Hybrids in public administration -
on technological mediation

Mogens Lilleør

Abstract
This paper presents a number of empirically based insights in digital mediation of knowledge production and the mediations importance for productivity, product quality, collaboration and the individual.

It makes good sense to consider employees as hybrids or collectives consisting of something human and something non-human. The paper presents examples of the very close relationship between man and technology. The professional and personal identity of the employee are often closely interwoven with the system expertise the employee has as user of digital technology. The connectedness represents a clear strengthening of agency, but at the same time vulnerability due to system dependencies and an immense complexity. Workplace digital technologies become engines of change due to system upgrades, system acquisitions and the replacing of digital devices and due to down time, system inertia and system crash. Techno-mediation as a fact implies that employees should rightly be described as hybrids in terms of their user role. This obviously should have implications for digitization and digital innovation.

Prolog
The digitization in Denmark which has taken place over the last 20 years, has largely focused on streamlining the public sector and its relations to citizens and businesses. Part of this development has taken place in the municipalities. Like many private companies facing the need for transforming their value propositions, municipalities have chosen to renew digitally the so-called 'operational processes' to set the stage for an actual digital transformation. My main business for a number of years being digitization, I have been part of this development.

In my early years as a student of philosophy, I read a book on technology by Don Ihde, Technics and Praxis from 1979. It left a deep mark. Time passed, I got other chores. But a few years ago, I returned to the book and felt a great desire to apply the book's perspectives on man and technology to the change technology creates in organizations. I wanted to explore the inertia or friction I have often witnessed in implementation processes. Why is the management task so often uphill? This is counter-intuitive if you believe that it is all about tools or systems that intend to improve efficiency and make organizational life easier for employees. Employees often agree to the need of new systems, they may even agree to the expected change - and yet friction arises. I decided to explore this more deeply.

The paper presents insights from a techno-mediation analysis, I performed in 2019 of a composite digital technology known as speech recognition technology (SRT), which is used in a number of

municipal organizations for text production. My empirical basis is a series of semi-structured, qualitative interviews with professionals in municipalities.

Section I in the following sets the context for the insights including my theoretical background and inspiration. I present insights in section II.

I. Setting the context

1.Cyborgs or hybrids

"We are all cyborgs" claims 'cyborg anthropologist' Amber Case in 2011 on a TedTalk. We as humans are connected with technology, analog technology, yes, but not least digital in the form of computer, tablet or smartphone, in such a characteristic way that Amber Case, perhaps with a twinkle in her eye, perhaps deadly serious, describes it as a new variant of homo sapiens: "(…) what's happening is that we've suddenly found a new species. I, as a cyborg anthropologist, have suddenly said, 'Oh, wow. Now suddenly we're a new form of homo sapiens. And look at these fascinating cultures. And look at these curious rituals that everybody's doing around this technology. They're clicking on things and staring at screens.'" (Case:2011)

A cyborg is an organism that is infused with exogenous components. Or with H.C.Gray in the Cyborg Citizen of 2001, one could say that a cyborg constitutes one 'system' that combines the natural and the artificial, i.e. the evolved and the made: "If you have been technologically modified in any significant way, from an implanted pacemaker to a vaccination that reprogrammed your immune system, then you are definitely a cyborg. Even if you are one of those rare people who is in no way a cyborg in the technical sense, cyborg issues still impact you. We live in a cyborg society; no matter how unmodified we are as individuals." (Gray 2001:2).

We live in a cyborg community in a culture that manifests itself as 'clicking on things and staring at screens'. That's a well-known context not least in workplaces. However, in spite of the heavy digitization and digital transformation in public municipal government hardly anyone will refer to himself as a cyborg. But what the term covers, I think, is not unknown to anyone in the municipalities, namely the very close interaction between human and technology and especially digital technology. The interplay creates hybrids of people and technologies (Latour 1999:178-180). 'Hybrid' or 'cyborg', I'm fresh on both terms, because to me they tend to be the same. In the following, I use the term 'hybrid' though. The title of this paper is 'hybrids in public administration'. Man lives by the machine; he cannot do without it.

2. A digital transformation

The municipal organization makes a number of value and core services available to citizens and businesses in a structured and designed way. This is done through priority channels and touch points that promote a certain kind of interaction between the municipality and citizen or companies. The municipal focus in recent years has largely been on digitizing the operating side, i.e., administration, resource management and infrastructure. In addition, value has been developed through redesigned channels for the contact between citizen, companies and the

municipal administration, especially citizen self-service. The greatest digital transformation lies probably in the interaction with the citizen and in the values offered. For instance, what matters is how one deliver value, and thus how employees meet citizens if they meet at all. Take telemedicine in the welfare area as an example:

It is about chronic diseases such as COPD, cardiovascular disease, diabetes: The patient is in his own home, the nurse is in her office. The nurse and the patient are thus separated in space (and often time), which means absence of full body sensation in physical proximity. In contrast, there is digital mediated proximity, i.e. the computer and screen: Medical images and other data are sent digitally from home to office and back. The nurse thus meets and interprets the patient through screen and data. Odor and touch are not possible, only audio-visual impressions and verbal and non-verbal communication. Proximity is enhanced through language and gestures. The nurse guides the patient towards goals defined by healthcare needs. The patient assists the nurse in working towards the goals.

The changes that telemedicine implies are by no means neutral. Role and responsibility are shifting - it's about how you as an employee apply your expertise. It is a movement from 'do it yourself' to facilitate the citizen co-producing healthcare services such as self-diagnosis, self-treatment, self-monitoring. It places great demands on communication. Nursing becomes primarily to observe and communicate. The nurse role is transformed into a guide or consultant role digitally connected. The task, the function, is more or less defined by the digital technology, i.e. it is not possible to perform the task decoupled from the technology. Nurse activities manifest themselves as "clicking on things and staring at screens". A corresponding transformation happens to the patient.

3. Hybrids in the workplace

A modern workplace is a complex system of analog and digital technologies. My own workplace, the city hall - should I describe my daily, technologically mediated environment, it looks like this:

The workplace-environment on my way in as I emerge from the parking lot consists of physical facilities such as sidewalk, bike path, bicycle shed, the building with climate controls, stairs, doors, digital locking systems that is handled with access cards. The city hall is designed with hall, offices, meeting rooms, canteen, toilets. All rooms have doors, and most have windows. You can move from room to room via walkways, stairs designed for transporting people, goods and information. Offices are furnished with desks, chairs, lamps, whiteboards, monitors, PCs, keyboards, mice. I know that the building is constructed with non-visible pipelines for water supply, heat supply, sewerage and associated visible water pipes, faucets, drains, heat pipes, radiators, ventilation systems, as well as power cables and network cables for screens, telephone, computers, networks, etc.

The building as physical hardware can be considered a set of technologies that make up a unified infrastructure system with some technologies emerging and others working in the background. The digital infrastructure in this is software and organizational structures (agreements, rules, procedures, governance, etc.) for digital transport, communication, data sharing and services, etc.

that are needed to support management and business needs, e.g. service and case management in relation to citizens, companies and authorities. The digital infrastructure is also the servers, networks, PCs, etc. that are needed for employees to have access to the digital tools, and professional systems they need in administration and in the professional areas. It is the technology that makes it possible to use the core business digital systems and to communicate. Part of it is invisible to the employee.

When an employee uses digital tools and professional systems, he manifests himself as a hybrid. In the jagon of digitization, he has become a user. The transformation is done with the assignment of a specific role, either as IT-Adm, SystemAdm, Group-systemAdm, which includes specific access rights, a location (stationary, mobile or combined) and corresponding digital 'devices' (PC, laptop, tablet, smartphone, monitor, etc.) of different nature, connected to secured networks, wired or wireless, and with either internal servers or a cloud, as a 'provider' of services (application software, programs) and archive - and thus the employee is included as a production factor along with non-human factors.

Overall, the workplace is an environment that is constantly maintained and improved, i.e. there are system upgrades, system acquisitions and device replacements. This ongoing maintenance also causes lasting changes in work processes and workflows, e.g. a system change implies often a change of behavior by the employee. Workplace technologies are thus not neutral, they are engines of change that can cause quite radical shifts in the task portfolio and social position. As an example the organization wants to 'power' a number of manual work processes in financial management. A number of systems do not 'connect' digitally, so the same data must be entered manually if another system should use them. The organization acquires a financial system that integrates all the functions that the separate systems take care of. But the new acquisition means that a number of finance professionals are losing their position as specialists because these positions are built into the now phased out systems. Some of these employees find that their social position is taken over by the colleagues who are better able to acquire the new financial system. For some of the detronized employees it may subsequently mean personal exit. Professional and personal identities often appear woven closely with the system expertise the employee incorporates.

The organization is thus not really staffed by people or employees, but by users. The immediate thinking, however, is that the organization is staffed by autonomous individuals who acquire digital technologies and implement them more or less neutrally as if they were merely tools. But there are no such free autonomous individuals who neutrally plant a new system in an organization, but only situated users who among other things, when they acquire a new system, also must release an old system. Friction occurs. Technologies integrate with the human in the workplace whether through designed, intentional mediation or as unintended influences.

4. The post-humanistic and post-phenomenological gaze

My theoretical framework, I lend from the post-humanistic and post-phenomenological philosophy of technology as presented within the STS, i.e., the loosely interwoven, interdisciplinary research field of Science and Technology Studies. STS research encompasses many disciplines, but my track lies in the field of technology and philosophy of science and the development that has problematized the traditional emphasis of 'theory' over 'practice', and instead considers science and technology as inextricably linked to practice (Bruun Jensen et al. 2007:7,10). In this perspective, man is not the only player or necessarily the central player. The player is the distribution of action between humans and non-humans. The underlying view is a 'decentration' of the human subject as the central actor, as seen in Bruno Latour: "We must learn to attribute - redistribute - actions to many more agents (...) agents can be human or nonhuman." (Latour1999:180)

In this context, post-humanism means a critical account of the idea that by virtue of its methodological characteristics, science has a privileged access to an objective outside world and acts as a neutral spokesman through the use of neutral technology such as instruments, models and procedures. This is science understood as a so-called material, heterogeneous practice (Danholt et al.2007:185/187), i.e., not just a mapping that neutrally reflect practice. Action is a temporal and situated product of the relationship between human and non-human actors, i.e., the researcher and the applied technologies. Thus, the knowledge generated is a product of this interaction.

Science is understood as a body-oriented approach as developed by the philosopher Merleau-Ponty. The point is that the body is always situated, biased, subjective, influential and participatory - all of which are characteristics that in the traditional scientific method are considered corrupt for the production of scientific knowledge (ibid193). The 'body subject' is the basic pre-reflective center of thought and action. The bodily pre-consciousness is operational before conscious reflecting, i.e., the body has already sensed and made sense before conscious reflection takes place.

The right way to approach the pre-conscious bodily situation is therefore to examine the phenomena of the immediate or lived experience. It is this practical approach that post-phenomenology links to, and in my case in particular STS researcher Don Ihde. My focus is on how humans relate through technology with the body as the center of experience and cognition. There is a clear practical angle - the concrete interaction between man and technologies.

5. The post-phenomenology - the middle between utopia and dystopia

When we relate as humans to the techno-mediated transformation, our views often separate. Roughly, either our technologies will make our lives better or the technology will result in alienation or even destruction of humanity.

Experiences and reflections on industrialization, the mass media and two world wars have created a certain breeding ground for so-called dystopian pessimism. It is expressed by the philosopher Martin Heidegger, who in the 1940s warned against the pioneering technological development in

Germany. Modern technologies such as aircraft, railways, highways, hydroelectric plants, lignite mines, tanks, machine guns, chemical weapons, etc., had enabled Germany to operate with a completely different power and efficiency than the world had seen so far. With industrialization, the technique has reduced nature and the essence of nature to material available for technical mastery and application. The instrumental approach has brought about a technologicalization of civilization, which has embedded man in a system of instrumental thinking. Man is imagining gaining more and more control over the world through technology, but in reality, technology is becoming increasingly autonomous. With Latour's interpretation of Heidegger's point: "Technology is unique, insuperable, omnipresent, superior, a monster born in our midst (...)." (Latour1999:176).

Technology transforms nature and man to technical factors of production, Don Ihde describes the development of production from craft to assembly line as partly a technological revolution and partly a social and existential revolution (Ihde1979:62): The entire craft-based production process was complex and opaque from the outside, the craftsman understood it intuitively. The production process was broken up, however, broken down into simpler functions. The assembly line employee required less training, was cheaper, more easily replaceable. Expertise went from being the center of the craft (the craftsman) to the organization of work (management). The result was partly a standardized product, but also a standardized employee. Any employee could be replaced or dismissed. The introduction of assembly line technology was thus a technological revolution, but also a social, existential revolution: "Human-machine relations are existential relations in which our fate and destiny are implicated." (Ihde1979:4). Man was given identity as a factor of production, a human resource. Man is thus part of production processes, where it is calculated, manipulated and utilized as any other force or 'pure and sharp accessory to the machine', as Karl Marx put it already in 1848 in the communist manifesto. And as Chaplin shows the assembly line work in the movie Modern Times of the 1930s. The fear of technology driving a development where man is dehumanized and alienated, fertilizes the ground for technology criticism.

From the Enlightenment to the immediate postwar era, apart from such individual voices, European culture has otherwise been marked by strong positive belief that man with technology could 'tame the forces of nature' and thereby create a better world. Today's utopianists or optimists increasingly regard technology as a solution to problems rather than being the cause of them. For the more entrepreneurial, there are many testimonies in the world that technologies increase the prosperity and welfare of people. Everyday life has become easier for many. Technologies are considered tools that man can use for his purposes (Ihde 1979:40-41). The now-defunct communist Soviet state regarded known technology as a productive force that acted as a 'primus motor' toward increased prosperity and world domination and, at least in theory, the free and classless society. Apple's Steve Jobs was occasionally quoted for saying that all humanity's problems are solvable - one program at a time. The Soviet pioneer, the engineer, the designer, the entrepreneur may all have in common, the believe in the 'technical fix'. And many with them. It is the myth of the neutral tool under complete human control (Latour 1999:178).

However, just like Heidegger, Don Ihde focuses on the role of technologies in human everyday life, how concrete technologies affect human existence and relationships. His 'middle' perspective

emphasizes with Heidegger that man is in a techno-mediated world. The naive optimist thinks that man is free, decides on a goal and chooses the technology that realizes the goal. However, Don Ihde points out that technology is already there when he is determining the goal and the task, i.e. man is not situated in complete freedom. On the other hand, technology is neither alienating in itself. Dystopics tend to objectify technology, empower it, give it its own life with a positivity that outperforms its creator and turns destructive to it (Ihde 1979:40-41). The dystopian, understands technology as infiltrating and alienating human thinking, i.e. removing it from its true nature. But there is no such true nature, according to Ihde. Human development took place hand in hand with the development of technology. Technology should be understood as plural, i.e. technologies in use such as tools and machines. The utopian agrees, as he also considers technology as technologies, that are actually used and almost always mean progress. But this utopian interpretation of technology, according to Ihde, overlooks the indispensable reductive dimension inherent the technological transformational structure (ibid:40-41), which technology owes to its functionality. Don Ihde thus emphasizes that the use of technology is never neutral, technology manipulates human relations and human self-relation. And because man is always in a relation to technology, it is most comprehensive to describe man as a hybrid in a 'technosphere', rather than operating with the notion of a free human carrying a 'toolbox'.

the technophobes	the middle	the technophilia
The Technology is an essence that manifests itself as instruments, machines, and systems. Technology infiltrates human thinking and constitutes the horizon of human understanding.	Technologies (plural) are objects, i.e., stones, sticks, tools, instruments, machines, and systems - when in use, however.	Technologies (plural) are tools, instruments, machines, and systems. Technologies (usually) mean progress - the 'technical fix'.
Technology is destiny - threats and alienates man.	Technologies are transforming human relationships and self-relation.	Technologies are neutral.

On the one hand, the ideal of neutral instruments and tools, and on the other, the opaque quasi-other, the autonomous and potentially threatening technology. Ihde in the middle focuses on how specific technologies affect human existence and relationships in human everyday life.

6. The Middle - Don Ihde
The middle implies man as 'embodied perception of the world'. Ihde is inspired by Merleau-Ponty, but to a great extent also by two other phenomenologists, Edmond Husserl and Martin Heidegger respectively. Inspired by Husserl, Ihde notes that the phenomenological analysis of perception covers a necessary correlation between the three elements 'the self - the process - the object'. There is not a self in an experience without a world of objects, and not an experience of such objects that is not structured by the object itself. Experience is thus shaped as a reflection of the world (objects). The keyword is intentionality. Ihde reconciles this with the Heidegger idea, that being in the world as a human happens in strong correlation with it, and further that this mutual

interrelation, which applies to the world and the human being, should be interpreted existentially (Ihde 1979:5-6). What is experienced is correlated with how it is experienced. Human experience builds up knowledge and form man existentially.

Human ----> World
Human <- - - World

Everything within this correlation constitutes, according to Ihde, the field of phenomenological analysis. Thus, it is not about 'objects in themselves' and 'subjects in themselves'. All that is included in the analysis are relationships between 'perceiving and perceived'. This is the framework for Ihde's phenomenological approach. And in this context, Ihde has a particular focus on how knowledge-building technologies modify and transform data collection situations (Ihde 1979:17).

Technologies are necessary conditions for data collection and are not neutral (ibid:68). When non-neutral technologies mediate, it happens in the relationships with humans they are part of (ibid: 53) - here follow some dimensions in an overview: 1) Embodied relationships that transform human experience of the world, e.g., probes, glasses, canes, stethoscopes, pencils, dentures, phones, and mouse or keyboards. 2) Hermeneutic relationships where techno mediation acts as an interpretive process. The world is represented by text, image, sound or numbers that must be decoded, e.g. radios, clocks, measuring instruments, dashboards, monitoring, and computer-compiled data. 3) Otherness: The machine as an independent, perhaps personified 'other', a quasi-otherness to be interpreted, i.e. a hermeneutic face-to-face relationship with technologies. 4) Background relationships, which involve technologies withdrawn, that form backgrounds as a peripheral part of the experienced field, e.g., machine sounds, background 'noise' from the highway, the city, air conditioning, computers, etc. I elaborate further on the dimensions below, as well as on the concept of 'neutrality', and on the fifth dimension - the existential.

7. Technology in the embodied relationship
Technology as embodied body extenders:

(human technology) ----> world

The dentist uses a probe to collect information about a tooth. The probe is made of stainless steel with a curved tip. She uses the probe to sense the texture, hardness, softness of the tooth, cracks and holes. The probe is thus a means of her perception of the tooth, it extends her tactile intentionality (Ihde1979:18). The object of perception is not the probe, but the tooth. The point of contact of perception is the probe's encounter with the tooth, i.e. the dentist senses the tooth at the end of the probe. The probe and dentist become a 'semi-symbiotic' device (ibid:19):

(dentist probe) ----> tooth

Through the probe, the dentist gains an improved, enhanced, sensation of the surface of the tooth - she is becoming better at discerning the micro features of the tooth than she would without the

probe. But while the probe expands and amplifies, it also reduces dimensions of perception, e.g., heat and humidity.

The probe amplifies the dentist's attention to the tooth as it causes a bodily distance to the tooth on the one hand, and on the other hand promotes a sensory proximity to the tooth (ibid:19). The point is that

> "(...) this experience of technology is one of experiencing something else *through* the technology being used, and that *what* is experienced through the technology is a part of *perceptual*, bodily experience." (Ihde1979:54)

The amplification is constituted by a kind of transparency in that the probe is not itself thematized, but rather incorporated into the perception of the tooth (Ihde1979:8). This transparency transforms perception, i.e., the dentist experiences the texture, hardness, unevenness of the tooth, but not how she would experience it if she used her bare finger, i.e., warmth and moisture. The perception through the probe is thus a reduced experience compared to the naked perception of the finger. The reductive consists of the technology filtering out all the sensory impressions except one, which then appears enhanced, e.g., the tactile when it comes to the probe. At other times the reduction is more about refining the selected sensory impression. The probe thus sharpens the dentist's tactile intentionality because it is made of hard stainless steel. If it was made of hard wood, it would change the dissemination of data, and had it been hard rubber the tactile data would have changed again (Ihde1979:20).

8. Technology in the hermeneutical relation

If the probe breaks, the transparency is abolished, and the probe becomes a thing that attracts attention. The probe is said to be 'opaque', barring the purpose of the work. And the relationship between the dentist and the probe thus moves from the embodied relation to a so-called 'hermeneutic' relation (Ihde1979:28) with the probe now as something to be interpreted. However, this kind of hermeneutic perception situation does not arise only because a technology breaks down. It is mostly a designed relationship in a context where technology is used to monitor and control temperature, moisture, sound, vibration, pressure, light, motion, speed, direction, etc. the function of which is the reading of data that is continuously performed through routine observations. By interpreting the symbols of the technology, the observer is indirectly experiencing a hidden world, i.e., the observer reading the technology does not experience what is happening in the world but has his primary experience with the technology. As such technologies work as distanced data providers that require interpretation and sometimes interaction. The technology acts as a kind of presentation layer through which the world manifests itself, i.e., a user interface (ibid:12):

human ----> (technology world)

Technologies in this hermeneutical relationship do not act as an extension of the user's bodily self but rather as a 'quasi-other' with which the user interacts and provides input to, and which generates output to the user (Ihde1979:55). Thus, the technology is directly thematized.

9. Background relations

The more technology emerges as 'another', the more the world takes shape as technology. This is happening as societies become more and more technologically advanced, technologically complex (Ihde1979:13). But the technologies are often out of focus, though their presence is almost constant - light, temperature, water, electricity, buildings, roads, networks, data, etc. Ihde outlines the structure like this (ibid:14):

human ----> (machine)
            (world)

The 'motorhome' is equipped with kitchen, water heater, microwave, sink, faucet, flush toilet, shower, color TV, air conditioning etc. As you drive off, the outside world is transformed into spectacular scenarios that can be seen through the camper's windows. In the evening and at night, the camper looks for places occupied by other campers equipped in the same way:

> "(...) there is a 'technosphere' within which we do a good deal of our living, surrounding us in part the way technological artifacts do literally for astronauts and deep sea investigators. Explorations into the universe in environments strange and hostile to our normal being are made possible by technological cocoons we develop for ourselves." (Ihde1979:14)

These 'cocoons' create routines that are difficult to escape. The same goes for man living in houses, and man in the workplace. We live in machines for living and working, i.e., artefacts filled with other artefacts that provide a framework and a technological texture for our daily activities (Ihde1979:55), some are hidden, some are at a distance, others are closer. Unless they fail, we are rarely aware of them. The background-technology relationship, as such, serves as a condition of opportunity for many types of activities.

10. Technologies are not neutral

Technologies are non-neutral because they organize (amplify - reduce) and thus select. They set direction by virtue of this technological selectivity, and as such are co-creators of focus (Ihde1979:53). This is not real determinism, but rather a so-called built-in targeted 'propensity' (telos or 'telic inclination'), which proposes to use technology where there is least friction or greatest functionality (greatest transparency) - a direction that can be followed and often will be. It requires some discipline to counter the direction.

When it comes to technologies in a hermeneutic relationship, telos is inherent the realism of the data that technology creates (data integrity). How well does data match with the world, e.g., the thermometer or barometer.

Technological mediation			
Embodied	Hermeneutic		Background
Technology on the body	Technology in front of the body	Technology as an active 'other'	Technology as the outside world
A concrete body technology conveys perception	An aspect of the world is read and interpreted through a technology	A technology manifests itself as an 'other', that directs attention and action.	Technologies in the background are providing texture to the environment and the outside world. Man among technologies.
Perceptions data	Data such as text, speech, image, audio	'Dialogue' and action	Technosphere, prerequisite technologies
Dentist's probe	Technologies for monitoring and control, e.g. measuring devices	Technology that fails or a designed digital assistant i.e., a computer	Motorhome, urban environment (housing machines), workplaces

11. The existential

All techno-mediated relationships have existential implications. What is experienced is correlated with how it is experienced, and at the same time there is a reflection from the experienced by which man interprets and understands himself: "I interpret myself in term of my world" (Ihde1979:64).

Don Ihde's point is that technologies are non-neutral because as you connect with them, they both organize and set (select) the practice you'll then work in. They organize by reinforcing, respectively reducing, and as a consequence set direction. And in that sense all technologies are existential, i.e., human beings have to learn to deal with them and apply them and thus adapt to them. Using technologies thus transforms not only the experience of the world, but also the human who does the experience, partly as a direct consequence of the technology man adapt to, partly as reflective 'mirroring'.

> "Relations with machines are non-neutral in the sense that they, by their very use, imply reflexive results for ourselves." (Ihde1979:4)

If my world is technologically textured, then I mirror myself in technology and understand myself through technology. The technologies convey a sharpening or expansion of the self (self-extension). Technologies in a technological culture become part of my self-experience and self-expression. They become favorite, confidential counterparts as autonomous quasi-others. The technologized society thus goes deep existentially as a pervasive technological texture of the world.

II. Speech recognition technology on the Job

Speech recognition technology (SRT) is the transformation of speech into text. The technology enables the user to voice text directly into a professional system, rather than using keyboard for typing or mouse for clicking. SRT is typically introduced as part of an efficiency context based on some more or less accurate ideas of how faster text could be produced through speech than through keyboard. Experience today has shown that at best two or three times faster.

SRT consists of several hardware technologies such as screen, microphone, mouse, and keyboard. The background technologies are typically networks, VPN access, server space, and integrations between systems. Systems are typically professional systems handling citizen data, word processing systems, computing power, and printing. The SRT software itself consists of a 'speech recognizer', which is really a search engine (algorithm) based on statistical methods developed in the 1980s and 1990s, and of three databases i.e., an acoustic model with sounds, a phonetic dictionary containing words, and a statistical language model with sentences.

SRT's impact on the job is quite significant. The impact concerns knowledge production, product quality, productivity, collaboration, relations to 'the machine' as such, the physical environment, individual coping abilities, and not the least leadership. SRT's influence takes place directly and visibly but also in a more subtle way. My focus is knowledge production using SRT, further on how SRT mediates the production of text whether it is data-to-text techno-mediation, or it is analysis-of-data-to-text techno-mediation where SRT mediates the analysis. My analysis and discussion below are thus about SRT text production. Text production as I see it, might use different kinds of technologies:

Chalk on blackboard	Charcoal or pencil on paper	The pen on paper	Typewriter on paper	Keyboard to screen	Mic to screen

When it comes to data collection, Don Ihde's master example is the dentist's probe. The point of contact of perception is the probe's encounter with the tooth. The dentist is better at discerning the micro features of the tooth with the probe than she would be without the probe (Ihde1979:21). When it comes to producing text, this could be done by writing on a blackboard with a piece of hard chalk. The relation resembles that of the probe inasmuch as the teacher has a good sense of the surface of the board at the end of the chalk, its smoothness or unevenness. The board may be more or less suitable for text production according to its texture, e.g., if it is smooth it is hopeless because it bells off. The chalk can also be more or less suitable, i.e., lying more or less well between the fingers or being porous and crack. When 'chalk and board' work together, neither the chalk nor the board is thematized - attention is on the words or numbers written. This becomes even clearer when text is produced using pencil or pen on paper.

The charcoal might be like the chalk, however. The charcoal must favor capital letters, or the charcoal is in fact more inclined to drawing and filling surfaces with grayscale and shadows like some soft pencils. The hard pencil on the other hand, supports writing on pages, provided, of course that the texture of the paper matches the pencil. When it comes to the ball pen, it is

imperative that the paper is not too smooth, the same goes for the ink pen, i.e., the ink might stay floating on top of the paper if it is too smooth, and on the other hand if the paper is too absorbent the ink line gets a frayed edge because ink flows out. At the same time, the ink must flow from the pen at an appropriate amount and pace that matches the speed of the hand, i.e., if the hand is faster than the ink flows you have to go back and rewrite. The same applies to the fountain pen, where the ink must flow in appropriate doses without forming 'blots'. The fountain pen is slower than the ball pen and probably more inclined to handsome writing with curvy and shapely curls, i.e., the fountain pen is for classic lettering, the ball pen is perhaps more for observation and notes. The typewriter is quick for the trained and perhaps is more inclined to journalistic reportage, more storytelling as Ihde points out (Ihde1979:43). Here too, the texture of the paper means a lot, but of course the key to success must be the nature of the keyboard. The keys of the typewriter have a very long clearance, so that each letter must be pressed well, travel far, and letters can get stucked and have to be brought back, which means the writing rhythm is broken. It is well known that computer keyboards vary a lot, some have keys you need to press far down, others like mine have low, flat keys that you just need to touch lightly.

For all the mentioned writing technologies, it is the hand that does the work. However, SRT's priority input device for producing text is the microphone. This is a radical hand-to-mouth shift that involves using voice and speak into the microphone and first from there on to paper via a printing device. It turns out, however, that text production often combines more input devices, i.e., not only do the keyboard and mouse continue to play a major role as supplementary technology, but also the analog notebook and pen.

1. SRT as such

The first step will be to look at SRT as such. The technique is demanding in itself. In the Danish context, it is primarily the acoustic model and the language model that present challenges to the quality of speech recognition. The acoustic model faces difficulties in dealing with so called glottal stop (a consonant formed by an audible airstream after closure of the glottis), accent (stress) and vocal extension associated with use of Danish language. The language model is a statistical probability model having difficulty handling Danish inflections and endings, variations in the use of words, prepositions and conjunctions and compound words. Danish-speaking users must therefore undergo an extensive preparation.

The radical hand-to-mouth shift implies a complex techno-mediation. It may in fact not be quite clear for the user what SRT is. The user sometimes refers to SRT as a user interface for a wide range of connected systems, at other times SRT is thought of as a more specific hardware such as microphone / headset or the screen. When SRT technology is met as a whole, it just seems to be a machine that requires an input and delivers an output, what Bruno Latour has described as a 'blackbox' (Latour 1987:131), i.e. a box that contains what is no longer necessary to consider. The only thing you need to know is that it needs an input to get an output. The SRT technique consists of both software and hardware, however.

SRT writes sound as a text file. SRT writes the sounds as sentences based on the statistical model, i.e., sound is linked to familiar words and phrases based on probability and displayed on the

screen as text suggestions. The text file should then be interpreted. The software mediates text production as it selects, i.e., sets direction by reinforcing and reducing: One may consider SRT analogously to the traditional tape recorder's audio tape. What is special about the tape is that the tape recorder does not differentiate the sounds. All sounds on the tape are equal, e.g. speech, cough, clearing throat, rattling, etc. One has therefore to interpret the audio product, i.e. the user has to keep the sounds apart. Digital recorders, on the other hand, may favor certain audio frequencies, e.g. speech (or music), and thereby down tone noise. SRT looks more like an intelligent digital recorder than a traditional tape recorder. SRT operates in a sound environment that includes voice and noise but selects voice rather than filters noise. SRT selects to promote recognition. It should therefore only be used for speech, i.e., should be turned off when not in use, so that noise is not registered as part of the dictionary.

The problem is as mentioned before that the SRT technology has difficulty dealing with the Danish language in several ways. First, the limitations imply that, as a Danish-speaking user, you have to go through a fairly extensive preparation before you get even a tiny benefit of the technology. It is about voice loading a large amount of self-produced texts to train the algorithm in your specific voicing and to build up both the dictionary and the language model. And it's about learning to dictate correctly, e.g. speak in whole sentences and with uniform pitch. This is of great importance for the degree of recognition. Second, SRT requires continuous maintenance of dictionary and language model, as well as discipline in the form of frequent, regular use of the system. SRT recognizability is therefore 'sensitive' to the user's absence, i.e. anything that breaks the frequent regular use, and any change in the voice (hoarseness, illness).

SRT is thus a technology that intervenes directly and openly in the human sphere. In fact, SRT selects (amplify and reduce) through such disciplinary 'interventions', which is essential for SRT's ability to facilitate text production and a high degree of productivity. If preparation and frameworks are insufficient the result is loss of productivity combined with an increasing amount of manual work. As a 'clou' on claims, SRT therefore requires extraordinary motivation from its users over a very long period of time.

Thus, it is quite a radical step to go from 'hand to speech' in text production. The technology is by no means neutral. To repeat: Technologies are non-neutral precisely because, as one connects with them, they both organize and set the direction for practice. As a human being, you have to deal with them, apply them and thereby adapt to them (Ihde1979:64).

2. SRT and the task
Imagine the user is in her own office. She is producing a note. She has the SRT microphone lying on the table next to her. She alternately sits and stands as she speaks. Sometimes she has her eyes closed or she looks out of the window. When she talks, it all comes much faster and easier to her, so the text becomes more fulfilling. She should not even think about how words are spelled, e.g. medical terms or Latin words. The SRT writes the words correctly. She only checks what is written when she is done.

The SRT-telos selects simpler text and by doing this makes it more difficult to produce complex documents. SRT selects by reinforcing the production of straightforward texts rather than complex multidimensional notes and 'dissertations'. SRT is less suited to produce heavy decisions dealing point by point with individual, specific arguments or complaints because this implies phrasing, rephrasing, correcting and adjusting several times - and then the keyboard is more convenient. Therefore, when dealing with such complex documents, the workflow is that the user creates text by speech as a starting point and then adjust by keyboard, i.e., the user compensates for greater complexity by involving other technologies.

When it comes to one-dimensional texts, SRT mediates almost friction-free between the user and the object of perception, i.e., the mediation between user and the text product she wants to end up with is almost transparent. The gain is made by reduced error rate and thereby a smoother process of sentence construction and reconstruction, as opposed to the complex process of error correction. So SRT embodies an incentive for simpler texts.

So, on the one hand, SRT is a technology of marked selectivity, i.e., its telos allows it to be better applied to certain things rather than to others (Ihde1979:43). This corresponds with Verbeek's understanding of material intentionality as an embedded 'script' in a technology (Verbeek2008:95) concerning the inherent role of the technology in the specific user context. The 'SRT script' might be to 'transform speech into text triple as fast as typing on keyboard'. And if one should think of a script for the SRT-hybrid, it might be 'speech-writing fuller journals triple as fast as using keyboard', where the script of the employee-element is 'write and update fuller journals faster'.

On the other hand, the friction-free application is linked to the fact that the tasks that are solved by the technology far along the way, are matching the SRT-telos. The productivity indicates successful user customization in relation to chosen tasks and text types. SRT-suitable text types apply subject language and the legal language of the subject area, and are of the type of summaries, notes, journals and emails, i.e., uniform but time-consuming writing tasks.

Speech (microphone) and keyboard represent different degrees of transparency. The keyboard creates breaks in the flow of thought. The typing creates typos and misspellings that block the view so to speak. The keyboard errors forces user to relate to the keyboard and the screen. Using the microphone on the other hand facilitates an almost pure object of thought relation, the object being not merely the screen text but the meaning that the user is voicing. There is no attention being paid to technology as such. It is a frictionless embodied technological mediation, i.e., the microphone and SRT-software together work as an extension of the speaking mouth and voice. SRT reinforces by reducing all other senses than the auditory.

So basically, text production begins with SRT not being thematized as such. But as complexity increases the technology detaches itself from the body, the SRT itself is thematized, the SRT relation becomes hermeneutic. The detachment manifests itself as a mismatch between telos and tasks and a user making corrections by keyboard - the greater the divide between telos and tasks the more corrections. It turns out that SRT practice creates many such correction processes.

Again imagine, when writing text on the screen, she has her eyes alternately on the keys, on the screen, on the keys, etc. Her thoughts are interrupted by the mistakes she makes hitting the keys incorrectly. When she realizes the mistakes, she immediately corrects them. The process is sometimes sluggish and reluctant depending on her skills on the keyboard. The wording takes place during the typing and there are often phrases that are corrected back and forth during the process. Her relation to the keyboard should be described as only partially transparent insofar as it requires ongoing looks at the keys and screen. She is brought into a recurring interpretation of what is on the screen, i.e., the errors to be corrected. So, when writing text on the screen, the text is met in a hermeneutic manner as text data to be decoded, interpreted and modified.

3. SRT and the existential empowerment

As I mentioned above, Don Ihde emphasizes that techno-relations have existential implications (Ihde1979:64). Techno-mediated knowledge production may transform both the knowledge I create as user, and the way I do it, and thus myself. SRT seems actually to be transforming both the user's language, the user's way of thinking, and the user's creativity.

Imagine the user is in her office. The door is closed. The microphone is on the table next to her. She doesn't speak loudly, in fact, she is almost whispering because this time she is producing a confidential note. She has become so used to it that talking muffled affects her approach in other job-contexts, e.g., face-to-face dialogue or meetings. SRT has made her more subdued in her way of expressing herself. She has developed a softer form of expression during the 6 years she has applied the SRT. She now hesitates a bit before she speaks, which entails she gets wordier in softer terms than she did before when she was busy getting her message out. The point is that she as an effect of SRT has developed her mode of communication from the more confrontational to the more accommodating, which then plays a significant role for her not only in relation to SRT, but in relation to her working life and life as such.

When she speaks, it all comes faster and easier to her. Her experience is that she has become much better in creating arguments, more analytical, because she much easier gets into an inner discussion about the object of thought, when she speaks. It has become easier to test a certain wording. She gets more nuances and points, and as a consequence she gets more and better arguments, and overall the product becomes more complete. This new ability she applies to mails, notes, and journal writing. The point is that by virtue of its telos, SRT drives the user into a professional 'pro et con' pattern considering 'what happens if we do this', and 'what if we don't', i.e., by making it easy SRT reinforces the analytical, argumentative mode.

Again, the user is alone in her office. She speaks. She has an (analog) notepad and pencil at hand. Now and then she writes a word or a phrase in the pad. She is in the process of speaking a longer text and is experiencing how new ideas are emerging and need to be maintained along the way. She often experiences this when spoken herself hot on a topic. Often the ideas appear both unique and volatile to her, so she finds it difficult both to repeat them and to remember them. She therefore has to place them right away, i.e., in the notepad. The point is, that in addition to all other influences, SRT also enhances creativity, i.e., the generation of ideas. And by so doing includes a need of analog technology.

The tree cases respectively, that of creativity, of using a more accommodating and effective language, and of developing stronger analytical skills, represents a technological mediation that enhances 'agency', i.e., being in control, being focused and motivated. The three cases show how techno-mediation might generate empowerment.

SRT is strengthening 'acting capacity' and 'reflexivity' as an outcome of the interaction. 'Agency' is thus created in the relation 'between actors', so that the hybrid represents enhanced 'agency'. Just as people in a conversation through the language are 'invited' to occupy or possess a certain position, you can say that through SRT's telos, SRT 'invites' the employee to fill out a certain position, so that together with SRT she becomes a user with extended reach so to speak. Thus, it is the composite actor or hybrid that acts. "Action is simply not a property of humans but of an association of actors." (Latour1999:182). Agency is not simply a matter of individual skills. But since 'agency' is a characteristic of the connected 'actors', person and technology, then responsibility must be shared between them (ibid:180).

When the user speaks in SRT she is engaged in her analyzing mind and SRT is not in focus. If the text production becomes too complex or if the system crashes or there are other problems, the machine comes into focus - becomes visible. When technical problems arise, SRT transforms from co-player to opponent. And then it's about decoding it. The problematic behavior of the technology requires analysis and interpretation. SRT in this hermeneutical relationship no longer functions as an extension of the user's bodily self, but rather as a quasi-other with which the user interacts (Ihde1979:11). The shift from SRT acting as an extension of the user's physical space to SRT as 'otherness', is a marked shift to an actor, a machine, with whom the user interacts.

Such an 'otherness'-position might also be intended by design. The user provides voice-input to SRT and generates text-output from it. The user is sometimes overwhelmed by SRT because it is capable of capturing and correctly reproducing rather complicated sentences and special words, she simply says the word and the machine recognizes it and spells it correctly. Sometimes SRT even makes suggestions for whole sentences based on SRT's 'knowledge' of the user from earlier text production. So SRT is more than just a tool. SRT is designed to act as a kind of digital 'assistant' who delivers text-output with correct grammar and spelling. It is a machine the user relies on.

4. SRT selectivity is dramatic

Ihde's dictum is that technologies are not neutral. In fact, SRT creates changes that are quite dramatic by virtue of its material intentionality, telos. There is gain of insight due to the reinforcement but at the same time loss of insight associated with the reduction (Ihde1979:21). SRT selects both in itself and with the organization.

Initially, SRT selects and prioritizes sound, and only 'endure' text production by keyboard and mouse, i.e., encourages the use of sound, and inhibits, but does not prohibit the use of other 'input devices'. Secondly, it consolidates its position by being good at handling sound, as SRT maintains and enhances the user experience when it provides frictionless functionality to the user. Full transparency would be when the technology retreats to the background 100%, so the

experience is purely on the object of thought when text is produced, as if SRT did not exist. However, it is a freedom of friction that has its price, because zero friction is due to a reduction that is only possible in and with the technology. The more transparent, the bigger gain, and the greater the reduction or loss, so when SRT really runs smoothly, the loss is biggest.

This SRT telos is dramatic. It is the drama of writing text without writing. It is very far from the normal practice writing with the pen in hand or on the keyboard, where the gaze follows the creation and corrections of the text. It is also dramatic in the way that the user is free to use her hands as she pleases, sitting with her hands in her lap, working with something else or 'as body language' supporting the speech process. The drama becomes clear if one imagined that the ordinary way to produce text was to use SRT, and then being forced to write with a pen or keyboard. I imagine that this would be felt quite restrictive. SRT offers a much freer production process that is more efficient and encourages the user to carry on.

But this is also the moment where you should notice a red lamp flashing. Don Ihde describes such reinforcement as dramatic in the sense that it emerges and dominates, while the reduction is typically overlooked (Ihde1979:21). The greater the transparency, the better the functionality, the greater the difference between reinforcement and reduction, and thus there is potentially a greater risk of so-called oblivion of reduction. The problem is if you evaluate the merits of a technology based solely on its purpose and not on what it actually does to you, your environment and the outside world. And if this negligence is going on unnoticed over time, then changes occur through and around the technology, because of the technology, but are not attributed to the technology and therefore not handled in conjunction with the technology and the purpose of the technology. This is about changes that therefore cannot easily be addressed in advance.

It is clear to me that when a technology such as SRT is implemented and present, then it mediates, and if it crashes so that one cannot use it, it also mediates, because its absence seems to be just as significant as its presence. Techno mediation occurs both when the technology is in operation and functioning well and when it is down and not functioning. The SRT user interacts with SRT both when it is working and when it is not working. As it runs, there is transparency alternating with the hermeneutic approach. When slow, the relationship is predominantly hermeneutically, i.e. speech is replaced by the keyboard. When SRT is completely dead, it is a 'quasi other' that is present as absence. Technology that does not work has an effect because, in context, it is an actor in its absence. It is very dramatic as far as it is one half of the hybrid that is dysfunctional. It affects productivity, product quality, etc. but affects also the other half of the hybrid on professional pride, perfection, tasks etc. As long as SRT has its validity, as long as one is dependent on it, as long as it is the tool to be used, it matters whether it works for its purpose or not. SRT is telic inclination as positivity as well as negativity. It only loses telic inclination when it is discarded and becomes junk and by that having its context replaced by another.

The telos of SRT lies in reinforcing sound by reducing the importance of other sensory input. On the job the texts are often produced in the public, so to speak, i.e. the users must speak out where colleagues are 'listening'. It appears that users may feel that they are exhibiting weaknesses in their professionalism because their colleagues can keep up with the writing process as it goes on, including errors and shortcomings. Colleagues may not be listening too intensively, but the

process will still be 'followed' perhaps with half an ear, as it is sometimes stated. Self-esteem, confidence and personal shyness are at stake and matters in this context. Altogether, the public text production sometimes creates a sort of muted-voice culture among the users, a culture that might clash with colleagues and guests who are not familiar with SRT and instinctively are not aware of anyone using SRT. The culture manifests itself as a practice working to get the voice down, i.e., the users speak muffled when they meet people, trying to 'pull' the voices down, and one promotes a contractual practice where you meet visitors in the hallway rather than in the office, and there are signs posted. Few technologies are pruned to get so much attention and 'talk time', most systems live quietly in the background. But SRT has gained a significant position as a cultural foreground, although for most employee it is actually just a digitally functional background technology, which sets the agenda for the overall organization concerning production, productivity and collaboration.

5. Main points collected

The speech recognition technology (SRT) as I have analyzed, is branching out broadly and deeply: SRT is an effective system for text production, producing text much faster and easier than other technologies. The production process is flexible for the users, enabling individual customization and work environment. SRT is strengthening 'agency' by promoting efficiency, creativity and analysis, and even an accommodating use of language. SRT improves product quality by making texts more complete, more elaborate.

But SRT is also vulnerable due to a number of technical system dependencies that sometimes cause SRT downtime. SRT should therefore not only be thought of as one isolated tool but be thought of as a hybrid-'collective' of non-human and human actors. SRT places high demands on user-preparation of recognizability, disciplined maintenance of recognizability, user-ability to cope with SRT's 'whims', i.e., SRT sometimes present and sometimes absent, users' existential handling of personal challenges, and further the collaborative culture around SRT, i.e., a muted-voice culture, which includes users as well as non-users, physical room management/interior design - SRT therefore also influences the management that is needed.

Overview

Technological mediation - SRT			
Embodied	Hermeneutic		Background
Technology on the body	Technology in front of the body	Technology as an active 'other'	Technology as the outside world
A concrete body technology conveys perception. Digital devices are microphone / headset, and keyboard.	An aspect of the world is read and interpreted through a technology. Screen as user interface	A technology manifests itself as 'other', which attention and action is directed at. Screen as user interface	Technologies in the background are providing texture to the environment and the outside world. Man among technologies. IT-system environment, IT-infrastructure, SRT software, digital devices
Perceptions data	Data such as speech and text i.e., audio and image	'Dialogue' and action	Technosphere, prerequisite technologies
SRT as embodied: a) Microphone / headset with SRT software extends mouth and voice. b) Keyboard extend the hand.	SRT as hermeneutic: The user encounters text data on the screen that needs to be interpreted and maybe modified (corrected). How complete and adequate is the text?	SRT as hermeneutic: a) When SRT is slow or down and needs to be 'diagnosed'. b) SRT as helper, partner, assistant who produces outputs that user relies on.	SRT as background: Text production takes place in public space with 'collegial transparency'; the interaction between people develops muted-voice culture.

III. Concluding perspectives

Digitization carries a dual perspective on its demands: On the one hand, we have to reinforce agency, i.e., design business processes that create transparent hybrid agency, the more transparent the relationship between the actants that constitute the hybrid, the better. And on the other hand, we must not overlook the reduction, i.e., we must explicitly explain the transformation that results from the reduction. Maybe we find the heel of Achilles of much unsuccessful digitization in this? And maybe a proper framework for preparatory techno-mediation analysis is part of the answer here?

A framework might integrate the strategic gaze, design awareness, and an organizational understanding of technology that deals with techno-mediations such as 'embodiment', 'hermeneutics' and 'background' which open the eyes to the selectivity of technologies through reinforcement and reduction. It should diminish 'oblivion of reduction', i.e., it should help to see and articulate reductions as well as assess them both in relation to existing techno-interactions and to future techno-interactions. Certain influences might be easy to predict and design, but as I have shown there are influences that are difficult to predict. I have shown some SRT implications that were not foreseen, which have been reactively dealt with as they became known. But I have also shown gains that were unnoticed by everyone except the specific users of SRT.

The oblivion of reduction means that there is knowledge that you do not get or observations you do not make, which could otherwise prove to be relevant. If you are familiar with the binocular with low depth of field and have tried to catch an object in motion, a bird, you know how narrow the field is, where the object is sharp. The sharpness is won at the expense of other observations perhaps of importance, i.e., both the foreground and background are fuzzy, and it is easy to miss the target. When it comes to techno-mediation it is about developing both organizational and managerial depth of field.

It's about understanding the complex interplay of hybrid 'agency', the gains as well as the hardships of the social and the individual. The guiding principle must be 'enhanced agency' as an outcome of the interaction with technologies. Technologies select and the users adapt. SRT invites and the users connect. It happens by virtue of scripts. When the employee starts up SRT in the morning, she connects to a machine and is thereby transformed into a 'user'. The user experience is enhanced 'agency' as a product of the interaction between her and SRT. In fact, the user is a "complex blend of humanity and technology" (Verbeek 2008:95). The technology-share in the hybrid, however, depends on how it interacts with humans, what it contributes to, i.e., the direction it sets and the way it does it (Ihde1979:43).

We need to know more about which 'scripts' we in fact have enabled in our actual system-conglomerate, which we intend to activate and which we may expect activate themselves. This calls for explicit research an explicit design with intended behavioral influences through delegation of responsibility to technologies. The designer of technologies is thus attributed greater responsibility. But the same must apply to the designer of work processes and the staffing of functions in the organization, i.e., the development of hybrids on the job.

We shall see ourselves as designers of work processes that include digital systems. Based on the experience with SRT, there are a number of potential arenas that call for design of agency: Productivity, knowledge production processes, product quality, and relations to technology. We might adopt an actual design approach and move forward systematically, for instance reflect the idea of script against 'Four Orders of Design' (Nylén et al. 2014:54,59). Scripts can be worked on as 'incentives in systems', i.e., software, e.g., SRT selects and promotes certain modes of speech, dictate, and text types; 'incentives in hardware', i.e., the physical environment including fixtures and interior design, e.g. SRT selects a specific physical environment such as desks, baffles between desks, mics, headsets, keyboards, and screens; 'incentives in interaction', i.e. processes, workflows, behavior, and collaboration', e.g. SRT selects focus, concentrated speech, perhaps 'muted voice'-culture, the physical and mental work environment; and 'incentives in enterprise', i.e. mission, strategy, operational 'backbone', e.g. SRT demands the relevant it-infrastructure, support, contract management, leadership, and strategic alignment.

Such intended formation of organizational hybrids requires awareness of the selectivity of technologies that happens through reinforcement and reduction, and an understanding of how technologies in processes invite and encourage activities or oppose and inhibit them or perhaps even prohibit activities (Verbeek2006:368). We need therefore adopt a broader perspective on technologies than their own purposes.

1. Hybrids of the past

Hybrids in organizations? Yes definitely. There is a lot of truth in the claim that man is a hybrid or cyborg - physically and mentally. As Amber Case points out, tool use for thousands of years has been a physical modification of self, that has helped us to extend our physical selves, go faster, hit things harder etc. (Case:2011). Digital technology of today a common view states, works more as an extension of the mind, i.e., the mental self. I believe however, that also analog technology may have an impact on the mental.

It goes way back - really far. If you follow medical archeology (Jensen2004 / 2019), humanity's earliest development happens to be closely linked to tool development happening in East and South Africa from about 2.5 million years ago with the genus Homo as the first to systematically manufacture and use tools made of stone (Jensen2004: 62-63). The story of the early creation of man shows how tool technology has been a 'sine qua non' for human development, both as a physical extension of scope and sphere of influence and in relation to the development of the size of the brain from 550 cm3 to 1350 cm3 and human intelligence social, visual, numerical , - numerical with force from about 100.000 years ago. Close to our time you will meet the amazing development of 'bureaucracy' at the Sumas in Mesopotamia about 4.500 years ago, as is known on the basis of 50.000 documents in the form of clay boards on which officials have posted all goods that passed their office, e.g., we find receipts for payment and delivery, commodity- and personal records, statistics, evidences, records of questioning, court decisions, and official letters, etc. (Papola1982:201-202). Over time while doing the accounts, the officials must have reflexively modified their own mindset so that not only bureaucracy was developed, bureaucrats were also created and probably some notion of the 'bureaucrat'.

And even closer to our times we see parchment scrolls, and later writings such as hand-copied books, and from about year 1455 eventually mass-produced books via the art of book printing by Gutenberg and Fust. In the year 1500 there were printers in 12 European countries with a production over the past 45 years of approx. 3500 different books printed in up to 15 million copies. Hundred years later they had printed approx. 150.000 books in up to 200 million copies (Nielsen et al. 1990:39-44). The book as a technology spread very quickly - perhaps because of the price. An example from 1483 in Northern Italy shows that the price of a printed version of Plato was 0.3% of the cost of the hand-copied edition. This development of book-technology meant that the insight, consciousness, self-awareness and identity of the individual was not simply mirrored up against the scholars' interpretation of the text, because he was no longer the only one with access to the books. Students were given the opportunity to read the books, e.g., books on techniques of operation mines, construction of machinery, manufacture of glass, chemical processes, canal building, agriculture, house building, military engineering, surveying, navigation, love stories, travel stories, philosophy, and church books (Nielsen et al.1990:39-44).

There is no doubt to my mind that the technologies such as 'written language' and 'books' are a 'sine qua non' for the human we know today and for how it understands itself. These are technologies that have significantly expanded the mental self, just as the mass media has done before the Internet and smartphones. As Bruno Latour emphasizes:

> "Humans for millions of years, have extended their social relations to other actants (tools and artifacts) with which, with whom, they have swapped many properties, and with which, with whom they form collectives." (Latour1994:53)

Man and artifacts mutually constitute each other in close relationships. Humans as hybrids have always been on the road, i.e. in transformation. Man develops the technique and thus affects his own lived life. That story encompasses the entire range of techno-mediation relationships - and more.

2. Hybrids of the future

Don Ihde shows how so-called 'cyborgisation' really begins with the embodying relationship and the feedback mechanisms that lie in the reinforcement and reduction of selectivity. It is 'technology on the body' (Ihde2008:32ff.), e.g. the blind man's stick, the pen of the illustrator, the painter's brush, the musician's flute, the doctor's stethoscope, the binoculars of the ornithologist, the pirate's wooden leg and arm hook, the beauty's face cream, the police officer's uniform. When it comes to implants i.e., 'technology in the body', we move closer to the cyborg as defined by Gray above (Gray 2001:2), e.g., the proven pacemaker that stabilizes the heartbeat, dental technologies like root canal treatment, where the tooth nerve is replaced by a 'filler' in the root canal, silver and plastic fillings or dental crowns, and medicine in the patient's body.

Concerning welfare technology, we are looking into a future where electronic chips implanted under the skin collect data ranging from heart rate, circadian rhythm and movement patterns to trace elements in the blood. Today, companies are using microchips shot under the skin for the purpose of open doors, handle printers or make purchases simply by waving the hand.

The hybrid is thus characterized by mixing 'the evolved and the created', most often with the created in the evolved. But for the afterthought also the 'evolved in the created', when the technology acts as a 'holster', e.g., the motorist in the car, the holiday guest in the cottage, the troglodyte in his cave, the warehouse worker, or maybe the physically disabled in the exoskeleton, and perhaps the police officer or the nurse in uniforms.

More recently, the shift in perspective to the 'human in technology', has been enhanced with the appearance of digital technologies such as Virtual Reality (VR), i.e., technologies on the body where the software universe almost assimilates the user - VR for instance as a 'gamification' in nursing and rehabilitation aimed at young people with acquired brain injury with the purpose of increasing motivation to exercise and rehabilitate. This is done by directing the mind by creating situations in a gaming environment where the youngsters as players are rewarded with high scores, new levels, coins etc.

It seems that an even more nuanced picture of hybrid intentionality peaks out: On one flank we find technology *in man*, i.e. hybrid intentionality as hardware and software, and on the other flank man *in technology*, i.e. hardware and software as background and environment. And in between we find varied forms of integration: Technology *on man* where hardware functions as a body extender and/or extension of perception; man *in front of* technology, hardware and software, which delivers data in a reading collaboration; man *associated* with technology, i.e. technology, mainly software, as a 'quasi-other' which requires dialogue and action; man *assimilated in* technology, i.e. software as a mental environment. Thus, the hybrid history of the future has become more nuanced.

3. Afterwords

When a human being as a citizen comes to work as an employee, it transforms into a 'user' of digital devices and systems. The workplace ratio is tightly woven into this role of user. When personal identity and position are based on a perhaps long-lasting and deep relationship with one or more digital technologies, then replacing them cannot be expected to be neutral replacements of one tool with another.

The immediate thinking is that an organization is staffed by employees who acquire technologies and use them for specific purposes or choose not to. It is the idea of non-situated, freely chosing, autonomous individuals that determines whether or not they want to be involved in implementing a selected technology. Leadership and perhaps sanction are the typical counterpart when this autonomy points the wrong way. Implementation thus requires 'strong management'. But as I see it, an organization is not a matter of freely choosing individuals signing in or out. Employees are not free autonomous individuals, but are truly situated users. Indeed, so-called change management is a consequence of employees being users, because to acquire a system is at the same time also a process of de-learning and let go the old system - digital or analog. If this is true, if this is the starting point, which I beliewe it is, then management needs a broader and deeper foundation, including insight into technologies and in technological mediation. There is a need of more and better understanding of how technologies integrate with the human, whether the

technologies are rolled out as a designed transformation in the light of the business model or simply result in a non-intended transformation.

I think one must grasp the overall picture of technology and organizational environment, i.e. move from viewing technologies as a 'monolithic force' to viewing technologies as mediators, seducers, and even manipulators, potentially inflicting risks on the organization with the potential for loss or gain. My ambition has been to conway such a better understanding and to enlight how tech mediation analysis can make it easier to identify, understand and manage problems and challenges associated with digitization and digital transformation.

IV. Literature

Amber Case. (2011). We are all cyborgs now, Jan 2011, TedTalks, transcription

Bruun Jensen C, Lauritsen P, Olesen F (red). (2007). Introduktion til STS, Hans Reitzels Forlag.

Danholt Peter, Simon K Madsen (2007): 'Posthumanitet og cyborgs' i Bruun Jensen C, Lauritsen P, Olesen F (red). Introduktion til STS, Hans Reitzels Forlag.

Gray, C. H. (2001): Cyborg Citizen. London and New York: Routledge.

Ihde Don. (1979). Technics and Praxis, Synthese Library vol.XXIV. D.Reidel Publishing Company, Dordrecht, Holland.

Ihde Don. (2008). Ironic Technics. Automatic Press. USA/UK.

Jensen Peter K.A. (2004). Da mennesket blev menneske, Gyldendal.

Jensen Peter K.A. (2019) i Høiris, Ole og Jensen, Peter K.A.: Evolutionens menneske – menneskets evolution, Århus Universitetsforlag.

Latour, Bruno (1994): 29-64. On technical mediation: Philosophy, sociology, genealogy. Common Knowledge, 3

Latour B. (1999). Pandora's Hope, Essays on the Reality of Science Studies, Harvard University Press, London.

Marx Karl og Engels Friedrich (1848): 'Om arbejderen og maskinen' i Det Kommunistiske Manifest; Den tyske ideologi (Peter Thielst (red), Det lille Forlag 2004.)

Nielsen Keld, Nielsen Henry, Siggaard Jensen Hans (1990): 39-44. Skruen uden ende, Gyldendal.

Nylén,D., Holmström,J., Lyytinen,K. (2014), Oscillating between four orders of design: the case of digital magazines.' Design Issues, 30 (3):53-68.

Papola Simo (1982): 201-202. Flodrigerne i Politikens Verdenshistorie bind 3. Erling Bjøl (red)

Verbeek P.P. (2019). What Things Do: Philosophical Reflections on Technology, Agency, and Design. Summary. Academy.edu.

Verbeek P.P. (2008). Morality in Design: Design Ethics and the Morality of Technological Artifacts. In Philosophy and Design. P.E.Vermaas et al. (eds.). Springer.

Verbeek P.P. (2006). Materializing Morality: Design Ethics and Technological Mediation.
In Science, Technology, & Human Values, Vol. 31, No. 3, Ethics and Engineering Design pp. 361-380. Sage Publications, Inc. (2006).