# „Unintended Information“ in Human-Machine Interaction

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**Abstract**

In this paper we discuss how far the concept of "unintended information" is an appropriate category for the analysis of Human-Machine Interaction phenomena. We first show that already from the engineer's perspective, contradictory intentions have to be considered at different levels of organisation of production. There, however, they are present more as "uninteded behaviour" or "unintended use". We show that the term "machine“ cannot be limited to technical artefacts of handy size, but with Factory 4.0, larger production complexes must also be subsumed under this term. This means that Human-Machine Interaction is directly encompassed by Human-Human Interaction, initially at the level of the human operators of such "machines". But it is actually the other way round, Human-Machine Interaction only become understandable from the perspective of such Human-Human Interaction. Human-Human Interaction here, however, are to be considered not on the individual level of single human operators, but as interactions of cooperative subjects at different levels of institutionalisation. The resulting planetary dimension of Human-Machine Interactions was already intensively addressed by Bogdanov and Vernadsky in the first half of the 20th century and played a central role in the cybernetics discourse in the second half of the 20th century. We recall those lines of argumentation.

**Keywords:** Intention; Uninteded information; Human-Machine Interaction; Human-Human Interaction

## 1 Introduction

This paper addresses the title of the Online-Conference *(Unintended) Information in Human-Machine Interaction* organised by the *Emmy Noether Research Group – Philosophy of Interaction between Humans & Machine* in April 2021. In the *Book of Abstracts*[1] of the conference, almost all contributions refer to a problematic concept of machine in the tradition of a peculiar argumentation in which machine individuals interact with human individuals. Such an individualistic instrumental dimension does underestimate cooperative use of tools and the more their cooperative production based on the division of labour. Of course, the authors embed this problematic concept in the human social structure, the SOCIAL [4], and argue about needs and transformations of this SOCIAL across various dimensions up to ethics and morality. Nevertheless it remains unclear what "intentions" are, how they are constituted and what is consequently to be named "unintended", even though the term is in brackets in the title of the conference and in quotes in our heading.

[1] https://interactionphilosophy.files.wordpress.com/2021/04/book-of-abstracts_final4.pdf

The only thing we have read out from these conceptions is that the flow of information in Human-Machine Interactions – "intended" as "unintended" – seem to be largely directed to guarantee or restrict the freedom of action of human individuals. Although Human-Human Interactions certainly precede those Human-Machine Interactions a certain "autonomy" of the machines is presupposed, as if the machines pursue their own purposes and intentions independent of humans and realise them in an algorithmic-automatic, ultimately "inhuman" way. But is it not precisely the question of the genesis of technology and its forms of Human-Human Interactions that such a conception must address? Technology cannot be meaningfully reduced to an artefactual dimension, but always includes interactions between people. At least in the understanding of the definition of technology given by the VDI – the German Association of Engineers – in their Guideline 3780 [22].

Also, most authors seem to assume that Human-Machine Interaction in the digital age is a new topic, which is shaped basically by algorithmic questions as discussed, e.g. in *Algorithmic Cultures* [18]. This leaves concepts as Stalder's *Culture of Digitality* [20] or Schetsche's *Digital Knowledge Revolution* [17] unnoticed in the new Human-Machine Interaction debates. Their notion of culture can neither be reduced to an algorithmic nor to a pure informational one. The more, considerations from the 1960s on *Cybernetic Machines* seem to be of archaeological interest only and their more comprehensive concept of machines are no longer connectable in modern discourses.

In this article, those roots will be excavated once again. We think that these concepts are worth re-reading because the problems at hand have already been considered from a perspective that avoids the above-mentioned shortcuts. In a first section we deal with the concept of machines from the perspective of engineering. We argue that a notion of machine misses the point which does not at least implicitly takes into account the planetary dimension of the Human-Machine Interaction. In a second section we discuss some consequences of such a global perspective and its relation to different "unintendednesses". It turns out that this leads to a principal epistemic problem of the relation between technology and reality. In a third section we discuss the historical development of attempts to address this epistemic problem in the scope of systemic concepts. We shortly grasp the historical genesis of the co-evolution and relationship between the mechanical (the machinic) and the "organismic" in 300 years of scientific and engineering development. We start from Offray de la Mettrie's *Man a Machine* and the chess-playing *Mechanical Turk* and continue to the transformation of the manufacture into the factory system in the mid-19th century and the modern Factory 4.0. The Factory 4.0 can be considered as a large machine in its own. Nevertheless it does not function as autonomously as occasionally assumed in certain theoretical explanations. It is not just a big machine, but a mirror of the Human-Human Interactions. We use an appropriate system concept as developed in [6] to show that today's digitality is a global phenomenon that cannot be reduced to algorithmic issues or information flows.

## 2 Human-Machine Interaction – The Engineer's Perspective

Let's start with an example, with a *use case* in the language of engineers.

The customer (you, a philosopher) comes to the expert (me, an engineer) with a broken device.

"Can you help me?" As an ardent follower of the moral principles of the GNU Manifesto[2], I am of course happy to help my friends and neighbours with their problems free of charge. "Let me see, what happened?" You explain the circumstances to me. I throw my hands up in horror: "Didn't you read the f... manual? You must never use the device in this way!" You: "But we've been using it like that for a long time and had never any problems, until now". A little interim conclusion: We are talking about *unintended use* and *unintended behavior*, but *unintended information*?

So I take my diagnostic tool to extract the data from the memory of the device (hereafter we use the term "brain" – mostly without quotes – as a data memory and not as a neurological unit).

**Variant 1** (in my experience not very typical for philosophers): The "brain" is empty. Me: "There's nothing recorded on the data memory." You: "Yes, I turned off this recording function out of fear for the privacy of my data." Me: "If I don't even have the data that is indispensable according to the state of the art, I can't help you. Buy a new device."

**Variant 2**: The data can be extracted from the memory, I start the repair and after a while the device is up and running again.

Now let's have a closer look at the flow of information between me and "the brain". More precisely, there are two such information flows – the first from the "brain" to my diagnostic tool and the second from my diagnostic tool to me. Of course, privacy plays a role if data about your weeks of use of the device are considered, but who owns the data we are talking about? Do you own the data or the device, the "brain"? After all, you didn't collect the data, the "brain" did. You can of course object that this was *completely intended*, but what does that say? There are many other "brains" out there – technical and human ones – that observe you every day (like the "brain" of the device), collect data and make up their own minds about you. *Self-impression management* is a tedious business.

At least the information in question is now not only in the "brain" of your device, but also in the "brain" of my diagnostic tool and I have seen *unintended information* about your lifestyle. Fortunately, I promised you not to gossip about this.

But what about the diagnostic tool, where did I get it and how is it connected to the device which I examined with it? Both obviously belong to a larger productive context in which you (as a customer), me (as an unpaid service partner) and the producer of the device and the diagnostic tool play a role as *independent third parties*. The device and the diagnostic tool are obviously pieces of equipment that have been manufactured by the producer in larger quantities according to a specific design. Devices are used by customers, diagnostic tools by service partners, but diagnostic tools only exist because customers occasionally have problems with their devices and then go to the service partner for help.

So our (you and me) specific service relationship is just one among many, and each of the service partners uses standardized tools and procedures to track down the problems. Over time, it turns out that some problems reoccur. For example, customers use the device in a specific way that causes problems over and over again. But even after this is now written in bold face as a warning in the f... manual, these kinds of problems still don't stop. Fortunately, they can be easily fixed by experienced service partners if the data memory can be read out.

Of course, problem classification is only possible if the service partners exchange information

[2] `https://www.gnu.de/documents/manifesto.en.html`

about the problems, preferably not just fragments, but the *complete information.* Then we can all improve the products together (first and foremost the producer, of course) and the customers are more satisfied. You guessed it probably already – the *complete information* about my service case has my diagnostic tool, not me.

Should the customer have a right to object? This is a difficult question e.g. for car manufacturers. It is less about autonomous driving than about the multitude of driver assistance systems (the brain of a modern car) and the Chinese (or whatever) competitors, which are not plagued by moral scruples and thus improve faster. Morality as an obstacle to success in market competition, so to speak.

The information – intended as well as unintended – converges in an even larger brain, the brain of the company that produces these devices. Does this mean we are leaving the Human-Machine interaction area? That depends on how exactly Machine is interpreted.

What is the quintessence of our thought experiment? We see that in a concrete use case the concept of machine quickly unfolds into several contradictory dimensions.

How have these contradictory dimensions been dealt with so far? Machines exist since ancient times, but the machine age or industrial age (I do not differentiate that here) is usually only referred to as the period from the middle of the 19th century onward. In those times machines were technologically developed in a systematic manner and used in a dominant way in the organisation of production. In particular, machines were produced by and using machines. With Industry 4.0, the "automated factory" is the vision, i.e. the *perfected machine producing machine.*

Under such real-world conditions, it will therefore be problematic to reject a conceptualisation in which the modern factory also passes for a machine. This idea was already formulated 150 years ago:

> Once adopted into the production process of capital, the means of labor passes through different metamorphoses, whose culmination is the machine, or rather, an automatic system of machinery (system of machinery: the automatic one is merely its most complete, most adequate form, and alone transforms machinery into a system), set in motion by an automaton, a moving power that moves itself; this automaton consists of numerous mechanical and intellectual organs, so that the workers themselves are cast merely as its conscious linkages. [12, ch. 13]

In the engineering domain we are more cautious and use the notion *technical system* instead of machine. This term is also controversial, as it quickly becomes clear that there are actually only *socio-technical systems.*

Ian Sommerville [19] starts with the *concept of a system* as a "meaningful set of interconnected components that work together to achieve a specific goal". A technical system is part of a *world of technical systems.* From the perspective of such a system, the neighbouring systems appear as Black Boxes, of which only "meaning" (in the form of a *specification*) and "goal" (as *provided function*) are known in the given context. The system itself is seen as a White Box whose functionality has to be designed, modelled, implemented, integrated and tested before the system can go into operation. Nevertheless, the neighbouring systems are more than Black Boxes, because the system not only accesses neighbouring systems through interfaces, but is also dependent on the promised performance being made available via these interfaces at the right time [5].

Sommerville proceeds with the *distinction of technical and socio-technical systems* as follows

> **Technical computer-based systems** are systems that contain hardware and software components, but not procedures and processes. ... Individuals and organisations use technical systems for specific purposes, but knowledge of that purpose is not part of the system.
>
> **Socio-technical systems** contain one or more technical systems, but beyond that – and this is crucial – the knowledge of how the system should be used to achieve a broader purpose. This means that these systems have *defined work processes*, *human operators* as integral part of the system, are *governed by organisational policies* and are affected by *external constraints* such as national laws and regulations.

This already complicates Human-Machine Interaction issues. What does it mean to interact with such a "machine" with human operators as an integral part? What does it mean to convince the human operator to fulfill my needs, even if "the machine does not want this", i.e. the *defined work processes* and *organisational policies* do not provide for this?

Ian Sommerville continues with three *essential characteristics of socio-technical systems*:

1. They have special properties that affect the system as a whole, and are not related to individual parts of the system. These special properties depend on the system components and the relationships between them. Because of this complexity, the system-specific properties can only be evaluated when the system is composed.
2. They are often not deterministic. The behaviour of the system depends on the human operators and on other people who do not always react in the same way. Also, the operation of the system can change the system itself.
3. The extent to which the system supports organisational goals depends not only on the system itself. It also depends on the stability of the goals, the relationships and conflicts between organisational goals, and how people in the organisation interpret those goals.

In this context, there is a clear shift on the scale of controllability and intentionality to intrinsic laws of movement within a given context. This shift to a movement according to intrinsic laws ("natural processes") is even more noticeable in **socio-economic systems** with a large number of stakeholders with differing interests or in **socio-ecological systems**, see [6].

What can be taken from this view of the engineer and computer scientist? There are few differences between planning and implementing of small and large machines. The *large machines*, industrial plants as real-world unique specimens [5], are characterised by a highly contradictory entanglement of processes of different spatial and temporal dimensions. This entanglement of processes is multidimensional, not artefactual and not reducible to flows of information only. This shows once again that the concept of machine mirrors Human-Human Interactions.

What do the discourses from Information Engineering offer in this regard? Sommerville, as a prominent representative of his discipline, very definitely points to the global dimension and determining role that Human-Human Interactions play in all phases of Software Engineering.

## 3 The Human-Machine Relationship

In the previous section it was shown that the Human-Machine relationship has a global component. This insight is not new – V.I. Vernadsky, one of the world's last universal scholars, further expanded this approach in his Nooshpere concept. Of particular importance is his work *Scientific Thought as a Planetary Phenomenon* [23], written at the end of the 1930s.

What are the conceptual foundations and approaches for grasping this dimension of the topic in the shift towards a digital future? Is there a need for a *Cybernetic Anthropology*, as Karl Steinbuch [21] brought up at the time, or rather a *Cybernetic Sociology* in the sense of Stanislaw Lem's *Summa technologiae* [9]?

In the sense of the system concept developed in more detail in [6], the Human-Machine relationship is a *system* with its own concepts, terminology, forms of movement and laws, see e.g. [10], [2], [3], [14], [16]. What are consequences of the *emergent character* of such a system, the "special properties that affect the system as a whole, and are not related to individual parts of the system" [19]? This imposes the impossibility to get all important systemic aspects from an analyse of the parts of such a system only. Even a synthesis of these details is insufficient to grasp that emergent character. On the other hand there is no other way than through such an analysis and synthesis in which partial truths are worked out only to be discarded later on. The systemic concept attempts to process this epistemically challenging dialectical contradictoriness by *contextualisation* and *reduction to the respective essentials* [5].

In such argumentation, *unintended information* primarily appears as *unintended effect.* Engineers have their own systematic methodologies to handle such contradictory requirements, for example TRIZ [1], [8], [11], [15]. In TRIZ such *unintended effects* are thematised as harmful effects and constitute a basic building block of its contradiction-oriented solution strategies.

Unintended effects of geostrategic significance occurred, for example, in the technologisation of cotton production in Central Asia in the second half of the 20th century. Excessive water extraction from the two central rivers Amu Darya and Syr Darya led to increasing drying up and silting of the Aral Sea, and the natural effects released by wind and salt led to massive salinisation of the region's soils. But even after information about those connections has become well known, there is no improvement in sight. Efforts fail on the one hand due to political power constellations and on the other hand due to the inherent times and dynamics of the influenced natural processes affected by that *Human-Machine.*

However, this is a general problem – "unintended" information leads to time-critical "unintended" effects. The later discovery of those connections in the course of comparing justified expectations with experienced results meets an already changed situation. The same phenomenon of inability to act in "controlling the machine" despite the availability of comprehensive information also plays a role in the issue of climate change, and even in the case of the corona pandemic. The invention, production, global distribution and application of vaccines in this last case illustrates the extent to which modern industry is deeply preconditioned, both scientifically and technologically. Even if information (about the production of suitable vaccines) and political will (to make everyone an offer of vaccination) are finally present, the realisation encounters problems with inherent eigentimes and dynamics to "trim" the "machine", i.e. the process of practical establishment of suitable production capacities.

In this systemic understanding, harmful effects are defects that stand in the way of the Ideal

Final Result (another central TRIZ concept). Such defects can have various causes. Most of them can be identified and eliminated within the framework of ARIZ – the algorithmic procedures proposed in TRIZ. "Uninteded information" often points to the problem that the separation of context and reduction to essentials underlying the concrete system design is not adequate to the problem. In this case, the transition to a supersystem is required, which also includes the source and the flow of the "unintended information", combined with a possible later refocusing of the modelling.

The self-similarity of the systemic concept is well suited to formulate such a hierarchisation and at the same time processual binding through hierarchies on different scales in a methodologically uniform way. A scaling of environment-system relationship plays an important role especially in socio-ecological models [7]. Such multi-scale systems are at the same time necessary to express the contradictions between context and internal system dynamics. The "machinic" character of every adequately modelled ecological system has active Human-Human Relationships, i.e. Human-Human Interactions, as its "environment". Thus, Human-Human Interaction is the decisive point in order to understand the "concept of machine" adequately at all.

## 4 On the Relationship between System and Reality

In this section, the contradictory relationship between system and reality in its historical development will be examined in more detail [6, ch. 4].

A fundamental problem of human negotiation and decision-making structures is the question of how we can adjust the diversity of *views on the Reality* (the "World(s)") with the *unity of the Reality itself*. What is really happening is not directly accessible to us through language, but only via co-operative forms of language practices that compare the justified expectations with the experienced results. In this sense "the world as reality *for us* is reality in the process of conceptual apprehension". And in this sense we will use the terms *world* (in plural) and *reality* (in singular) in the following considerations.

The *concept of system* tries to bring this connection between views and reality itself into a language form and thus develop its *concept of holism*. Let's look at how this connection has developed over the last 300 years. Five essential development stages can be distinguished in the period under review.

**1.** At the transition from the 17th to the 18th century, the following point of view (e.g. Leibniz) prevailed: The wholeness of the world (here as *reality*, a distinction between world and reality was not made at that time) can only be grasped from an internal perspective, because the world moves out of itself and within itself; there is *no outside*. This rejects the proof of divine creation as a claim because this idea hindered a further development of technical possibilities of the human. This approach is in a certain sense already present in Archimedes' position that he only needs a fixed point outside the world to unhinge it.

**2.** From the end of the 18th century the wholeness of the world becomes postulated as a unity of reality, which is, however, practically accessible only through description forms of practical planning. That's why the wholeness and unity of the forms of description has to be considered. To incorporate the irreconcilable contradiction between forms of description and reality into the forms of description the terms *system* (with a claim to coherence) and *organism* (as principally incomplete form of description of parts of reality) were distinguished. The systemic world is accessible to a (constructive) notion of technology, but not yet the organismic one. However, experiences from that mechanistic-technical world are transferred to the forms of description of these "organisms" with corresponding consequences also for an image of man, see for example (as an early publication of the period) *Man a Machine* by Julien Offray de la Mettrie.

**3.** From the end of the 19th century, for example, energetic experiments are carried out with *organisms* so that the forms of description of organisms themselves are subject to a rational-critical refoundation. They are analysed with the means of the mechanistic-technical world of systems. In addition to the speculative-inductive method of generalizing observations a symbolic-deductive method is developing, in which logic and mathematics as completing tools are brought into position for theory buildings with holistic claim. These *closed theories* justify

(a) a new argumentative tradition of the relationship between induction and deduction (funding a term of science in the widespread in the Anglo-Saxon language area meaning) and
(b) a division into individual sciences, whose representatives like to mix up the internal (deductive) claim of completeness of their theory building with the old (inductive) claim of developing a World Description (Naturphilosophie, empiriocriticism).

**4.** In the first half of the 20th century, these two lines lead to the schism in *science* and *humanities*. Let's pursue the line of *science*, in which the more interesting developments of language forms occurred in which the contradiction between the theoretical completeness of the theory body and the wholeness and unity of reality evolved.

The first thing to be mentioned here is the attempt to resolve this contradiction by simple identification of the poles: Russell, Hilbert, Bernays et al. tried to show that with the demand of completeness of a theory the holistic nature of reality can in principle be captured in language form. This attempt fails however, with Kurt Gödel, already on the first serious question: Is the theoretical tool to be developed suitable to ensure the demanded unity at least in application to itself? The baffling answer isn't just "no". The answer can even be proved with the means of that theoretical approach, and therefore is not of speculative, but deductive type.

On the other hand, domains (individual sciences) are evolving in which specific balances between speculative and deductive approaches are developing. The claim of completeness obtains in such a way an intra-disciplinary socialisation-based institutionalisation (domain logic). These *domain logics*, paradigms in the terminology of T.S. Kuhn, are in turn subject to dialectical development processes up to "scientific revolutions" (Kuhn intensively investigates such *paradigm shifts*).

A third line of development starting at that time is the beginning *technisation of science* in the sense of a technical tool support of test set-up structures up to repetitive processes within those language forms of mathematical-deductive reasoning. This is founded also theoretically.

Turing picks up older approaches (calculating machines by Leibniz and Pascal, the *Analytical Engine* by Charles Babbage and Ada Lovelace) in the theoretical concept of the Turing machine (1936).

The Turing machine is also a *Gödel machine*, because it implements Gödel's incompleteness approach as machine: the infinite input band leads to an infinite sequence of inner states, *repetitive* state structures are tied to repetitive inputs and can be realized already within the narrower class of push-down automata.

**5.** Since the 1960s, this instrumental setting of mathematical-deductive approaches continues to expand in cybernetics, regulation systems, AI, automation technologies, etc. Tool support in automation technology is, however, significantly older. Mechanical regulations have existed since thousands of years, the use of complicated, mechanically based process controls accompany the automation technology since the beginning of industrialisation in the middle of 19th century, upto the first computers. Zuse's Z1 (1937) still uses completely such technology and even Zuse's Z4 (1945) was – after transition to a technology with electro-mechanical relays – only half-hearted "electrified".

The entire engineering concept of a (global) *state of the art* is basically founded on such a mathematical-deductive claim of unity, which is, due to the principal orientation of technology at *solving problems*, interdisciplinary. But the *mathematically-deductively justified* claim of completeness of each individual science can be brought together in such an interdisciplinary frame only as a *socio-practically justifiable* claim of unity. With the progressing penetration of our mode of production with practices founded on scientific languages and progressing technologisation thus the dialectical contradiction between the variety of (now instrumentally highly charged) *worlds* (of the individual sciences) and *unity of reality* is reproduced on a new level.

The mathematical-deductive approach as increasingly guiding principle in the individual sciences as opposed to speculative methods is (still?) reaching its limit in the interdisciplinary field. However, it is not the *search for truth* in a positivistic understanding of science that drives engineers, but *efficiency* and *practicability.* The problem-specific separation of holism into system and viable context dependency are proven means of reducing the complexity of requirements in modelling and substantiates the efficiency of systemic considerations.

Axiom systems of *logical* reduction in mathematical-deductive approaches are thus *not universal*, but must be contextualised (in models) for the respective application. The Renaissance still regarded mathematics as a universal instrument of quantification, as the *language of the universe.* In modern science, mathematics is no longer the language of the universe, but "only" the *lingua franca*, the language of science. In applications, it must be adapted to the *respective context* of the calculus of engineering disciplines. Context, however, is already adaptation itself, so it is a matter of adaptation to adaptation in various intrinsic systemic dimensions. Here, multidimensionality and entanglement of a "machinic" world are present anew.

It is not decisive what is the system or our machine, but it is about an appropriate *understanding of the context.* That is, for the concept of technology and machine, not the Human-Machine Interaction is decisive, but understanding of the modes of Human-Human Interaction in the respective field of engineering and modelling.

## 5 Conclusion

The Human-Human relationship is not to be misunderstood as a reduction to an Individual-to-Individual relationship, but rather as relationship between different institutionalised forms of cooperative action by people. In modern society, this cooperative action of skilled and charged with responsibly subjects is embedded in technicality, which we define as a triad of

- socially available processual knowledge,
- institutionalised cooperative procedures and
- private procedural skills.

Technicality in that sense shapes the highly organised mode of production based on the division of labour in a modern society [6].

This problematisation is by no means only of academic interest. In a high-tech society in which purposeful tool based action is the basic form of practical doing, it is always the question what and who is subject and what and who is object or – in terms of TRIZ – what is tool and what is product. Designing affects people, hence (in *this* logic of action) people always are not only subject but also tool and product of action. Also TRIZ perpetuates the approach to take an external point of view in the *action planning* to “unhinge the world” in the execution of the action like Archimedes. After the five stages of development of systemic thinking over 300 years we actually gained nothing *in this basic question* and remain on the level of speculative social theories, such as Talcott Parsons’ AGIL approach [13].

But we learned that every system theory has to face five problems:

- Problem 1: What is inside and outside?
- Problem 2: The system structure. What is input and output?
- Problem 3: Development of a viable concept of information on a systemic basis.
- Problem 4: What then means sustainability?
- Problem 5: The political dimension.

The struggle for a viable notion of system thus is part of the struggle for a reasonably powerful language to describe the design and decision-making processes of the civil society. On the way of strengthening the symbolic-deductive basis of this language as the foundation of a scientifically and technically constituted modern mode of production, it is *on a first level* important to justify the *meanings* of terms. On a *second level* the bundling of terms in practical important *systems* (ontologies[3]) is important. They appear as language component of approved and institutionalized practices and procedures. The relationship between the two levels is synergetic: The available terms limit and enable practices on the level of the system, conversely, terms continue to develop in the context of systemic practices. This can be brought on the following point: The meaning of terms is their use. Term and system are thus in a reflexive relationship, which defines our power of action.

In this sense, also terms/systems on the one hand and sustainability on the other hand are in a synergetic relationship. We don’t just have to learn to incorporate thinking in cycles into our instrumental approach, but rather to *transform the instrumental thinking itself into a cyclic process.*

[3] `https://lod-cloud.net/`

This means

- It is not about Human-Machine Interaction, but about Human-Human Interaction.
- It is not about Human-Human Interaction in the sense of a Individuum-Individuum Interaction, but about cooperative action.
- Cooperative subjects have goals and interests. Individuals are part of many such cooperative subjects and thus Humans are inherently multidimensional and intersubjectively entangled.
- "Uninteded" information is an expression of the ambivalences and openings of meaning in our communicative practices.
- No theoretical approach should reduce a human being to an algorithmic core. This corresponds neither to human's way of speaking nor to human's way of acting.
- It is a bad idea to reduce the *Culture of Digitality* to an algorithmic culture.

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