MEDIA ARCHAEOLOGIES OF THE RECENT PRESENT

[Keynote to *Technopolitics Salon* "Media archeologies of the present", 28th January 2017, within the exhibition*Tracing Information Society – a Timeline*, at neue Gesellschaft für bildende Kunst (nGbK) Berlin, presented by *transmediale* in collaboration with the TECHNOPOLITICS working group (Vienna)]

While contemporary culture increasingly indulges in timeless ubiquitous computing, a media archaeology of our technological present reminds of its underlying technical and logical pre-conditions. Contrary to the intuitive understanding, "media archeologies of the present" is *not* about the most recent technological events which govern our contemporary techno-social condition. The printed timeline *Tracing Information Society*[1] starts with 1900. But when do media conditions "begin"? Any "media archaeology of the recent past" finds itself in a blind spot: The *archive* of the present, which in Michel Foucault's sense is the techno-logical *a priori* of multi-media enunciation, by definition is not accessible. The media archaeology of the present refers to technological infrastructures, not to narratives. Further entries in to the "timeline" will be proposed under that perspective, finally questioning the suggestive linearity of the "timeline" itself, in favor of alternative chrono-poetics such as algorithmic timestretching. My arguments will zig-zag back and forth on (and against) the *Technopolitics* timeline of information society, performatively opposite to a sequence in chronological order, resulting rather in the operation of the turingmachine key

Obscuring media technologies: Online communication and "cloud computing" as challenge to media archaeology

In times of so-called "social media" (where the "social" in fact is a function of nonhuman communication engineering), users do not care about the technological past in a historical sense. A different strategy therefore is to apply a media archaeology of the present. Even "cloud computing" still requires a close analysis of its underlying hard- and software, such as a reminder of the giant water cooling systems for hot data processing at the Google data centers in the European North.[2] In order not to let terms like "network" slip into pure metaphors, an analysis of its technical and logical infrastructure (which is optical fiber cables / protocols) needs to be as exact as the description of the electronic FlipFlop circuitry, the very condition for "binary" computing.

Even "cloud computing" in times of "social media" still asks for analysis close to the infra-structural data logistics.[3] Metaphors like the data "cloud" are literally obscuring, "cloudy" in both the thermodynamic and informational sense of entropy. The current fashion of so-called media-ecology puts a veil on the actual technological condition. Only a renewed *enlightenment* will - less

---

1   http://www.technopolitics.info/Timeline
2   Jennifer Holt / Patrick Vonderau, "Where the Internet Lives": Data Centers as Cloud Infrastructure, in: Parks / Starosielki (eds.) 2015: 71-93
3   As argued in Shannon Mattern, Deep Time of Media Infrastructure, in: Parks / Starosielki (ed.) 2015: 71-93 - even if the author traps into the metaphors of the archaeological "excavation."

allegorically - read the operative diagram of current Information Society like it used to open the black box of individual technologies so far. The *protocols* (Alexander Galloway) of Internet traffic are still there to be deciphered with media-philo*logical* competence in its most ancient sense of *logos*, that is: alpha-numerically.

While hardware- and code-focused knowledge of ubiquitous computing is still vital, what additionally has emerged is the necessity to identify the operative temporality of the World Wide Web, like the time-critical "ping" signal and UNIX time, as well as a neo-cybernetic model of the coupling of humans to algorithmic devices. The everyday cyborg is loosely coupled to communication devices, while s/he (or "it") becomes tightly coupled to microchip implantations. The tablet computer or smart phone (the neo-German "Handy") is not simply *ready-to-hand*; like Martin Heidegger's "hammer" (in *Time and Being*) any more; computational communication devices rather subject the human to their time regime.

"Media archaeologies of the present" as non-historicist diagnosis of Information Society

A media-archaeological understanding of techno-politics does not focus on phenomenological 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.

According to Michel Foucault, the present can be analyzed only when it just starts to recede into the past. The prefix "pre-" in the concept of a prehistory of the present technological condition does not only refer to a "before" in its temporally sequential, historical sense, but to the 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 temporal meaning of "origins" in the past, refers to a structural argument: the *arché* which is the insisting, essential features of a technological system. Heuristically, it means reduction to the essential, the elementary bits, a "rarefication" against discursive redundancies (Foucault).

A linear timeline misses the complex non-linear constellations which redefine the "recent" technological past. According to Walter Benjamin's *Theses on History*, the past "flashes" into the temporal now ("Jetzt-Zeit"). In reverse, the "Now" becomes antiquity almost immediately. The contemporary condition dates back to basic, recurrent technologies which are *recent* in the literal sense. German "rezent", as defined in the dictionary, in the biological context means "gegenwärtig [noch] lebend, auftretend oder sich bildend"; in Austrian use of speech, "rezent" means "zeitgenössisch, aktuell, vor Kurzem entstanden."[4]

---

4 http://www.duden.de/rechtschreibung/rezent; 27. Oktober 2016

Digitization means archaeologisation in the sense of mathematising the present. The Instant Archaeology Concept, connecting computer data bases with digital editing, has been developed by Michael Mikina and Francis Wittenberger for Digitale '98 festival at the Cologne Academy of Media Arts. The video material during the festival was recorded in a away that allowed for an individual editing in real-time.[5]

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. But again, a 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.

In present information society (for which the Actor-Network-Theory admits non-human members), time-criticality turns out as a central focus of critical analysis. High frequency trading as data exchange, in the electronic stock market as well as in the communication sphere (called the "Internet"), gets late medieval monasteries into the focus. A true media archaeology of the present starts here (and not in the short memory of the present timeline where the passing visitor is seduced to link his personal biographical dates with events of recent generations). But the central time base of modernity, the escapement-driven clock, has been invented anonymously in late Medieval times[6]; cultural techno-logics rather finds "itself". Benedictine monks which needed periodically exact clocking for prayers according to their monastic rules invented the escapement-driven wheeled clock. 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.

According to Heidegger, Information Society already starts 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-

---

5   On the concept of "instant archaeology", see Siegfried Zielinski, (An-)Archive. Die Abschaffung der Gegenwart und das Archiv der Zukunft, in: Bernhard Serexhe (Hg.), Konservierung digitaler Kunst: Theorie und Praxis. Das Projekt digital art conservation, Karlsruhe (ZKM) / Wien (AMBRA) 2013, 95-113 (100

6   See xxx Dohrn-van Rossum, xxx

epistemological terms, *recedes* even further below the clock technology, to the "technologizing" of the spoken word (Walter Ong) by the ancient Greek vocal alphabet itself. It has been alphabetic writing which cognitively induced "literal" analyzing and synthesizing of the 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. It is media-epistemologically remarkable that there is no way to inscribe this cultureal technique on the timeline, since there is neither a date nor a known inventor.[7] Technological culture takes place in anonymous temporality.

Further entries into the "Time Line"

- Media history usually dates cinematography back to 1895, with its first public screening (*The arrival of a train*) in Paris by the Lumiére brothers. But this vintage drama is not historical; in way, the train arrives again. In recent years, the "post-digital" in media art has been announced, such as the "archaeological" use of anachronistic media like early 16mm film - a retro-effect against digital atemporality, an archaic counter-practice.[8]

- In September 1919 Eccles and Jordan described the flip-flop in a brief one-page paper "A trigger relay utilizing three-electrode thermionic vacuum tubes"[9]. In the previous year (June 21, 1918), Eccles & Jordan *implicitely* invented the vacuum-tube based trigger circuit or multivibrator as circuitry which only retrospectively is identified as the "first" flipflop circuit, the basis for binary electronic memory. Media-archaeologically prior to the invention of electronic computing, Eccles and Jordan described their invention as a "method of relaying or magnifying in electrical ciruits for use in telegraphy and telephony". Implicitely, a flip-flop circuit embodies two stable states. It takes a timeline shift to link to Claude Shannon's "A Mathematical Theory of Communication" (1948) pointing out that a flip-flop can be used to store one bit of information and flip-flop circuits can operate symbolic algebra by Boolean two-valued algebra (AND, OR, NOT). "Using vacuum tubes as switches, flip-flops became the basic storage element in sequential logic used in digital circuitry, and the basis for electronic memory."[10]

Independently, in the early Soviet Union, Bonch-Brujevich in 1919 defines the same electronic coupling for radio signal transmission.[11] Such co-originality expresses a non-linear temporality of techno-logistical coming-to-articulation, subverting the timeline. Instead of a linear history of technologies, there is diagrammatic "path dependency" in technical individuation rather than the

---

7   See Barry Powell, Homer and the Origin of Writing, xxx

8 See Malin Wahlberg, A Relative Timetable. Picturing time in the era of new media, in: John Fullerton / Jan Olsson (eds.) 2004: 93-103

9 In: The Electrician, vol. 83, (September 19, 1919), 298

10   http://www.historyofinformation.com/expanded.php?id=4061; accessed November 3, 2016

11   See Nitussov / Trogemann / Ernst (eds.), Computing in Russia, Braunschwieg (Vieweg) 2002

linear timeline historiogram of technical evolution. If the analysis of information society is meant to be "traced" rather than narrated, media archaeography is required. There are temporal modalities, or time-scales, which escape the timeline, such as cyclical patterning of "techno-economic paradigms"[12] (so-called Kondratieff waves). Cultural experimentation and techno-aesthetic discoveries may be "out of sync", in relation to such long wave patterns of around 50 years. Such macro level cycles may be applied to techno-aesthetics, experimenting with alternative modes of writing history of media. The concept of techno-logical non-linear "path dependency" (as applied by Pinch / Trocco in their synthesizer-book *Analog Days*) recalls Fernand Braudel's triad of temporalities (immobile history on the geological or climate level, the *longue durée* of cultural time, and finally the event level. Media have their own time and temporality, rather in self-stabilizing intervals than as linear unfolding.

The timeline becomes operative when conceived like the "tape" of the Turing machine, scanning the entries and removing them back or forth as a function of the media-archaeological "program" table of media-archaeological reasoning. The very entry 1936 (Turing, "On computable numbers") will thereby transform into a write/read operation of the turingmachine itself : "Das Medienzeitalter, im Unterschied zur Geschichte - die es beendet - läuft ruckhaft wie Turings Papierband. Von der Remington über die Turing-Maschine zur Mikroelektronik, von der Mechanisierung über die Automatisierung zur Implementierung einer Schrift, die Ziffer und nicht Sinn ist [...]."[13]

The turingmachine scans an entry in a square from the paper tape, which in combination with the instruction by the command list results in a specific "m-configuration" at a given time[14]. "These events occur only at discrete 'moments' - between which nothing happens [...] like the ticking of a clock [...]."[15] = archival, symbolically ordered temporality, a kind of kinematographical apparatus where the read/write head takes chrono-photographic snapshots of the machine state.

This operation reenacts the early Mediaeval form of registering events (the Annalistic tradition as opposed to chronicles and historiography proper) conveys a way of experiencing reality not in terms of continuous but in discrete time[16], closer to state-based automata with discrete writing/reading of symbols on an endless memory tape (which is, of course, the diagram of the Turing Machine)

Media culture is not shaped by a transcendent timeline but technologies themselves "shape" time (George Kubler). In the 1930s, the crystal quartz clock

---

12 As expressed in Michael Century's forthcoming book on experimental media culture in Canada 1968-90 (contracted for publication with MIT Press)

13 Friedrich Kittler, Grammophon - Film - Typewriter, Berlin (Brinkmann & Bose) 1986, 33

14 William Aspray, John von Neumann and the Origins of Modern Computing, Cambridge, Mass. / London (MIT Press) 1990, 176

15 Marvin L. Minsky, Computation. Finite and infinite machines, Englewood Cliffs, New Jersey (Prentice-Hall) 1967, 12

16 Hayden White, The Value of Narrativity in the Representation of Reality, in: Critical Inquiry vol. 7 no. 1 (autumn 1980), 5-27

emancipated the timebase of technology from the astronomical "natural" reference - an epistemological break point.

More recently, "real-time" data processing 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 / environment

The timer chip 555 (IC) makes sense to the clock signals derived from the oscillating quartz within the computer main board.

Since 1970, UNIX-Time is 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. It is used widely in Unix-like and many other operating systems and file formats. Because it does not handle leap seconds, it is neither a linear representation of time nor a true representation of UTC.[17] The *epoch* of the computational present starts here.

The UNIX time-definition, developed 1969, became standard as POSIX. The first Unix clock counted in 1/100 sec.; 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 syncopic interpolations in open computing sytems which is the time-critical domain of the current techno-political regime.[18]

Consequently, after the creators of the POSIX standard simultaneouly forced computers to use the leap-second friendly UTC, in 2012 it 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. More independent are accurate timekeeping systems such as the atom-caesium clock embedded in GPS signal traffic.

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* (provided by the Physikalisch-Technische Bundesanstalt NTP time server (ptbtime1.ptb.de) and then, by intelligent algorithms, equal the time delay in

---

17   https://en.wikipedia.org/wiki/Unix_time; accessed November 3, 2016
18 See http://www.wired.com/2015/01/torvalds_leapsecond/?mbid=social_fb

the Network Time Protocol NTP, based on IP Protocol and "Time Synchronization software.[19]

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[20]. This is "an indifferent time, no longer the vectorial time of chronology"[21] - therefore the failure of the *timeline* graph.

- A media archaeology of the present is not only non-linear (in the sense of Manuel De Landa's proposal *A Thousand Years of Non Linear History* (1997), but even non-human. Providing insights into the non-human nature of technological tempor(e)alities is a specific interest of media archaeological sense of time.[22] "Media cross one another in time, which is no longer history"[23], but rather re-entries of past technologies within the new.

Between remake and re-mediation (Bolter / Grusin 1999), certain technologial media apparatus and artefacts sometimes reoccur; historicizing media analysis accentuates this *discursive* force, whereas media archaeology lets the non-discursive real of such processes speak. Media historiography semanticizes technological events, while media archaeology is the articulation of the indexical trace.

Telegraphy, for example, is not an outdated communication technology from the nineteenth century; beyond its obsolete technical implemenation in cables and electro-magnetic relays, its endurance is the "digital" *avant la lettre*, different from radio and television analog transmission inbetween.

Analog discrete-time signal processing is implemented in electronic modules such as the sample and hold circuits, analog delay lines, analog feedback shift registers as predecessors of digital signal procesing. There is a current re-entry of analog computing as mathematical modelling. An analog computer, modeling a real physical system, uses its physical quantities to represent the behaviour of another physical system, or mathematical function.[24]
 Even if it is obsolete in techno-historical terms, the analog computer media-archaeologically re-occurs in quantum computing, thereby questioning the linear timeline.

---

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

20 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)

21 Loovink 2002: 143

22 See Michael Goddard, Opening up the black boxes: Media archaeology, 'anarchaeology' and media materiality, published 28 April 2014 in the online journal New Media & Society, http://nms.sagepub.com/content/early/2014/04/27/1461444814532193

23 Friedrich A. Kittler, Gramophone, Film, Typewriter, Stanford, CA (Stanford University Press) 1999, 115

24 See http://en.wikipedia.org/wiki/Analog_computer; last modified 29. April 2007

Back to 1839, we are already in the actual "present"; Walter Benjamin defined the nineteenth century as the antiquity of the "Jetztzeit". 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 "wireless" to radio clocks.

- 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."[25]

In favor of a diagrammatic definition of technological media, media archaeology is concerned with media not only on their structural level but as well on their *operative* unfolding-in-time. This post-structural vector places it close to signal analysis. Any media event is a time function of signals - "Zeitfunktionen der Signale".[26] A radical media archaeology of the present technological condition is not about "dead media" in terms of obsolete hardware, but in a strict sense of mathematical roots.

- 1822: In terms of a media archaeology of the present Information Society, Joseph Fourier's *Theory of Heat* provided for the mathematical condition of techno-mathematical Digital Signal Processing. Fourier Transform converts a mathematical function of time into a new function whose argument is frequency counted in cycles per second (hertz)[27], thus transforming the time domain of a signal into its frequency domain which is discrete numerical values; discrete-time Fourier Transform facilitates digital storage and computation of physical (real-world) signals and their replay, since the operation can be time-inverted. Such high-fidelity reconstruction of time-reversed signals is not simply essential for audio and video reproduction technologies today; inquiries into the non-historical nature of media tempor(e)alities: Moebius loop like entanglement between the time and frequency, between analogue vibrations and discrete numbers, is the essence of a time machine which is physical and symbolic at the same time: *algorhythmics*[28].

---

25 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

26 Karl Küpfmüller, Die Systemtheorie der elektrischen Nachrichtenübertragung, Stuttgart (Hirzel) 1974, 393

27 en.wikipedia, "Fourier transform", accessed September 27, 2013

28 See Shintaro Miyazaki, Algorithmics. Understanding Micro-Temporality in Computational Cultures, *online* in: Computational Culture, Issue 2 / 2012

- After 1965, when James Cooley and John Tukey published a paper "re-inventing the algorithm of Fourier Transform and describing how to perform it conveniently on a computer."[29] Against its suggestive expression, Fast Fourier Transform is not simply an escalation of computational speed by resulted in a new quality in terms of Process-Oriented Ontology. FFT has been included in the Top 10 Algorithms of 20th Century by the IEEE journal Computing in Science & Engineering.[30] In principle (*en arché*), this algorithm, including its recursive application, was implicitely invented around 1805 by Carl Friedrich Gauss, who used it to interpolate the trajectories of asteroids. Published only posthumously, the recipy of Gauss' asymptotic computational time remained in latency; still it is implicitely operative in present ubiqutous computing. At that point, the suggestive timeline actually *mis*represents the archaeology of media knowledge.

- The domain name www.youtube.com was activated on February 14, 2005 and has since become the substitute for a missing audio-visual "library" of the WWW (no "archive"). In 1996, being aware of the accelerating obsolescence of Web pages in the Internet, Brewster Kahle started the Internet Archive http://www.archive.org which soon provided for an additional symbolic time machine: the Wayback Machine, implemented in 2001, which for an Internet address (URL) presents a chronologically ordered list of links to the same web page at different times.

The current Internet may be associated with previous communication networks like the horse-based postal system of the Persian empire (Innis, *Bias of Communication*) and the telegraph network in nineteenth century, a reconciliation of the high-technological present to the cultural past; radical archaeology of communication media concentrates on the non-linear discontinuities which challenge even the human as central agency of such processes. Paul Baran's proposal for packet switching distribution in the US military digital ARPAnet makes the decisive conceptual difference. Media archaeology is both about identifying the logical precondition and the actual escalation of such constellations.

Questioning the "Time line"

Let time "finally" fold the timeline upon itself, like a Moebius loop. The first timeline has been a diagram designed by the founder of graphical methods of statistics William Playfair, an engineer and political economist. the line, area and bar chart of economic data. Playfair's trade-balance time-series chart has been published in his Commercial and Political Atlas, in 1786.[31] But instead of being an external function of linear time, technology since has auto-poietically

---

(http://computationalculture.net)

29 https://en.wikipedia.org/wiki/Cooley%E2%80%93Tukey_FFT_algorithm (3-11-16)

30 https://en.wikipedia.org/wiki/Fast_Fourier_transform (3-11-2016)

31 https://en.wikipedia.org/wiki/William_Playfair; accessed Nov 3, 2016

generated its own "time axis" as differential signal in every oscilloscope to measure electrified time signals.

There is no time in a graphical timeline; this is a geometric spatialization, a visual suggestion of one-directional sequences of events. Temporal processuality is claimed here only symbolically, different from any physical or technical signal. In the physical world, the time axis is synonymous with the one-directional "time arrow" as defined in 1927 by Arthur Stanley Eddington.

With technological operations, we are actually within time, not in simply symbolic "historical" time. Symbol time returns with informational entropy.

The current Technopolitics Salon "Media archeologies of the present" primarily refers to "*Dinge die in den letzten 20 Jahren passiert sind*" (Armin Medosch); in a parallel Transmediale project, the present even extends to "100 years". The timeline is supplied with names, years, and subject headings. But the media-archaeological question is not primarily about "beginnings" and moments in the historic timeline, but rather the crucial epistemological and structural moments and momentum worth to be identified and analyzed.

Current intellectual discourse in "spectulative design" theory registers a current shift from modernity to an *epoché* of contemporaneity where time is not an empty duration unaffected by the events that fill it on a timeline; rather: "Time is ... multiple, and asymmetrical, neither homogeneous nor blank, and there are many different co-existing ways of being in time and belonging to it" – reminiscent of Ernst Bloch's notion of "non-contemporaneous contemporaneities" ("die Gleichzeitigkeit des Ungleichzeitigen"). The term 'contemporaneity' should not be seen as a simple periodizing category, but rather as designator of the changing temporal quality of the historical present, which is not simply a coming together in time, but of times (Osborne, Smith). Technological machine time challenges historicist notions of accumulative continuity. The technological present is increasingly characterised by a coming together of different, but equally 'present' temporalities or 'times'", induced by recursive random access memories. A dynamical concept of the very media that enable such contemporaneity is "media ecology" in the sense of temporal environments, of being in a clocked world, Heidegger's "Zeit des Weltbilds" taken literally.[32]

Google's N-gram viewer searches the full texts of some 15 million books for semantic terms and plots their frequency over a timeline. Alternatives to the linear concept of a techno-political timeline are foldings and recursions in the sense of McLuhan's *Laws of Media* ("Tetrads"); non-linear time is expressed as well in the Nyquist-criterium of physical equilibrium and the "chaotic" oscillations in the Chua electronic circuit; sociology of technology knows the diagramatic model of path-dependence.

_____

32 See the Danish Research Fund project "The contemporary condition", University of Aarhus, 2015-2018 c/o Jacob Lund / Geoff Cox

"Recursions fold time and thus enable direct contact between points and events [...] that are separated when history time is stretched out on a continuous line."[33]

In a "Timeline" of storage techniques from A.D. 77 to 2014[34], the chronological axis is boring; US computer industry privileges the linear outlook into an increasingly powerful future of storage media, instead of admitting the aporetic dead-end of Moore's Law ca. 2030. Moore's Law, the observation that the number of transistors in a dense integrated circuit doubles approximately every two years, has been formulated in 1965 to define the growth of processing power and memory capactiy in micro processors, in graphic expression on a timeline is a logarithmic function. The timeline of Information Society as archaeology of the present should be Janus-faced, anticipating the "future in the past" (*futurum exactum*) already for around 2030 as dead end. Gordon Moore, the co-founder of Fairchild Semiconductor and Intel, in his paper described a doubling every year in the number of components per integrated circuit; in 1975 he revised the forecast to doubling every two years. The very condition for Information Society has a sense of its own ending.

Non-linear, rather "epochal" media-archaegraphy is resistance against the narrative-linearity which seduces to interfere with biographical data by the spectator.

How do you draw time?", Rosenberg and Grafton ask in their 2010 study. The answer is on the micro-computational level. Here, contemporary information culture has the means to actually cope with temporal complexity. The "time line" concept which started with Playfair in eighteenth-century but is an out-dated way of symbolically reducing temporal complexity (Koselleck, Luhman) to linear history. The timeline as info-graphics on display here explicitely is a print-out on paper; this affords physical space experience; the time of reading can be controlled by the visitor him/herself like a museum walk, different to externally defined video streaming. The timeline privileges the visual cognition of techno-temporality; an alternative option is a truly time-based form of knowledge access: sonification, by parameter mapping of the data entries.

Already, a more complex interrelation between the components of the "Tracing Information Society" installation has been proposed by the "dynamic-abstract" diagrams developed by Doron Goldfarb with algorithms and codes: the data-aesthetics of "Digital Humanities", allowing for *n*-demensional analysis rather than focus on one-dimensional time line. Instead of the graphically linear time, an interactive diagram allows for "diffractive time" (Paula Barad).

Traditional stratigraphic time "exhibits succession but not duration"[35], but the more advanced so-called "Harris matrix"[36] for archaeological excavation of cultural sites puts emphasis on differential series rather than on geological layers. The temporal evidence for data on computer hard drives and storage

33 Winthrop-Young, op. cit., note 5

34 http://www.computerhistory.org/storageengine/timeline

35 V. G. Childe, A Short Introduction to Archaeology, New York (Collier Books)
    1962, 30 (as quoted in Kusch 1991: 8)

36 E. C. Harris, Principles of Archaeological Stratigraphy, London (Academic
Press) 1979

media is flat and rather archaeo-*logical* in the strict sense. It requires special software for an artifical chronological listing as "timeline" of all activities which have been enacted on such a data carrier, based on the analysis of file systems, log- and registry informations.[37] David Gelernter's candidate for replacing the current desktop metaphor is called "Lifestreams"[38]. Since December 15, 2011, the "timeline" has been the order in which all the content of Facebook users is organized and shown. But "within" the computer, "the writing head of a Turing machine inscribes symbols one by one in an infinite string, giving rise to time as a sequence-stream, exactly as in classical mechanics."[39] The turingmachine memory tape has replaced the linear timeline.

Against the phenomenological suggestions of intuitive, live-like continuity, a truly archaeological sense of time is "time-discrete" (Alan Turing writes in his ACE report): "We might say that the clock enables us to introduce a discreteness into time, so that time for some purposes can be regarded as a successiuon of instants instead of a continuous flow. A digital machine must essentially deal with discrete objects."[40] According to Turing, a most efficient device for intermediary storage of data in the electronic high speed computer, the mercury-based acoustic delay line, required clocking for a sufficient synchronisation of memory with the processing unit. The imperative to treat time as discrete, in digital computing, conditions the rhythmic bias of digital culture.[41]

Media archaeology is time-reversed analysis. Rather than nostalgically looking back to "dead media" as the fossils of past technologies, it attempts epistemological reverse engineering – a taking apart of contemporary technologies to see in them temporal superimpositions. Techno-logical traces of the past, in the current hardware conditions, are polychronic assemblages of past technical solutions with have actual effects on (literally con-temporary culture. Media technology does not ask for external discursive narrativization any more, but itself exposes its knots or folds of technical developments in its layers of engineering. Rather than being seduced by a linear, narrative timeline, let us attend for such unexpexted moments,.

Undermining the "timeline": Timestretching

37 See http://www.sleuthkit.org
38 David Gelernter, Machine Beauty. Elegance and the Heart of Technology, New York (Basic Books) 1997, 102
39 As summarised by Francisco J. Varela, The Specious Present. A Neurophenomenolgy of Time Consciusness, in: Jean Petitot / same author / Bernhard Pachoud / Jean-Michel Roy (eds.), Naturalizing Phenomenology. Issues in Contemporary Phenomenolgy and Cognitive Science, Stanford (Stanford UP) 1999, 266–316 (268)
40 Alan Turing, Lecture to the Mathematical Society on 20 February 1947, in: The Charles Babbage Institute Reprint Series for the History of Computing, Bd. 10, A. M. Turing's ACE Report of 1946 and Other Papers, Cambridge, Mass. 1986, 111
41 See Alan Turing, Lecture to the London Mathematical Society on 20th February 1947, in: B. E. Carpenter / R. W. Doran (eds.), A. M. Turing's ACE Report of 1946 and other Papers, Cambridge, Mass., et al. (MIT Press) 1986

It has been in musical notation (since Guido of Arezzo) that a symbolic "timeline" has been introduced which is quantized by interval marks of beats, with the notes on the y-axis being a function of the non-variable *t* which is the x-axis. Etymologically, *timing* itself means "dividing". The sonic "present" itself, taken at face value, becomes subject to micro-temporal manipulations. Karlheinz Stockhausen started his tonal compositions by phase-shifting of electric signals in the sonic "time field"[42].

The apparent linearity of time had already been irritated by Muybridge's and Marey's chonophotographical sampling of micro-temporal moments; temporal zigzags provided composers like Paul Hindemith with paradigms through which to explore the manipulation of both time and motion as infinitely divisible properties - the master paradox of Zeno's arrow as discussed film-critically by Henri Bergson in *L'Évolution Créatrice*. Hindemith's one-act opera *Hin und Zurück* (1927) plays with conceptions of temporal reversal. The music, running forward and backward, evokes such time axis manipulation.[43] *Online*-navigation in data bank, nowadays, leads to a permanent " re-programming" of the temporal entries ("Zeitstellen") on the historic timeline."[44]

A micro-"archaeology of the present" has been in(tro)duced by signal processing. Different from a linear timeline, the "time series" (Norbert Wiener) has become the central feature of signal analysis of the cybernetic present.

Once sound or light waves have been transformed into frequency values, computable reality results in "a quantifiable, nonhuman time"[45]; signal processing is independent of the narrative time line. "It is only with multimedia interface metaphors that the timeline has re-entered into computational space.

A further, "final" proposal points to limits of the visual timeline graphics itself, to be replaced the temporalities of "acoustic space" (McLuhan). Time warping and rhythm manipulation such as introduced in the audio engineering software packet Ableton Live, time stretching and time compression as introduced with the ACAI sampler, are operations introduced into audio engineering with the arrival of the digital sampler since the late 1980s. The sonic present can since be extended to the immediate past as "retention" or future as "protention" in Husserl's phenomenological terms, thereby technically emulating the human "inner sense of time" itself. While with the firmly inscribed phonographic groove of analog recording as material micro-timeline, changing pitch without affecting speed has been impossible, sono-poetical algorithms now allow to dis-continue the apparent temporal flow of time itself - resulting in an aesthetics of loosely coupled time as a key feature of our contemporary media condition.

---

42 Karlheinz Stockhausen, ... wie die Zeit vergeht ..., in: Die Reihe. Information über serielle Musik, no. 3, Universal Edition, Wien / Zürich / London (1957), 13–42

43 David Trippett, Composing Time: Zeno's Arrow, Hindemith's Erinnerung, and Satie's Instantanéisme, in: The Journal of Musicology, Vol. 24, Issue 4 (2007), 522–580 (paraphrased abstract)

44 Wolfgang Hagen, "Being There!" Epistemologische Skizzen zur Smartphone-Fotografie, in: Bildwerte. Visualität in der digitalen Medienkultur, transcript Verlag, Bielefeld 2013, 103-131

45 Kittler 1999: 170 f.