SUSPENDING THE 'TIME DOMAIN'. Technological tempor(e)alities of media infrastructures"

[proposed paper for *Hardwired Temporalities* Siegen workshop (1st / 2nd June 2018) and book project]

## The non-human temporality of technological knowledge

In favor of a diagrammatic definition of technological media, media archaeology is concerned with media not only on their structural "hardwired" level but on their *operative* unfolding-in-time as well. This vector places it close to signal analysis. Any media event is a time function of signals.[1] In addition, the radical media archaeology of the present media-infrastructural condition can not be reduced to hardware analysis, but requires analysis of its mathematical, algorithmic operations.

Such an understanding of techno-temporalities does not focus on phenomenal effects of media on humans but primarily refers to the microregimes *within* technological devices. Complementary to discourse analysis, it listens to the implicit epistemic articulations and enunciations of infra-technical operations. In that sense, "hardwired temporality" does not simply refer to the infrastructuring of time by technologies, but in a media-epistemological sense, is concerned with the temporal structure as revealed from within techno-logical knowledge itself.

## The anonymous time-base of modernity: Clocking

In present information society (for which the Actor-Network-Theory admits non-human members), its time-base turns out as a critical focus of analysis. High frequency trading as data exchange, in the electronic stock market as well as in the communication sphere (the "Internet"), surprisingly recalls late medieval monasteries. A true media archaeology of technically temporalized infrastructures starts here and not in the short memory of the recent present. Benedictine monks which needed periodically exact clocking for prayers according to their monastic rules invented the escapement-driven wheeled clock.[2] The regular oscillation, subdividing movement into equal quanta, is a precondition not only for industrial production but "social media" communication as well. Within the von-Neuman architecture of current computers, the heart-beat of the time base enables exact synchronization of cycling units in data processing.

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1 "Zeitfunktionen der Signale": Karl Küpfmüller, Die Systemtheorie der elektrischen Nachrichtenübertragung, Stuttgart (Hirzel) 1974, 393

2 See W. E., Ticking Clock, Vibrating String: How Time Sense Oscillates Between Religion and Machine, in: Jeremy Stolow (ed.), Deus In Machina: Religion, Technology, and the Things in Between, New York (Fordham University Press) 2013, 43-60

The escapement-driven clock, though, has been invented anonymously.[3] Such temporality can not be reduced to the timeline of cultural history but rather finds "itself". There is a rather non-human temporality at work in the infrastructuring of techno-logical knowledge.

According to Heidegger, long before computing in the strict sense, information society already started with the modern *Weltbild*: with the measuring and numerical (scientific) approach to physical nature. An archaeology of the contemporary therefore starts with what in German is appropriately called "Neuzeit" in a double sense, since the new epoque starts with the mechanical clock itself. Marshall McLuhan, in media-epistemological terms, *recedes* even further below the clock technology, to the "technologizing" of the spoken word[4] by the ancient Greek vocal alphabet itself. It has been alphabetic writing which cognitively induced the analysis and synthesis of oral speech flow into discrete, digital units. Only when the letter (reduced to the max as binary information unit) is radically meaningless in itself, it enables all kind of storage, transfer and symbol manipulation (processing) of meaning. Once more, it is epistemologically remarkable that there is no way to inscribe this cultural technique on the historic timeline, since there is neither a precise date nor a known inventor.[5] Technological culture takes place in anonymous temporality.

## The non-sense of "time" for technological analysis

Technological media knows processual realities but not "time"; therefore the neographism "tempor(e)alities" is preferred in the subsequent argument which unfolds such media tempor(e)alities on three levels: first of all within technologies, when the micro-timing of signal transduction is crucial for the event to succeed at all; next there are phenomal affects and irritations induced by media events on the human sense of temporal experience; finally "deep" media temporality (logic and machine) turns out to be rather autonomous from the cultural imaginary of imaginary time aka "history".[6]

In that context, the very title of this volume *Hardwired Temporality* is a relief. Its ambition is not deep philosophical questioning of the nature of time; *temporality* is rather a term which names a couple of signal functions like the Delta-t, functions of signal processualities like transfer or delay, even storage. For the close analysis of contemporary media technologies, the *arché* is not in "time", but a cooriginality where "time" is suspended. Media archaeology is "radical" in the sense that it looks for roots not in "time" but in the technological event. There can be no infrastucturing of temporal orders but only infrastructures triggering notions of "time" as secondary effect. Here, the notion of time as *a priori* condition for perception (as defined by Immanuel Kant) does not count. If time counts here, it is in the precise sense of clocking

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3 See Gerhard Dohrn-van Rossum, History of the Hour, Chicago (University of Chicago Press) 1996

4 Walter Ong, The Technologizing of the Word, London 1982

5 See Barry Powell, Homer and the Origin of the Greek Alphabet, Cambridge (UP) 1991

6 See W. E., Chronopoetics. The Temporal Being and Operativity of Technological Media (2016)

which generates what Martin Heidegger denounced as "vulgar" technical time. In that sense, technical infrastructures are not "time"-based, but "time-basing". What has been decisive for digital computing in the singular machine, the more counts for interconnected computers. Communication is infrastructured not only materially by hardwired cables, antennas and data processing devices, and in the symbolical order by protocols and codes, but temporally infra-structured. Synchronization of internet traffic creates an artefactual tempor(e)ality, just like the introduction of a synchronizing master clock has been the condition of being for the impression of a universal "time" in nineteenth century. The master clock, in networked computing and communication, has imploded into a myriad of local temporal agencies. This temporal pattern is multiple and invites to replace transcendent signifiers like "time" by a plurality of more precise *termini technici*, practicing a language of analysis which by-passes outdated notions like "time" in the mediasphere.

Walter Benjamin defined the nineteenth century as the antiquity of the "now". Back to 1839, we are already in the actual "present" indeed, when Karl August Steinheil designed a time-keeping system for the synchronization of electro-magnetic external clocks which get their time impulse by a mechanical central clock whose pendulum triggers alternating positive and negative poled "time impulses" - an interlacing of time-keeping and telegraphy. Today, the radio time signal transmitter DCF77 (77,6 kHz) at Mainflingen synchronizes radio clocks wireless.

In a radically media-archaeological understanding, techno-logical infrastructures extend from material (technical) to mathematical (logical) grids, to the algorithms embedded within ubiquitous microchips. The imaginary unifying time axis is decomposed into a symbolic concatenation of programmed processes, patterned and interrupted by moments of the tempoReal. Aristotle has been radically media-archaeological in book IV of his *Physics,* defining "time" as resulting from measuring movement sequentially by numbers. Even etymologically, only from incisive cuts the notion of a temporal order arises.

## Functional timing in technology: synchronization

Rigid analysis of technology does not know metaphysical "time" but rather an ensemble of temporal operators. There is no given pre-existing "time" but rather an enforced timing, as expressed in the very constructive term of synchronization.

Edmund Husserls once phenomenologically described as mechanism of the inner sense of subjective time. Such a temporal horizon unfolding as extended present between re- and protention is radically "grounded" and de-metaphysicized when it comes to technological ensembles. Lewis Fry Richardson's once designed a (human) computing "forecast-factory" for real-time calculation of weather[7], connected to local weather stations in telegraphic

7 Lewis Fry Richardson, A Forecast-Factory, in: ders., Meteorology and numerical analysis, Cambridge / New York (Cambridge University Press) 1993, 219

"instantaneity". A central official maintains "a uniform speed of progress" for the individual partial calculations, "like the conductor of an orchestra in which the intruments are slide-rules and calculating machines" (ibid.). Pantoptically, "he turns a beam of rosy light upon any region that is running ahead of the rest, and a beam of clue light upon those who are behindhand" (ibid.).

In the meantime, human synchronization of human "computers" has been replaced by the cybernetic diagram of feedback circuits, replacing the central time control agency by a flexible automation where human monitoring itself becomes integrated into the circuitry. For a moment, technological utopia has become reality: the "Opsroom" for monitoring & control in Stafford Beer's Cybersyn computing structure in Salvador Allende's Chile 1971-73 for national feedback and control of economic data from state-owned factories. The data flow was based on a "Cybernet" teletype network, to be calculated by a central mainframe IBM 360 computer Cyberstride, and monitored by a collective of humans for positive or negative feedback. Human wetware is wired into the symbolic infrastructure for the option to interrupt and correct: suspending the time series generated by data.[8] The melodic re- and protentional "inner time consciousness" of the human individual (Husserl) is replaced by a radically "discrete" attitude which is the temporality of counting.

**The emancipation of technical timing from natural "time"**

Media culture is not shaped by a transcendent timeline but technologies themselves "shape" time (George Kubler). In the 1930s, the crystal quartz clock emancipated the timebase of technology from the astronomical "natural" reference - an epistemological break point. Within microprocessors, the timer chip 555 (IC) makes sense to the clock signals derived from the oscillating quartz within the computer main board.

Against phenomenological suggestions of endurance, a truly archaeological analysis of temporality is time-discrete. This imperative conditions the rhythmic bias of digital culture. As once expressed by Alan Turing himself, clocking is still the heart beat of structuring data processing from within.[9]

Against its meaning at first sight, "real-time" data processing is not about close to time but its actual negation. It replaces the familiar "live" signal transmission by a re- and protentional micro-time window of the present; telepresence (Heideggerean "Ent-fernung") becomes predictive coding, a mathematical *inbetween* of man and its physical environment.

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8 See Manuela Garretón / Diego Gómez Venegas, Towards an Archaeology of Media and Visual Languages, in: FabLab Santiago (ed.), The Counterculture Room. Pavillion of Chile at the London design biennale 2016, Barcelona (Ediciones Poligrafa) 2016, 108-127

9 Alan Turing, Lecture to the Mathematical Society on 20 February 1947, in: B. E. Carpenter / R. W. Doran (eds.), A. M. Turing's ACE Report of 1946 and Other Papers, Cambridge, Mass. (MIT Press) 1986, 111

Since 1970, UNIX-Time for operating systems and file formats in computers has been a system for describing instants in time, defined as the number of seconds that have elapsed since 00:00:00 Coordinated Universal Time (UTC), Thursday, 1 January 1970, not counting leap seconds. Because it does not handle leap seconds, it is neither a linear representation of time nor a true representation of UTC.[10] The *epoch* of the computational present starts here.

Since Unix version 6, Unix time counts seconds which have passed since 1st January 1970 00:00 o'clock UTC. This starting date is appropriately called "The Epoch". The Linux and Unix operating system subdivides the day exactly in 86400 Sec. But this chronotechnical regime does not itself tolerate for the interpolation of a leap-second according to atomic clock generated time keeping. A leap second is "occasionally adding a second to the Coordinated Univeral Time (UTC) system, familiar from current use to set our watches by radio signal transmission. Linus Torvald himself argued in favor of such time-critical syncopic interpolations in open computing systems as domain of the current techno-political regime.[11]

Occasionally, when computers have been forced to use the leap-second friendly UTC, such ruptures of the tempoReal crashed websites and confused airline departures. As well in 1999/2000, the Millenium Bug reminded that time within digital computers is logical, mathematical, not intuitive ("Bergsonean") time; counting dates is limited by the capacity of processor registers.

The tempor(e)ality of "online" timing actually escapes the historiographical timeline. Accurate timekeeping systems such as the atom-caesium clock embedded in GPS signal traffic are rather independent.

In computing science, the so-called "realtime" or the "physical" clock (as hardware) measuring physical time, differs from the logical clock (which is software); this causes the necessity to synchronize, in intervals, the realtime clock in computers with external time, by requesting time from *time servers* and then, by intelligent algorithms, equal the time delay in the Network Time Protocol NTP, based on IP Protocol and "Time Synchronization software.[12]

In October 1998, Swiss wachtmaker Swatch announced "Internet Time" which undoes the familiar differential time zones. Every day is devided into 1000 "beats", creating a new meridian in Biel, home of Swatch itself: the Biel Mean Time (BMT) as universal reference to InternetTime[13]. This is "an indifferent time, no longer the vectorial time of chronology"[14]. At that point, the familar historic *timeline* graph fails.

## The fuzzy present of Internet communication

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10 https://en.wikipedia.org/wiki/Unix_time; accessed November 3, 2016

11 See http://www.wired.com/2015/01/torvalds_leapsecond/?mbid=social_fb

12 See http://de.wikipedia.org, entry "Echtzeituhr"

13 See Geert Lovink, Net.Times, Not Swatch Time: 21st-Century Global Time Wars, in: same author, Dark fiber: tracking critical internet culture, Cambridge, Mass. (M. I. T.) 2002, 142-159 (152)

14 Loovink 2002: 143

Jack Goody once defined cultural tradition in implicitely technological terms as "delayed transfer". Media archaeology applies such terms from emphatic temporality to the analysis of the micro-temporal field unfolding within communication infrastructures. Any media archaeological analysis of technological communication infrastructures takes their increasingly time-critical nature into account. If "time" is not understood in a unifying metaphysical sense but in its Aristeotelean definition, it turns out as a functional plurality of signifying incisions and intervals.

What has once been electro-magnetic "live" radio or TV signal transmission in tele-communication, has been replaced by "real time" computation which dissimulates the belatedness of complex calculations of discrete pulse trains, in order to trap the human perception of the "present". In digital *online* communication, there is no transmission *in* time but a timing of data packets (datagrams) which are numerically time-stamped to avoid traffic congestion in the Internet.

In 1972, Bob Metcalfe developed a programm for computer networking (the Ethernet) named PING, for testing its inter-operability. A connection through the physical and logical network topology is opened in order to test if the addressee actually reacts at all. From that technical implementatin of a time-critical test, Vint Cerf developed the Transmission Control Protocol for the Arpanet in 1975, which precedes the actual Internet. So-called time-to-live and ping-to-death are articulations of Internet temporality. The past is not "imperfect" any more, but becomes "historical perfect", residually enduring within the present. The "residual" is still active, "not at all as an element of the past, but as an effective element of the present."[15]

Metaphors like "streaming media" are misleading in their suggestion of a temporal flow. Even with respect to the signal carrier (the "flow" of electricity) information depends on the digitally coded electrons. Where humans believe to communicate messages via digital channels, there is a non-human temporality at work: computer-to-computer-connectivities. Any political criticism of the micro-physics of power has to focus on the time-critical eventalities on the most physical level of the OSI network model.

Network culture is less about modernist clock time but more about latencies. The delayed present stems from the "hyperbolic temporalities of digitality"[16]. Speculative media theory asks experimental questions: What if data packets were humans, how (if at all) they experience time?[17] In Web 2.0 packet switching, before any kind of "social memory" is triggered, intermediary storage is a decisive and integral part of the technical transmission itself. The age-old contradiction between archive and transmission collapses in the delayed present. Before there can be any moments of short-time virtual

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15 Raymond Williams, Marxism and Literature, New York (Oxford University Press) 1977, 122. See Shannon Mattern, Deep Time of Media Infrastructure, in: Lisa Parks / Nicole Starosielski (eds.), Signal Traffic. Critical Studies of Media Infrastructures, Urbana / Chicago / Springfield (Univ. of Illinois Pr.) 2015, 71-93

16 As stated in a lecture by Jussi Parikka (Winchester School of Art), Of Queues and Traffic: Network Microtemporealities", on occasion of the symposium *Digital / social media and memory*, University of Glasgow, April 17th, 2013

17 Parikka ibid.

communities ("crowds", or even societies), data networks consist of distributed sparks of ultra-short retentions and protentions.

## Time-to-live and ping-to-death: Internet temporality

In times of Internet protocols McLuhan's thesis that the pace of electronic media changes the patterns of temporal perception requires a somewhat closer reading. What he has described metaphorially has become literally true. Time-critical processes take place in its most media-archaeological sense, that is: on the basic layer of bit transfer in the, the *physical layer*. This layer represents the interface of symbolic transfer to the material (or electro-magnetic) channel of communication (such as copper cables, wireless directions, light waves lines) and thus embodies very concretely the interlacing of logi(sti)cs and matter which is already implied in the term "technology". It is on this layer that the voltage level of what is meant to represent a logic "zero" and a logic "one" is being defined. The function of this bit transfer layer is in the transformation of signals within a physical transfer channel into information in order to be passed further to level two of the OSI system.[18] This identification of signals happens within the time-critical field, such as signal frequency and signal duration, sychronous or asynchronous clocking, and the decision on serial or parallel data transfer.

In communication networks topological systems are being appropriately expressed by hypertextual links, whereas time-critical processes rarely become apparent. The answer to this is the finding of a new term which does not nominate a new medium but declares the temporal mode of a mode its decisive media-theoretical criterium. "The real-time web is a set of technologies and practices which enable users to receive information as soon as it is published [...], rather than requiring that they or their software check a source periodically for updates."[19] The communicative practice of *instant messaging* belongs to this temporal field; im McLuhan's sense the message of the medium here is immediacy serving to create the illusion of a pseudo-copresence. This recent form of web economy is being defined by communication within the time-critical realm; cyber*space* as "docuverse" (Ted Nelson) is being replaced by an extremely speed-up information processing in cyber*time*.[20] The Internet thus turns out not to be just a topological extension of a generalized archive, but equally as a chrono-technical expression of time.

To reveal the time-critical *message* of the Internet use, a close look at time-critical operations on the physical and logistical level of the Internet is required, such as the "Ping" signal. Each data packet into which a document has been sliced is being observed individually; its transfer happens independent from its preceeding or successive packages. This procedure is radically time-critical since is takes place within the so-called Time To Live-field which defines the

18 Christoph Neubert, Elektronische Adressenordnung, in: Stefan Andriopoulos et al. (ed.), Die Adresse des Mediums, Köln (DuMont) 2001, 34-63 (41)

19 http://en.wikipedia.org/wiki/Real-time_web (Stand: 20. Januar 2010)

20 "Früher ging es um die Schaffung von Räumen [...], heute geht es um die Zeit selbst, um Chronos, um die Kunst der *longue durée*": Geert Lovink, Was uns wirklich krank macht, in: Frankfurter Allgemeine Zeitung No 140, 21st June 2010, 27 (referring to the media theory of Franco Bernardi)

maximal temporal duration in seconds an IP packet is allowed to exist in the Internet. A counter is progressively being reduced during this routing; in case the TTL-counter reaches zero before the packet has reached its destination, it is being annihilated.[21] Media time is not endless. In TCP/IP as fundamental network program, techniques of synchronisation meet a deadly economy of time. "Time to live" means that each data packet is assigned a given life span; "time to die" thus becomes a crucial signature of the information age.

But while phenomenology makes use of such neuro-cognitive diagrams in a convincing way (just like Husserl's "time diagrams" of perception of the present inbetween retention and protention), media archaeology tries to precisely identify the rather different operations of micro-technical signal transduction and algorithmic data processing. Humans and machines are different in their operative signal processing, resulting in different tempor(e)alities.

## (A)Temporalizing radio: infrastructures in wireless communication

The present can be analyzed only when it just starts to recede into the past. The concept of a "pre"history of the present technological condition does not only refer to a "before" in its temporally sequential, historical sense, but to its technological pre-conditions as well. This pre-structuring "before" endures or re(oc)curs in the present in non-linear modes. Media archaeological analysis, besides its apparent meaning of "origins" in the past, refers to a structural argument: the *archê* which is the insisting, essential features of a technological system. Heuristically, this means analytic reduction to the essential functions, the elementary bits, a rarefication against discursive redundancies.

All of the sudden, the "recent" is not past but a concealed retreat, the hidden, still co-present ground behind the apparent visible. The technological conditions takes place in intervals (*epoché*) where an established infrastructure remains valid across all apparent political, historical and cultural changes, like analog AM radio has endured almost technologically invariant for more than 80 years. Such intervals, as Delta-*t*, endure anachronistically (even achronically) when compared with the historical timeline. Public radio, in Germany, dates back to October 1923. As an independent media format, based in autonomous technological implementation, it apparently dies these years in its familiar AM / FM analog technology. A historic "timeline" representation of the heroic radio age is misleading. There is a re-entry of "radio" within mobile communication, not as program format and "broadcasting", but in its purest form as technical medium: wireless (German "Funk") electro-magnetic waves, this time: digitally modulated (mobile telephony, W-LAN internet access). In present mobile communication, there is more radio than ever, even if dissimulated as condition of possibility.

"Rather than wireless cities of wirless networks, it might be more accurate to speak of the rewiring of cities through the highly reconfigurable paths of chipsets."[22] In wireless communication, the infrastructure has become mobile itself. For wireless transmission of analogue signals, electro-magnetic

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21 Othmar Kyas, Internet: Zugang, Utilities, Nutzung, Bergheim (DATACOM) 1994, 65

infrastructures have been described as a sphere, as "acoustic space" by Marshall McLuhan, since its inherent message (its implicit "sonicity") has been the wave as temporal form. "Electric speed is approximately the speed of light, and this constitutes an information environment that has basically an acoustic structure."[23] In digital communication, this almost Heideggerean "Being" of electro-magnetic space[24] has been inverted from melodic tuning to pulsed rhythm. Eleni Ikoniadou's *The Rhythmic Event* (MIT press) conceptualizes digital events not as binary sequences of zeros and ones but instead as relational pulsation. This correlates with the notion of "algorhythmics" - the rhythmic processes of computational algorithms.[25] In that sense, hard-wired temporalities can never be reduced to (infra-)structures, but in reverse, they temporalize such structuring conditions (*l'archive*, in the sense given by Foucault's *Archéologie de Savoir*) themselves, "posting" infrastructures.

While the data processing microchips themselves are still hardwired infrastructures in themselves, the wireless signal transfer has become a dynamic infrastructure consisting of extremely volatile temporal objects: multiple radio-frequency waves, which are transduced in Digital Signal Processing devices embedded within mobile phones and other wireless communication devices. In order to exhaust the available channels for signal transmission in parallel (known from George Antheil and Hedy Lamarr's invention of "frequency hopping"), "[t]he designers of contemporary wireles DSP chipsets usually supply a palette of different hardwired algorithms alongside generic processors."[26] While most of the physical layer of information networks "is quasi-hardwired into semiconductor chips"[27], in order to facilitate algorithmic intelligence (or "cognitive radio") to unfold its micro-timecritical efficiency, its dynamic intra-structure is not "time"-based anymore in the ontological sense but an asynchronous grid of operative temporal actions like compressing movements into ultra-short slots. Such a mobile network replaces the immobile cables of Internet or telephone lines by a dynamic, in fact temporal grid for time-critical signal processing. Wireless communication is not simply a form of bridging spatial distances by electro-magnetic waves between antenna and receiver any more, but becomes primarily a function of intelligent shaping of signal events inbetween. The traditional linear medium channel becomes itself dynamical and temporalized, "synthesized by technical processes expressed in algorithms. These algorithms generate waveforms that support conjunctive pathways"[28] - that is, a mobile infrastructure, a new kind of

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22 David Mackenzie, Wirelessness. Radical Empiricism in Network Cultures, Cambridge, Mass. / London (MIT Press) 2010, 65

23 Letter to Barbara Ward, 9 February, 1973. McLuhan 1987: 466

24 See Rainer Bayreuther, "Phänomenologische Grundlegung" einer Disziplin, in: Heidegger-Handbuch: Leben - Werk - Wirkung, ed. Dieter Thomä, Katrin Meyer, Hans Bernhard Schmid, chapter 2.2 "Auf dem Weg zu einer Akustik des Seyns": 'Stimmung', 'Schwingung', und 'Harmonie' nach Sein und Zeit", Stuttgart / Weimar (Metzler) 2013, 509-512

25 Shintaro Miyazaki, Algorithmics. Understanding Micro-Temporality in Computational Cultures, *online* in: Computational Culture, Issue 2 / 2012 (http://computationalculture.net)

26 Mackenzie 2010: 72

27 Mackenzie 2010: 70

28 Mackenzie 2010: 67

ether. "Their interwoven texture creates an envelope that allows data to circulate in the crowded signal channels of urban-electronic space as if it were just noise."[29] Although this almost amorphous infrastructure is still grounded in conventional communication ingineering and technologies, in its essence it becomes more radically mathematized than even conceived by Shannon.[30] While the traditional radio wave has been a time signal, in digital processing it becomes decomposed in frequency values in order to be treated computationally. The time axis itself is techno-mathematically suspended when a waveform that varies over time is transsubstantiated into a set of component frequencies by Fourier transform; at the same time it allows for switching back from the frequency domain into the time domain. Such communication infrastructres oscillate between temporal and atemporal moments. Fourier transform is challenged by a structual incertitude either towards temporality or spatiality; in so-called wavelets, temporal linearity itself is suspended. For more efficient transmission streams of digital signals themselves become superimposed and enclosed in a signal envelope that looks like white noise, which is finally filtered back into a data stream. Temporality is just one (itself "ephemeral") function within such chains of operations. Efficient coding (convolution) has been developed to match signal errors and erroneous signal intrusions: "The stochastic chacter of the Viterbi algorithm [...] alters the terrain on which machine time moves."[31] What has once been conceived as moments "in time" becomes a function of irruptions of the tempoReal (an escalation of Norbert Wiener's notorious term "time of non-reality" for the switching momentum between binary states[32]). Far beyond the world of communication engineering, knowledge culture has to acknowledge this non-symbolic temporal quality, learning from media.

## Contemporary "media ecology" identified from within its temporal infrastructures

The often debated "technological determinism" in media analysis is infra-structual by necessity. This leads to a reconnaissance of both hardwired (materially embedded) and softwired (algorithmic) structures with govern media temporality from within. Media archaeology is a consciously *anachronistic* identification of con-temporary predefining states and layers of electronic media culture. The technological infrastructure of AM radio, for instance, endured for almost the whole 20th century, notwithstanding the political and cultural catastrophies occurring within that century. The endurance of insisting hardwired and softcoded technologistics creates a temporal interval of its own. As long as such an *epoché* is still in operation, its media are excepted from the transience of the historical event. Such a theory of media time does not only concern emphatic "deep temporality" on a grand

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29 Mackenzie 2010: 70

30 Claude E. Shannon / Warren Weaver, The Mathematical Theory of Communication, Urbana, Illinois (Univ. of Illinois Press) 1949

31 Mackenzie 2010: 80

32 See Claus Pias, Time of Non-Reality. Miszellen zum Thema Zeit und Auflösung, in: Axel Volmar (ed.), Zeitkritische Medien, Berlin (Kulturverlag Kadmos) 2009, 267-279

scale, but inversively re(oc)curs within the microscale of techological timing in the concrete circuitry of electronics itself.

Current intellectual discourse in "spectulative design" theory registers a current shift from progressive modernity to an *epoché* of contemporaneity where time is not an empty duration unaffected by the processes which happen within its technologies. On the extensive and micro-level of technological infrastructures, there is no homogeneous "time" but multiple and asynchronous tempor(e)alities, reminiscent of Ernst Bloch’s notion of “non-contemporaneous contemporaneities” ("die Gleichzeitigkeit des Ungleichzeitigen"). The infrastructures of technological contemporaneity is not a coming together of data in time, but of functional timings. Technological machine times challenge historicist notions of accumulative continuity. The concept of "media ecology" in that sense refers to temporal environments, of being in a clocked world, Heidegger's "Zeit des Weltbilds" taken literally.[33]

In media-archaeological terms, computational technologies, in the very essence of both components (*techné* as well as *lógos*), consists of *both* "hard-wired" temporality on the very infrastructual level of microchip circuitry, and of "soft-wired" temporalities resulting from what drives such machines: source code which concerns time-critial operations in computational languages such as Assembly. Micro-temporal physicality (the "real") is as much the object of media archaeological analysis as "the symbolic" ordering of signal series, the algorithmic logic of digital culture) - while the imaginary (*alias* "history") does not matter.

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33 See the Danish Research Fund project "The contemporary condition", University of Aarhus, 2015-2018, directed by Jacob Lund and Geoff Cox, and (related to this research project) W. E., The Delayed Present. Media-induced interventions into contempor(e)alities [*The Contemporary Condition* series], Berlin (Sternberg Press) 2017