

in the sense that the respective traditions have largely defined themselves in contradistinction to one another. This is apparent when we consider how the two traditions define and construct their respective foci of interest.

- In mass communication research the object of study is defined as ‘mediated communication’, i.e., communication which takes place via technical distribution media, whereas in interpersonal communication the object of study is defined as ‘unmediated communication’, ‘face-to-face communication’, i.e., communication which takes place without technical distribution media.
- Mass communication researchers define their object of study as indirect communication, i.e., communication which involves distance in time or space between the communication partners, whereas students of interpersonal communication define their object as direct communication and interaction, i.e., coinciding in time and space.
- The object of mass communication research is ‘one-way’ communication, i.e., communication in which information flows in only one direction, with no opportunity for senders and receivers to exchange roles: the object of interpersonal communication research, on the other hand, is two-way communication with a relationship of mutuality between sender and receiver.
- Mass communication involves minimal feedback from the receiver to the sender, whereas interpersonal communication allows the greatest possible feedback.
- Mass communication is characterized by an absence of interaction (or only ‘simulated’ or ‘parasocial’ interaction) between sender and receiver, whereas interpersonal communication involves a high degree of interaction between the two parties.
- Mass communication is defined as communication which addresses a large, dispersed, heterogeneous, anonymous audience; interpersonal communication is defined as communication between two or several participants who are in immediate proximity to one another.
- Mass communication is defined as communication which is public, i.e., non-exclusive, open to participation, whereas interpersonal communication is private, taking place within personally defined circles.

Mass Communication	Interactive Communication	Interpersonal Communication
Mediated	mediated person-to-person	Unmediated
Indirect	indirect	Direct
One-way	one-and-two-way	Two-way
Minimal feedback	great feedback	Maximum feedback
Absence of interaction	interactivity	Interaction
One sender vs. large audience	many senders vs. many receivers	Few participants
Open	open/private	Private

The new information technologies and network media do not easily fall into either of these categories. In many respects their interactivity and capacity for dialogue constitute a mediation between or convergence of the two – a species of ‘interpersonal mass media’. Thus, they appear to land alongside or in the no man’s land between the two traditional fields of research. This may be one of the reasons why researchers in the two traditions have been so slow to take an interest in the new, interactive media and to respond to the challenge they present. In the longer term, however, the new media call for the re-integration of communication theory and thus a critical review of some fundamental lines of demarcation, assumptions and concepts. In other words, the only adequate response to convergence of the media is the convergence of media research traditions.

We see signs of such convergence in the recent and growing interest in applying theories developed in the field of interpersonal communication to mass media phenomena (cf. Gumpert & Cathcart 1986, i.a.), and in the growing interest in theories borrowed from the schools which grew up in reaction to Shannon’s linear conception of communication, such as the circular and retroactive – and more complex – models proposed by Norbert Wiener (Bateson, Hall, Goffman)

Tomita’s Grid and the ‘Black Hole’

A second approach to visualizing current developments in the media is via ‘Tomita’s grid’ (Tomita 1980). The media may be conceived of as attempts to conquer differences in time and space. Japanese communication researcher Tetsuro Tomita consequently localized the various media in a time-space grid. Here, time represents the time it takes for the sender’s message to reach the receiver, and space represents the number of receivers the message can reach. Individual media will occupy a significant

part of this time-space grid, which says something about the special nature of the medium, its communicative function, content, and so forth.³

Tomita's grid revealed a 'media gap', an area where it has been impossible to communicate. A sort of 'black hole' in the communication universe, which had not previously been visible. Many of the new, computer-based media and computer networks – at the time of Tomita's article: e-mail, bulletin boards, databases; today also: Internet, intranets and www – fill this 'gap'. These media grow out of the grassroots. Tomita takes their current popularity and vigorous growth as a sign of the need for these modes of communication, a need conventional media have been unable to fulfill.

Meanwhile, most of these media are more flexible along the time dimension as well as the space dimension (the number of users). A bulletin board is almost instantaneously accessible, and, in contrast to broadcast media, it does not presume the coincidence in time of sender and receiver, but has a more lasting character. Media like this fill the grid's entire time (vertical) axis. Turning to the spatial dimension, a database can be accessible to one user (the person setting it up) or to, in principle, everyone on the planet. Thus, media like this can fill the entire spatial (horizontal) axis.

Thus, new, computer-based, digital media occupy not only the 'black hole', but in fact the entire time-space grid. Like a new gravitational field, the new media draw the entire grid to them; the grid implodes or explodes and tend to render dimensions like time and space irrelevant to the communication process.

Media Typology and Information Traffic Patterns

A third way to describe developments in the media is in terms of control or power. Bordewijk and Kaam have elaborated a matrix or typology where the variables are not time and space, but the power-relations represented in the communication. They ask two questions: Who produces and owns the information, and who controls its distribution in terms of time and selection. By cross-tabulating these two aspects in relation to whether ownership and selection are performed by a centralized information source or by a decentralized information user, Bordewijk and Kaam arrive at a four-field matrix of fundamentally distinct media or patterns of communication.

- 1) If the information is produced and owned by a central provider which also controls its distribution, we are dealing with a pattern of communication which Bordewijk and Kaam term transmission. It is one-way communication, where the principal mode of use is relatively passive reception. Typical of this category are the classic broadcast media. This is the habitat of the Mediasaurus.
- 2) If the information is produced and owned by a central provider, but control over what is distributed and when lies in the hands of the user, we have a pattern of communication known as consultation. Here, the user of the information sends a request or order to the center, whereupon the desired information is delivered. The characteristic mode of behavior on the part of the user is active choice among several alternatives. Typical of this field are various forms of on-demand services, on-line information resources, browsing, input to the medium to control or influence the course, content and duration of the media text, etc.
- 3) If the information is produced and controlled by the users, and control over distribution is also controlled by the users, we have a pattern which Bordewijk and Kaam term conversation. Here it is a matter of conventional two-way communication, dialogue, or mediated interpersonal communication (one-to-one, few-to-few) where a significant user mode is production of messages, and input in a dialogic structure. Typical examples are the telephone, e-mail, etc.
- 4) Finally, if information is produced by the user, but processing and use of the information is centrally controlled, we have a pattern termed registration. In this case a central body collects information from or about the users, and the characteristic mode is storage, processing and exploitation of the data about the users. One might call it a many-to-one pattern. Typical examples here are various kinds of monitoring and registration systems, but also various kinds of individual adaptation of media in the form of programmable software agents, intelligent interfaces, personalized and customized services, and so forth.

Of these four categories, only transmissions are characterized by one-way communication flows from an information central to users, that is to say,

only transmission lacks a return or feedback channel which allows input from users into the system. Up to the present, the vast majority of studies of communication and media have derived their models and insights from the transmission pattern and only to a lesser degree – and particularly in the field of interpersonal communication – from the conversation pattern. The other two patterns have been virtually ignored in communication research to date, as are combinations of the various patterns. (See the discussion of ‘push-pull’ media, below.)

When we consider current developments in the media sector as are related to digitization, telematics, computers, computer networks, etc., within the framework of this two-dimensional matrix, they may best be described as a shift away from the upper right-hand corner toward the other positions, i.e., from traditional transmitting patterns toward primarily consultative patterns, but conversational and registering patterns, as well⁴ – not to mention the various combinations of these kinds of communication. This also implies a general shift away from highly asymmetrical, centralistic power structures in the direction of greater symmetry in, or wider distribution of power. In many ways these new media, which make various forms of input and information flows from the users to the system possible, represent the opposite of the Mediasauruses and the reasoning about mass communication and do not lend themselves to description in terms of one-way communication models and the terminology such models have generated. Seen in this perspective, one may advance the argument that existing media theory is becoming less and less able to grasp and explain current media phenomena. Or, conversely, one may argue that the new media constitute a looming challenge to traditional media and communication research – a challenge which calls for a thorough re-examination of our central models and concepts.

‘Push-Pull’ Media

The new media not only represent a shift in information traffic patterns, they also mean new combinations and convergences of familiar patterns. In recent years the new kinds of media have frequently been described in terms of the buzzwords, ‘push media’ and ‘pull media’.

Kelly et al. (1997) describe ‘push media’, typical examples of which are radio, television and film, as follows: “Content is pushed to you. ... Push media arrive automatically – on your desktop, in your email, via your pager. ... The distinguishing

characteristic of the new push media is that it finds you, rather than you finding it” (14ff, 23). ‘Pull media’, on the other hand, get their name from “the invitational pull you make when you click on the Web” (14). In other words, pull media are media that you (interactively) steer; they correspond in many respects to what Bordewijk and Kaam call ‘consultative’ media.

Up to now, most of the new media – offered via ‘the Net’ (e.g., www) – have had the character of ‘networked pull media’ but in time, Kelly et al. Predict, these will be supplanted by ‘networked push media’. The Web, as we know it today, is fading away and will be replaced by new point-to-point media. Under the heading, “The radical future of media beyond the Web” they write: “... a new medium is arising, surging across the Web in the preferred, many-to-many way: anything flows from anyone to anyone – from anywhere to anywhere – anytime. In other words, a true network like the telephone system, rather than a radiating system like radio or TV. This new medium doesn’t wait for clicks. ... It means personalized experiences not bound by a page. ... It means information that cascades, not just through a PC, but across all forms of communication devices.... And it means content that will not hesitate to find you - whether you’ve clicked on something recently or not. It means, in short, a more full-bodied experience that combines many of the traits of networks with those of broadcast” (Kelly et al. 1997:14).

Although these new networked push media may resemble broadcast media in some respects, the similarities are deceptive: Until now, broadcast networks had to be huge to be ubiquitous. Smaller ones were proprietary and fixed. Really small ones were called mailing lists or videoconferences. Networked media, on the other hand, can create broadcasting networks of any size and shape, especially the intermediate size between TV and, say, personal mailing lists. You can push-pull broadcast to llama keepers or home schoolers, reconfiguring the shape of the network on the fly. Until now, the Net has been a place of pull-laden networks; now it will also be a Net of push-laden networks, a world of nichcasting – thousands of mini-networks, ranging from micro-TV stations to totally customized personal programming (Ibid.:21).

But perhaps the most characteristic media form will be hybrids, ‘push-pull’ media which allow you to “move seamlessly between media you steer (interactive) and media that steer you (passive)” (Ibid.:12). As we move into what Kelly et al. term “the post-HTML environment”, the promise of

push-pull media is this:...to marry the programmed experience of television with two key yearnings: navigating information and experience, and connecting to other people. With networked media you get TV's high production values along with the intense communal experience of watching something together – virtual communities. You also get the ability to address small self-organizing audiences that broadcast could never afford to find. And you get well-crafted stories seamlessly integrated into other media, such as on-line conversations. This heightened ability to extract meaning, experience, or community – rare with content pushed by broadcast – is almost the rule with content pushed on a network (Ibid.:18)

Networked media, Kelly et al. predict – totally consonant with Tomita – will fill the entire media continuum, taking us “one more step toward closing the gaps between existing media, toward one seamless media continuum, viewable in an infinite number of ingenious ways” (Ibid.:21f).

Post-Mediasaurus Communication Concepts

A fifth approach to the new media situation is to look at the key models and concepts applied by mass communication researchers. Here one particular model stands out. It is particularly suited to the mass media, especially through its stress on the linear character of communication, conceiving of communication as a form of transport, involving active senders and passive receivers, etc. The model is one of the most harshly criticized, yet one of the most persistent. I am, of course, referring to the model of communication proposed by Claude Shannon – the dinosaur among models of communication.

Shannon's model and theory have been criticized so long by so many that there is little one can say that hasn't been said many times before. There is little use spending one's breath on the subject. But I shall review some of the key concepts in Shannon's theory which, while they may have been adequate in relation to traditional mass media, have proven less well suited to the new media.

Take, for example, the concept of 'medium'. Earlier, it was possible to consider a technical apparatus, a communication service and the relevant sender institutions as a more or less unified entity, a 'medium' – e.g., the medium of television. Now, thanks to convergence, several different apparatuses are able to perform the same tasks. You can receive facsimile messages via fax-machines, com-

puters and telephones. You can receive newspapers in hard copy, via teletext and via Internet. You can listen to the radio through a radio receiver, via cable-TV and via the Net. Conversely, any given apparatus can serve multiple functions: e.g., the computer as both word processor, digital communicator and television receiver. Television sets serve as terminals for TV programming, teletext services, radio programs, video games, e-mail and surfing the Web. At once melding and differentiating communication functions – convergence and divergence.

The Concept of Media

Medium – technical	Communication structure
Medium – as a service	Media use
Sender	Organizing participants
Receiver (viewers, listeners readers)	User (participant) ...
Feedback (feedforward)	Interactivity
Information transport	'Communication'
...	Electronically mediated communication space
Noice	User's request
Text	Process

What, then, is left of the concept of the medium? And in what sense is it meaningful to speak of a computer as a medium? A radio? Television? Clearly, we can no longer use the concept with the same confidence and clarity as we once did. Nor can we call ourselves television researchers, computer researchers, press researchers, and so forth, as unambiguously as before. It may even be necessary to abandon the terminology which is based on mass media, and which bears the prejudices of that perspective, altogether. Perhaps, as Lutz Goertz (1995) proposes, we might in the case of 'medium' as hardware or technology use 'communication structure', and in place of 'medium' as a service use 'media use', defined as a product of the final receiver apparatus.

Shannon's model and terminology had their starting point in a transportation metaphor, the conveyance of information, and communication could be conceived of as a relatively symmetrical process, where encoding and decoding were believed to be identical, albeit reversed, operations. Attention was therefore often focused on the perfect transfer from sender to receiver. The new, digital media are able not only to carry information, but to process, manipulate and revise the data transferred, as well. Consequently, the process is not necessarily symmetrical. The user's text may, after processing (and interactivity) differ from the sender's text. And the

most interesting aspect is often the ways in which the user actually creates text in his or her use or reading. It may be expressed in hypertext and hypermedia, where the user is accorded a major influence over the media text which arises in the act of media use. The user may, with the help of bits-about-bits decide how the data received shall be presented: as text, sound, images, video or 3D graphics – in any number of ways, which the sender cannot know, let alone control. Or, it may be that the message, rather than a fixed message, takes the form of a world to be explored relatively independent of the assumptions and intentions the ‘sender’ may have had.⁵ In other words, on this plane the convergence of technologies results in a new divergence between sender, media text and receiver. The classic model no longer – or only partly – captures these aspects. In Shannon’s model the term ‘noise’ was used as a catch-all for anything that interfered with or modified the message as transmitted. In this sense, the new, digital, interactive media are extremely ‘noisy’. But the concept has only limited relevance to what is actually at play.

The conception of communication as ‘information transport’ needs to be replaced with a model which sees communication as both transfer and processing. Anthony Oettinger coined the term *compunication* to cover the linkage between communication and information. Fredrich Kortz proposes that the notion of communication as information transfer be replaced by a notion that takes its point of departure in the user and conceives of communication as an electronically mediated communication space.

Many other key concepts relating to communication are equally in need of review and revision. In some extreme cases in the new media, the party which in traditional models is more or less simply referred to as the ‘sender’ does not produce any messages, but only controls the technical process of communication, as in the case of bulletin boards, video-on-demand or web servers. Such a party might – as suggested by Goertz – more aptly be termed ‘organizing participants’. The parties which in traditional models are referred to as ‘viewers’, ‘listeners’, ‘readers’, each referring to a specific form of information, or ‘receivers’, ‘recipients’, ‘consumers’ or ‘the audience’, all referring to relative passive practices, might be called something that is neutral with respect to form and stresses the active, participatory nature of communication: e.g., ‘users’ or ‘participants’. Among other things, because the notion of using the medium, of participat-

ing actively in the communication process, to produce or provide information, and to create networks for the exchange of information is central in the case of new media.⁶ The parallel between the two terms, ‘participant’ and ‘organizing participant’ underlines the fact that, theoretically speaking, the two parties may be regarded as operating on the same level.

As the ‘sender’ and ‘receiver’ concepts are replaced, the ‘sender apparatus’ and ‘receiving apparatus’ must also change inasmuch as the ‘intelligence’ in new communication systems to a greater or lesser extent has shifted from the act of encoding to the process of decoding. The shift may, for example, mean that the receiving apparatus takes over some routine operations from the receiver, that decoding increasingly becomes adaptive or responsive to the user’s needs, desires or previous behavior, that the receiving apparatus may be used to ask for or seek information, etc. Thus, concepts like sender apparatus/receiving apparatus, and encoder/decoder, too, must also be reviewed and reformulated.

The concept of ‘feedback’, which in traditional models referred to the receiver’s response and reply to the sender’s transmissions, covers only a minor portion of the information traffic involved in new media and media systems, featuring information-return systems or two-way communication, which allow users to request (on demand) specific content or to contribute their own input into the media system in the form of participation or dialogic communication. Therefore, an attempt has been made to introduce the concept of ‘feedforward’ to cover the circumstance that the process begins with the user’s request for specified content, which the medium then delivers. Still, the concept does not adequately describe the key aspect of the process, and it is clearly more meaningful to talk about interactivity, (mediated) interaction or dialogue than about feedback or feedforward.⁷

The same applies to many other concepts in communication research, which are derived from or consonant with the mass communication model: gatekeeper, two-step flow models, studies of media effects, quantitative content analysis, etc. Here, as in many other respects, the mass media terminology and model have proved deficient. The concepts which may have been adequate in relation to central features of the old mass media fail to capture significant features of the new media, and they can no longer be used with the confidence they once inspired. The new mini-media and network media are not only the signal for the old mass me-

dia to bow out; they also sound the retreat for the dinosaurs of communication models. It is high time we coined new concepts which are better suited to describe the new landscape.

Post-Mediasaurus Media Research

In addition to these basic concepts there are numerous more specific areas and problem complexes which require attention in the post-mediasaurus era. In the following I shall no more than outline a handful of them and raise some questions for further discussion.

Interactivity

One of the most central and significant features of the new media is their interactive character, the fact that in addition to conventional media output to the user, the new media can allow various amounts and kinds of input from the user to the medium or media system, which can significantly influence the form, order, length, structure of the message, i.e., the content of the media text.

Although this interactive potential is widely recognized, and despite the fact that 'interactivity' has been the subject of a considerable amount of 'hype' and media attention, it has received remarkably little attention within the research community and remains poorly defined (cf. Jensen 1998b, 1998c). The field of media and communication research still lacks a comprehensive theory of the phenomenon, let alone a consensus definition of it. Interactivity is thus an area in need of theoretical and analytical work.

Questions that need to be answered are: How should interactivity be conceptualized? How should we conceive of the interactive user? What are the implications of interactivity for the content which can be presented? What is novel, entertaining, informative about interactivity? That is, what is its appeal? Do users want to 'interact'?

Content

The interactive aspect raises a number of questions having to do with the technology, but it also raises questions relating to content. And these are, as always, more interesting. On the one hand, content in the new media is not expected to be radically different from the content of old media. The world in the digital, interactive era is – in the words of Peter Gruber of Sony Pictures Entertainment – “still a talent-driven, story-driven, melody-driven world”.⁸

Bran Faren of Disney Imagineering concurs: “Technologies are changing, but people are not. ... What it takes to touch their hearts has remained constant for thousands of years.” And so does John Lasseter: “...flashy f/x may get people into the theater, but the essentials – plot and character development – are what keep them in their seats.”

This suggests another possible reading of Michael Crichton’s “Today’s mass media is tomorrow’s fossil fuel”. Content, like fossil fuels, is becoming a finite, even a scarce resource. Given insatiable digital storage media and equally insatiable broadband distribution systems, it has become difficult to muster enough content to fill media capacity. We are reminded of Springsteen’s “57 channels (and nothin’ on)”. The media of tomorrow will therefore to a considerable extent have to make do with yesterday’s content, with fuel aggregated in the age of the mediasaurus – in repackaged, recycled, and ‘reprise’ editions.⁹

On the other hand, interactivity and the new convergence of computers and content will naturally change the premises for how content can be made available and for the kinds of content that can be made available. The question then arises: What will digitization, convergence, interactivity, etc., mean with respect to the stories that will be told? to the modes of address and aesthetic principles used? to the services offered? to the experiences shared? and to the sensations that can be simulated? What, exactly, does the novelty of interactive programs, services and content consist of?

In many respects content is the least developed, least explored aspect of the new media. New forms of expression, new products, formats, genres and services will, of course, evolve. When the PC was first introduced, the spread sheet was about the only application envisaged. But once the technology was in place, applications proliferated at a previously unimagined pace. The same will surely occur in the case of digital, interactive media.

Another major question concerns how we should approach the new content analytically. Most content analysis approaches presume the existence of a text, fait accompli, with a beginning and an end and having fairly fixed, identifiable features. But how do you go about analyzing a media product which does not have a manifest text but, instead, a set of unrealized, potential texts – a virtual world which the individual user can explore at will? Or a set of data which the user can use in any number of ways, where, for example – as Nicholas Negroponte (1995:49) proposes – we can influence the degree of sex, violence or political correctness just as

we today can adjust the sound, color and contrast? In short: How do we analyze texts that diverge?

Media Culture

Another area where interactivity and the convergence of computers and media content have an impact is the media culture, and users' behavior. A media culture surrounding not one-way media and broadcasting, but interactive media and dialogic communication must reasonably be something different. At present we know next to nothing about interactive users and the culture of interactive use: search patterns, preferences, behavior, interpretations, gratifications.

Among other things, we might ask: Can 'interactivity' enhance the tremendous cultural and commercial success that traditional media already have achieved? Or, phrased in more commercial terms: Does the average viewer or consumer want interactive media and interactive services? And, if so, what are they willing to pay for them?

The Media History of New Media

The access of media historians to media as they appear on the scene is vital to an understanding of the media in question. New media are presently surrounded by an extreme degree of historical amnesia. The reasons are several.

For one thing, according to the cultural logic of the media, the interesting, legitimate and prestige-laden objects of study are novelties. The instant version 4.1 is out on the market, interest in its predecessor, 4.0, is 'out'. Secondly, it is a consequence of the commercial logic of the manner in which new technologies are developed and launched. Most R&D projects are privately financed. If they are successes, efforts are made to keep them secret from their competitors. If, on the other hand, they are failures, they are kept secret from shareholders and investors. In either case, data are not readily available to students of the media, and the results, lessons learned, etc., are not documented. Finally, there are the requirements of publicity, the financial basis, and commercial success, which mean that every new product is touted as something truly revolutionary. Every little improvement and modification of existing technology and every new combination of existing technologies is introduced as something radically new and different. That is why 'the birth' of interactive television has been proclaimed again and again this

past decade. All these factors work against the development of historical consciousness.

A Broader Field

Even if the mass media may be on the verge of extinction, one may – even without resorting to the more speculative branches of 'futurism' – confidently conclude that communication and media, as objects of study, them.

A steadily increasing share of modern-day reality takes place in mediated form. And with the new, digital, interactive media the mediated world takes yet another evolutionary quantum leap. Many activities which today require physical presence and take place face-to-face – shopping, bank transactions, marketing, teaching, social services, health services, games, etc. – have become mediated activities via interactive television, full-service networks, wireless technologies, integrated multimedia services in the home, and so forth. Speaking of telematics and 'push media', Kelly et al. observe: "Push media will penetrate environments that have, in the past, been mediafree – work, school, church, the solitude of a country walk. Through cheap wireless technologies, push media are already colonizing the world's last quiet nooks and crannies. ... Media abhors a vacuum. It will colonize any vacant communication channel" (1997:17, 22).

But what happens when all these spheres of life become mediated? What does it mean when a good part of everyday life becomes an object of interest to communication research? Meanwhile, the media occupy a much more central place in the current transition to the so-called 'information society', in international industrial convergence, and in strategies relating to the interface between citizen and polity, producer and consumer, teacher and pupil, and so forth.

Thus, mass media researchers may be losing their objects of preference: the mastodon mediasauruses; at the same time, however, beyond the era of the mediasaurus a new, more expansive landscape – home of an abundance of smaller and medium-sized, convergent and divergent media creatures – is opening up.

Media Research – Tendencies

New information technology and new media, as phenomena and praxis, have attained widespread acceptance and support, approaching consensus.

But there is a stark contrast between this extraordinary aura of consensus and the mobilizing force which surrounds the expansion of the new media technologies, on the one hand, and the progress made in conceptualizing them – theoretical work which is characterized by confusion, uncertainty and hesitation.

Surveying the current theoretical landscape, a number of new species or mutations present themselves:

- There is a tendency toward a growing share of administrative research which often has its origin in government or industrial planning and modernization policy and frequently takes the form of applied and policy research in the form of committee and consultant reports. This kind of research implies certain attitudes toward the production of knowledge and attaches conditions to it. Those who commission such research often presume that the studies will be conducted within the system, that is, that the system itself or its cultural, sociological and economic precepts and consequences will not be questioned. Thus, the prospects for generating theory are often poor, and free thinking is at a premium.
- Partly related to the foregoing: there appears to be a move away from theoretically oriented research toward more common sense-oriented studies with an emphasis on description, coupled with a fascination with data and the technological tools that produce them.
- The emergence of a new branch of journalism, ‘IT-reporting’, which, in the absence of media

researchers, constitutes the primary frame of reference and source of knowledge about the new technologies – for members of the research community, as well. It has all the shortcomings of most journalistic products: a predilection for sensation and the novel, a short-term perspective, haste, superficiality, and a general lack of theoretical reflection. A discourse, in short, which is sometimes difficult to distinguish from pure PR and advertising.

- Finally, a tendency toward a technocratic point of view which naïvely equates democracy with technology and, lacking a definition of the former, concludes that more technology leads to greater democracy: that more interpersonal exchanges and more channels of communication will, in themselves, stimulate and promote democracy.

Naturally, these mutations – hardly a complete taxonomy – fall far short of telling us what we need to know and providing a theoretical framework in which to understand new media technology and what changes in the media landscape mean. Whether there is a relationship or congruence between the extinction of the mediasaurus, on the one hand, and the emergence of these new theoretical mutations – and the lack of critical theory which they result in – is, of course, a matter of speculation.

But, in this new media landscape, in these new circumstances, it would be very unfortunate if the critical theoretical reflection and understanding correspondingly turned out to be a ‘theorysaurus’ – fossil evidence of life-forms now extinct.

Notes

1. *Wired* puts it like this: “Their central mission is to shoot every conceivable media flavor across, through, in between, and around a network that includes every conceivable hardware device. In effect, they unify the mediascape, making it possible to send a video to a phone, to push an email to a dashboard, or insert your preferred colors and body size into a clothes ad” (1997:15).
2. Consider, for example, the title of the conference to which this paper was presented or the names of some of our research associations.
3. For example: mass audience = universal content; one-to-one communication = selective content, etc.
4. This change is consonant with broader cultural shifts in which mass markets are replaced by niche markets, mass distribution is replaced by segment-rationales and targeted marketing, traditional broadcasting is replaced by narrow-, niche- and pointcasting, etc. The convergence of media seems to be accompanied on a broad plane by a diversity of products, markets and (sub)cultures.
5. Negroponte writes, for example: “The medium is not the message in a digital world. It is an embodiment of it. A message might have several embodiments automatically derivable from the same data. In the future, the broadcaster will send out one stream of bits ... which can be converted by the receiver in many different ways. The same bits can be looked at by the viewer from many perspectives” (1995:71).

6. Recent years' shift toward greater interest in the receiver, and a corresponding subsidence in interest for the sender within the media research community – even if not addressing the new media – is thus consonant with the trends described here, which also lead to a greater emphasis on the user.
7. These proposed formulations are more than pinning new labels on old, familiar concepts; they represent concepts that have radical consequences for the entire conceptualization of the respective aspects of communication. Significantly, none of these new concepts refers to mass communication or interpersonal communication exclusively.
8. Quoted in *Newsweek*, 31 May 1993, p 37.
9. This is the motive behind the many acquisitions of media archives and other content caches that we see today.

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