

# CONCERNING INVISIBILITY OF MEDIA

## SULL'INVISIBILITÀ DEI MEDIA

Georg Rückriem | Emeritus Professor, Berlin University of Arts | Berlin (DE)

✉ (home address) Sandhauserstrasse 15D, 13505 Berlin, Germany | [georg.rueckriem@gmx.net](mailto:georg.rueckriem@gmx.net)

**Abstract** This paper describes the concept of medium as an epistemological explanatory principle. It begins by examining the idea of the invisible and disappearing computer, which is related to the worldwide development of the so-called third wave of computing. The crux of the article is that the disappearing computer is not a consequence of technology, but rather of human psychology. That is to say, the medium can no longer be interpreted simply as a tool or instrument. It is not about optional instrumentality, since, when it functions as a leading technology, it leads to the emergence of new ideas, world-views, social utopia and principles for living. Each new medium transforms the existing societal system into which it emerges. Put simply, digitalization can be a medium, a non-optional way of mediation. It is a general mediatedness (in German *Vermitteltheit*), that is to say a necessary precondition to any mediated action or to the emergence of new forms of mediation.

**KEY-WORDS** Invisible computer, Medium, Mediatedness.

**Sommario** L'articolo mira a descrivere il concetto di medium inteso come principio epistemologico esplicativo. L'idea di partenza, legata al concetto di sviluppo globale della cosiddetta terza ondata dell'informatica, è quella di computer invisibile e capace di scomparire. Il punto cruciale dell'articolo, tuttavia, è che la scomparsa del computer non è una conseguenza della tecnologia, quanto piuttosto della psicologia umana. Ossia, il medium non può essere interpretato come un mezzo o uno strumento. Il medium non è strumentalità facoltativa, poiché, quando funziona come tecnologia principale e trainante provoca la nascita di nuove visioni del mondo, nuove utopie sociali, nuove idee e nuovi motivi su come vivere. Ogni nuovo medium implica la trasformazione di un intero sistema sociale esistente. In poche parole, la digitalizzazione può essere un medium, ossia un modo non facoltativo di mediazione. È una più generale forma di mediatezza (in tedesco *Vermitteltheit*), ossia una preconditione necessaria per ogni azione mediata o per la nascita di nuove forme di mediazione.

**PAROLE CHIAVE** Computer invisibile, Medium, Mediatezza.

## THE INVISIBLE COMPUTER?

Talk of the “invisible” or “disappearing” computer refers to a new technological development that is also called “the third wave of computing”. Although it actually emerged as a concept 25 years ago, it is now attracting worldwide attention as a phenomenon manifesting in many areas of society, except for the fields of learning and education. The term “disappearing computer” was coined by Mark Weiser, developer-in-chief at Xerox Palo Alto Research Center (PARC) in the 1980s. It became well known internationally following publication of Weiser’s famous 1991 paper, which began:

*«The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it»* (p. 94).

In Europe - especially in Austria, Germany and Switzerland - Weiser’s ideas have been picked up and developed by Norbert Streitz (who had met Weiser at PARC in the nineties) and by his research group (Davies, 2010). Their work received European Commission support under Future and Emerging Technology (FET)<sup>1</sup>, an EC research program that had the ambition to spark overall social transformation processes<sup>2</sup>. The extent of research funding the group received was so substantial that we can only presume the EC was expecting both the delivery of disappearing computer technology and the realization of its societal implications, something which Streitz’s research activities sought to put into operation.

Weiser’s idea was conceptually subversive, even revolutionary. While the processes of performance enhancement, increasing effectiveness, miniaturization, networking and globalization made it possible for more and more of the ambient world to be integrated with the ever-cheaper personal computer - generating a new virtual world of its own - Weiser had the idea to reverse the process and to integrate “the computer” into the ambient world:

*«My colleagues and I at PARC think that the idea of a “personal” computer itself is misplaced, and that the vision of laptop machines, dynabooks and “knowledge navigators” is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of the way people live their lives. Therefore we are trying to conceive a new way of thinking about computers in the world, one that takes into account the natural human environment and allows the computers themselves to vanish into the background»* (1991, p. 94).

The more that the ever-miniaturized “computer” pervades everyday human life, the more environmental things become “smart things”; the more the “computer” is omnipresent – or ubiquitous, in Mark Weiser’s (1993) terms – the less it will be knowingly realized. It grows “invisible” and “vanishes” because what goes without saying will not be consciously discerned:

*«A good tool is an invisible tool. By invisible, I mean that the tool does not intrude on your consciousness; you focus on the task, not the tool. [...] Of course, tools are not invisible in themselves [...] but good tools enhance invisibility. [...] Unfortunately, our common metaphors for computer interaction lead us away from the invisible tool, and towards making the tool the center of attention.»* (p. 72).

But Weiser (1991) himself already made clear that the term “invisible” is just a metaphor:

*«Such a disappearance is a fundamental consequence not of technology, but of human psychology. [...] When you look at a street sign, for example, you absorb its information without consciously performing the act of reading»* (p. 94).

Weiser’s strategies of integrating ubiquitous mobile “computing resources” into the ambient physical world, termed “computing without computer” or “ubiquitous computing” (also “context-aware mobile computing”) prompted the so-called “third wave of computing technologies”.

## POLITICAL STRATEGIES FOR A EUROPE WITH INVISIBLE COMPUTERS

Norbert Streitz, who took up Weiser’s idea in 1999 (Streitz, Kameas, & Mavrommati, 2007) was a foundation member of the FET planning group and was later FET’s chief of engineering management when the EC approved 17 projects under the FET Program from 2001 to 2004. Initially, his research focused on implementing intelligent devices (smart things) in small “places” - meeting rooms, walls, groups, supermarkets, “cooperative buildings”, “environments”. The scope later expanded, encompassing “smart cities” and “smart ecosystems” or “ambient intelligence landscapes”; this involved development of software such as Roomware, SEPIA, DOLPHIN, AMBIENTE and AGORA<sup>3</sup>.

This has since grown into a booming international industry, including leading IKT companies like Ericsson, Nokia, Telcare, Amdocs, Orange, Sony, Cisco, IBM, Deutsche

<sup>1</sup> <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/future-and-emerging-technologies>

<sup>2</sup> *«It seems like a paradox but it will soon become reality: the rate at which computers disappear will be matched by the rate at which information technology will increasingly permeate our environment and determine our lives»*, FET Newsletter, 1(1), 2. Retrieved from <ftp://ftp.cordis.europa.eu/pub/ist/docs/fet/nl-1.pdf>

<sup>3</sup> For a summarizing presentation and an extensive bibliography, see Davies (2010) and Russel (2012).

Telecom, Microsoft, Morgan Stanley, Telefónica Móviles, NEUL, Machina Research, Aeris, ARM, net4things. In parallel, we have witnessed the blooming of new research sectors like Ubiquitous Computing<sup>4</sup>, Pervasive Computing, Internet of Things (IoT), Internet of Everything (IoE), Machine-to-Machine-Communication (M2M)<sup>5</sup>. These have generated a slew of international congresses - Distributed, Ambient and Pervasive Interactions (2013, Las Vegas; 2014, Crete), Internet of Things World Forum (2014, London), Internet of Things Conference (2014, Berlin), Smart Grid World Summit (2014, London) - not to mention a swathe of specialist journals and newsletters.

And we have been witnessing the implications in our daily lives for some time now. Dishwashers, exercise machines, heating systems, room thermostats, sewing machines, toothbrushes, washers, light switches, electricity meters, navigation aids, copying machines, cars, and even entire houses are “smart” now and directly linked with the Internet.

The overarching aim is - in the EC’s terms - the general modernization of Europe, turning the “old continent” into a modern, internationally competitive information society. The debate over the related terminology goes back to EU programming initiatives like “Europe’s Way to the Information Society” and “Europe as Forerunner of the Global Information Society”: e.g. “Information Society” (Giesecke 1991; 2002; 2005), “Knowledge Society” (Willke, 1995; 1998a; 1998b), “Meaning society” (Bolz, 1997), “Network Society” (Castells, 1996). However, there is little doubt about what these EU schedules are referring to and reporting on. They document political decisions and strategies of action concerning the aims, priorities, norms and standards of processes and structures forming part of a complex social transformation, which national and international agencies have irreversibly implemented. Nevertheless, it is still worth remembering that this EU strategy is not primarily about technology but about policy and social transformation.

At the 1994 Corfu summit, the European Council decided to establish a special Information Society Commission aimed at ensuring a coordinated course of action for all members (Corfu Conclusions). Yet in the same year this commission developed strategies for accelerating the enforcement of

technical innovations, which served as a basis for the G7 meeting 1995 in Brussels and the subsequent Information Society and Development Conference 1996 held in Midrand, South Africa, which had been explicitly arranged to discuss these issues. As a result, the Fourth Framework

Program (FP4) provided 3600 million ECU for Telematics, Communication and Information Technologies (TCIT), FP5 guaranteed 24% of its overall budget to support related projects while the FP6 (2002–2006) earmarked 3600 million Euros exclusively for information technologies, plus 2345 million Euros for scientific preview projects, 1800 million for human resources, as well as 1250 million for further structural accompanying measures. Back in 2001, the eEurope 2002 Action Plan stated:

*«The Internet sector is now big enough to have a drastic impact on economies. The public sector needs to take a leadership role in adopting new technologies, instead of linking to their development afterwards. It has to provide the general conditions and framework requirements for a flourishing private economy as well as the new technologies that public services need to work more efficiently. The European Commission should affirm that the transition to the information society is a decisive factor in future growth, and that “eEurope” remains one of the most important political goals».*

As early as 2002, Giesecke (2002) commented:

*«Never in history has so much money has been invested in ‘next generation technology’. Compared with the capital investment necessary to initiate printing, the steam engine, film or broadcasting, this is a quantum leap»* (p. 345).

But even this amount was surpassed within a few years. In order to accelerate the pace of transformation, the EU made six billion Euros available exclusively in favour of target-1-regions. FP7 provided an additional nine billion Euros for ICT research (particularly for the Disappearing Computer Project), as well as 1.8 billion Euros for ICT special projects and 800 million Euros for promoting ICT use. The levels of investment that big international IT corporations made in ubiquitous computing and IoT cannot be estimated, but they are certainly many times higher.

Presently, official EU publications leave no doubt about what is going on: “Deep transformations are under way in our society”; “ICT innovations are both a driver and a support for these transformations”<sup>6</sup>.

In reality, those “deep transformations ... in our society” have long since changed into transformations of society itself. They are about what society we all want to live in tomorrow. In fact, these subliminally functioning new technological infra- and supra-structures are systemic. That is, they have determine our social system down to the core of our concrete living, and have transformed everything irreversibly, whether we like it or not - and even whether we are aware of it or not, since systemic transformations are those we cannot reject because they are even fundamental to our decision-making processes.

<sup>4</sup> Just for “ubiquitous”, Amazon.com proves about 7 million books in English language.

<sup>5</sup> For definitions, differences, and bibliographies compare Wikipedia and Google.

<sup>6</sup> <http://cordis.europa.eu/fp7/ict/docs/ict-wp2013-10-7-2013-with-cover-issn.pdf>

<sup>7</sup> To Luhmann (1998) a computer is not the box. It is an “invisible machine” because it is able to reconstruct itself from one moment to another. It shows at the screen what it has been ordered to do by coded command but “itself keeps invisible”.

Unfortunately, those highly subsidized second generation 'intelligent' infrastructures (satellite-sustained global networks and positioning systems, worldwide distributed Internet databases, unimaginably voluminous flows of communications data through reams of global proprietary networks, countless local intranets, the ever-spreading "embedded technologies" of ubiquitous computing - are in fact invisible, silent, odourless, and effectively intangible because they are made up of nothing but electronic bits<sup>7</sup>. This virtuality might actually make it seem that in our homes and workplaces, offices and hospitals, corporations and mass media, schools and universities, cities and political institutions, nothing essential has changed (see Willke, 1998a).

As far back as 1994, well-known sociologists like Peter F. Drucker (1994) (to name just one) were sure that «*a post-capitalist society is practically certain. And it is certain also that its primary resource will be knowledge*» (p. 4). However, explicit awareness that we are witnessing a fundamental societal revolution has not arisen - neither in the public sphere, nor within education systems, education policy, educational theory or media didactics (see Erdmann & Rückriem, 2010). The enormous number of publications about how to apply new media in school settings serves as a meaningful indication; these mostly deal with applying new technological means to old methods of instruction:

*«Few authors analysing e-learning go so far as to call into question their concepts of learning and knowledge as well. Instead, they construe their practice and their models against the background of typographic concepts of communication, information media and information processing»* (Giesecke, 2005, p. 18).

They use new media to optimize the old learning paradigm of reproducing received information, thus attempting to preserve the historic learning culture as a cornerstone of a society that has long since undergone transformation itself.

### INVISIBLE NEW MEDIA?

This underlying question is as sensible - or better as senseless - as its opposite: Are new media visible? Why? Because the answer depends anyway on what we mean when we talk about "new media", something this is totally unclear. There are at least two possibilities here (including several uncertainties or even obscurities): we can either seek to understand the term "medium" by means of epistemology or, on the other hand, treat it simply as a thing. This seems to be a very plain and facile distinction but it has far-reaching corollaries and practical ramifications.

First, we could say that New Media (including computers) is a set of real things, objects, devices, gad-

gets, instruments, apparatuses or - considering the adjective "new" - the sum of all media that are not old. This is not just a question of everyday naming: the term is quite common in scientific discourse as well, even though it embodies many unclear and implicit assumptions.

- a) It is unclear which media are old and which new, and why. For example, how do we attribute telephones, broadcasting, film, TV, copying and fax machines as belonging to old or new media? They are all telecommunication technologies. What is it that differentiates them from computers?
- b) If only particular things can be labelled as a "medium", then we have a classification problem or a specific problem of ontology. The world of things would then contain two different classes - simple things and media things - presuming there is a clear difference between the two.
- c) What could this specific difference between simple things and media things be: a special form, quality or the like? Then "medium" would constitute a property of a thing, and not a thing itself.
- d) Are media-things such from the very beginning? If not, what is it that makes a simple thing become a medium? But what is the cause? We would then have to assume a special driving force.
- e) Furthermore: what is the difference between (the property/form/quality of) old and new media? Going out of date is a process of change within a system that leaves parts of the system behind. Within a static system, there is no process of becoming antiquated. Yet the elements of a system never change in isolation from one another and without changing the relationship between system and environment.
- f) And finally, what could it be that makes those media things invisible - although being real things? More precisely, what do we mean by "invisible"?

In daily speech, media are things which mediate - as a mediational means or mediator - between two poles of a relation, thus making the relation - more precisely its realization - possible. But normally they are optional. A man putting a ladder between himself and the roof he wants to get on could possibly achieve the same result successfully without recourse to an auxiliary means. Thus, in everyday speech media are reduced to the status of instrumentality within a means-ends-relationship, without acknowledgement of the underlying philosophical premises, and this has practical implications. For example, when a certain goal is set in school education, the question is asked in media didactics as to whether New Media possibly provide better means for attaining this goal. And media education investigates whether New Media damage or even



derogate the normal development of children. In both cases, media are treated simply as optional means. The fundamental mediatedness of learning - its being mediated by an underlying learning culture cluster which permeates or pervades every teaching-learning-relationship - is not being considered. There is not even a word in the English language to denote what is meant.

The importance of this reduction is obvious when we take communication as an example. Within a means-end-perspective, we would be forced to presume a single individual who is thinking about sending a message concerning a certain object and, in search of any appropriate means, opts for language. But language is not built by things such as a pig could have told us how to call it (Röttgers, 2006b). Language is not a means of considerations of expedience but their necessary and inevitable premise. Language is the essential form without which even the content of those considerations would not be possible. Language is the horizon of the emergence of sense and meaning and thus out of disposition for communicating persons. It cannot be intended nor controlled but performed only.

On the other hand, there is no absolute differentiation between medium and tool or instrument. A hammer can serve as a tool to hammer nails, but in the hand of a small child a hammer can be a medium for experiencing the world. To quote Mark Twain, if all you have is a hammer, everything looks like a nail, or at least, a man holding a hammer considers the whole world in terms of nails and non-nails (Maslow, 2002).

In summary, a medium is neither a thing nor a means, and least of all is it optional. Medium and means are both something "third", something that "mediates" - but in a totally different manner (Röttgers, 2006a; 2010). Therefore, speaking of a medium as a real thing is an "epistemological error" (Bateson, 1984). The term "New Media" serves as a container term, a kind of black box, a conventional agreement which, despite its vagueness, serves as a reference for making discussion - even among

scientists - possible (or sometimes to stop any attempt at explaining things).

Secondly, we should be aware that "medium" is just a name, and a name is not the named thing itself. It is an epistemological concept. Bateson so often insisted on the difference between "map and territory", "meal and menu" being different logical types (Bateson, 1984, pp. 143ff; 1985, pp. 362ff). He stresses the importance of logical typification as a premise to grasp the concept of "medium" as a kind of epistemology or world-view, a cluster of conceiving, feeling, thinking, learning, acting, of culture and societal reproduction. Epistemologies are not things, they cannot be touched, and they cannot be "seen" - they are invisible although we can talk about them. They are real like ideas are real but their reality is different from that of things. The logical type of epistemological concepts needs a higher level of abstraction, resulting in (Bateson, 1985): «*even a stringent discourse on a given logical type can by no means at all explain phenomena of a higher logical type*» (p. 381).

But what does it mean to state that a medium mediates in a different manner? What is the difference in terms of mediation?

Let us look at some examples. Aquatic creatures cannot live without water. It is their medium of living. But this does not mean that water located between the creature and its food is a means for ingestion. Rather, aquatic creatures and their food exist *within* the water. Water is not a sheer option to them: they cannot avoid it, evade it, or steer clear of it because water is an inevitable condition of their living. In the same way, land animals live *within* the medium of air, not because they use the air option as a means for their ends. We see objects by way of reflected rays of light, but we don't perceive the actual rays; we hear by way of acoustic waves, but we don't perceive the waves; we walk around thanks to gravity, but we are unable to perceive it (Schürmann, 2010). Or in a more abstract way: Relations between subject and object are never immediate but always mediated by an instrument - they form a kind of <2+1-relation> (subject-object-instrument). On the other hand, mediated relations always exist within a specific "space" - a medium - which is their condition of existence, thus forming a special kind of <3-within-1-relation> (subject-object-instrument *within* a medium) (see Figure 1). The difference between "means" (or instruments or device etc.) and "medium" is a difference of logical types and therefore of meaning: what we commonly call "new media" are instruments, tools, apparatuses and computer-mediated actions (such as learning) that function within the Internet as their condition of existence (their medium), which makes them possible and determines their form. In other words, we cannot understand the decisive differ-

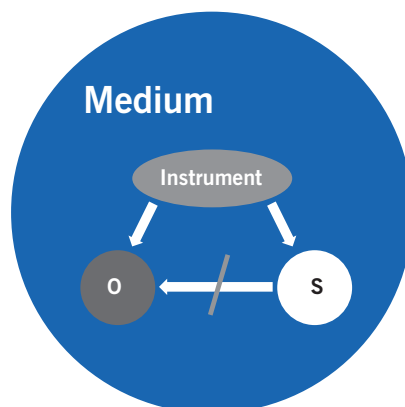


Figura 1. The 3-within-1 relation.

ence between learning processes (to take one an example) that occur by way of the medium of the printed book and new learning processes that emerge by way of the Internet.

These examples are used here to make it clear that a medium is not a space *between* subject and object, a thing *between* two entities that fills up the interspace. If we insist on using the term “space” we should rather say it is a kind of overlapping or comprising dimension – the space *within* which the subject and object move. All these formulations, however, persist or intend to persist more or less in forms of reification. It must therefore be repeated: any attempt to reify a medium ends up at best with a means, a tool, an instrument. I therefore prefer to say that a medium is an epistemological explanatory principle to elucidate what the different meaning of mediation is at this level of abstraction: a non-optional way of mediation, general mediatedness<sup>8</sup> as a necessary precondition to any mediated action or to the emergence of new forms of mediation.

It is an implicit consequence of its epistemological understanding that a medium is neither a cause nor a driving force or factor. A medium is a catalyst (Giesecke, 1991; 2002) that opens up new perspectives and possibilities (including chances, risks and misuse). Communication media – particularly within the process of becoming global and universal, when they function as a “leading technology” (Nussbaum, 1984) or as “the medium that integrates all other media” (Bolz, 1997) – provoke the emergence of new world-views, of new social utopia, new ideas and new motives of how to live. Experienced on a daily basis, media activate new systems, new forms, functions and abilities of communication, and lead to an expansion in the range of human possibilities by enabling us to see everything in a new light.

On the other hand, every new medium implies a transformation of already existing media and their societal implications mostly including corrosion or even deletion of the given system’s structures, functions, perspectives, norms, habits, and abilities in a long-lasting, subtle, and insensible process. Between media turn-taking there is no break, no crash or disruption, but a creeping and long-lasting transition process. McLuhan spoke of “interlocking”, and used Russian “babushka” dolls as an example: if you open one, there is always another one inside. All

hitherto existing media will be integrated by the new one and linger on with new societal meanings. Nevertheless, the transition process has its own structure (Erdmann & Rückriem, 2010; Giesecke, 1990a; 1990b; Rückriem, Ang-Stein, & Erdmann, 2010).

## CONCLUSION

To conclude, the new technology of computing has started to become a medium. Referring to Adam Smith’s metaphor of the *«invisible hand»* – which Smith used to explain economy as a game behind the actor’s back that follows neither the intentions nor the power of the actors – Willke uses the metaphor of *«invisible angels»* (quoting Michel Serres, 1995) in order to describe in detail the power and global functioning of these knowledge-based infra- and supra-structures (Willke, 2001, pp. 66ff).

*«Nobody turns symbolic systems on or off, nobody commands them, they belong to nobody. Nobody can constitute or convert them by one’s own. And nobody exclusively defines the rules of their application»* (p. 251).

Applied in ambient things and embedded into the manner of operation of almost every social system, they are in this ability – like language – independent from concrete persons and systems<sup>9</sup>.

Our difficulty in dealing with ICT technologies stems from our “enchantment” from a long humanistic tradition. The “target course” of human sciences to escape from the pre-eminence of computers is still the human subject (Luhmann, 1998). One of the underlying illusions is that of knowledge as being independent of any perceptual, storage and dispersal media. Giesecke (2005) calls it a *«mangling sensitivity for the fundamental medial bondage of every type of information [...] our concepts of ‘knowledge’ and ‘learning’ have emerged in coevolution with those media our culture uses to store and disperse its knowledge»*. *«The present-day discussion about applying the new electronic media in school settings mistakes this relationship, when operating furthermore with those concepts of knowledge and learning which book culture developed to organize its own process of self-assurance»* (p. 18).

<sup>8</sup> The term “mediatedness” is an attempt to translate the German notion “Vermitteltheit” into English. Unfortunately, there is no direct equivalent term in any European language. As far as I see, also Italian terms like *mediazione*, *intermediazione* (or *tramite*) and respective verbal forms like *intercedere*, *interporre* or *mediare* share the same difficulty. See Rückriem (2010).

<sup>9</sup> For more, see Willke (1998a; 1998b; 2001) and Giesecke (2002; 2005).

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