



An Essay About the Impact of the Digital Revolution on Higher Education in Art and Design

Hendrik Wahl^(✉)

American University in Dubai, Dubai, UAE
hendrik@optio-n.com

Abstract. This paper focuses the shift in human culture and society, delivered by the digital revolution. Due to an expected dematerialization of the most future products and services the contradiction between the classical value of a commodity, negotiated in the traditional exchange systems and the digital economy will further increase. This again will contribute to dramatic changes in production, rendering gigantic industrial complexes obsolete, which puts the personal creativity as an eternal, never expiring source of inspiration, art, design and high elaborated products into the focus.

Starting from this point we want to explore how future-oriented education can meaningfully interlink the widely chaotic processes of art and design production, the absolute necessary fuzziness of an artist's mind with the cool and sometimes unforgiving logic of the digital machines. We are deeply convinced that this is not a matter of interface-design anymore. That's why we want to go beyond any conventions and rethink higher education in the domain of art and design related creativity, virtuosity and intellectuality under the impact of the digital revolution from the beginning. By conducting an analytic review of the mindsets and methods applied here, we are expecting to face the major challenge in defining the criteria, which are allowing us to establish and to sustain a dynamic balance between the needs of the carbon beings and the possibilities of their siliconized representations - far apart from buzzword centered platitudes.

Keywords: Art · Design · Higher education · Digital revolution · Human labor
Dematerialization · Fuzziness of the artist's mind · Tectonic shift
Parallels in history · Industrial robotics · Uniformity of mass-production
Philosophy · Creativity · Virtuosity · Intellectuality · Global society
Self-regulating markets · Deviation · Evolution · Success · Ethics
Needs vs. Possibilities · Lifelong learning

1 Introduction

The world we are living in is subjected to a dramatic change. Something deep below in human society has lost coherence. Our certainties, our thinking, our beliefs in enlightenment and progress of the human being, are deeply rocked. At first, subconsciously we get aware of a tectonic shift, delivered to not insignificant extents by the repercussions

of the digital revolution. Interpenetrating any aspect of an increasing number of individual lives, the promises made by the concepts of pure reason and formal logic, to deliver a reliable order of knowledge and a predictable vision of the future are becoming astonishingly challenged from an unexpected direction. Suddenly, memories of seemingly long forgotten phenomena deeply believed to be overcome, now arising from nothingness. Newer variations of protectionism, separatism, discrimination, alternative facts, speech regulations and backward oriented sentiments are gaining perceivable relevance within an increasing segment of the population. This development indicates a climate of precariousness, anxiety and the impression of being individually subjected to an overwhelming complexity, controlled by an incomprehensible “establishment” situated somewhere high above.

Since the worldwide networks, the industrial robotics, the magic of digital illusion and other varieties of the technology driven realm, for a longer period have been perceived as a playground of nerds and highly qualified people, now have come of age, unfolding its highly dynamic, chaotic potential on a global scale, a strong urge for simplicity of life, driven by sentiments of easy to understand, compartmentalized structures, for simple criteria of personal identification and distinction has emerged. What has been for years the credo of the user interface design, making highly complex logical systems playful and intuitive accessible for everyone, now shows its flip side - appears to be a mask, disguising, distracting and disconnecting the common user from the actual processes underneath. Sensing this, getting aware of the function of this thin layer, makes an increasing number of people reacting with anger and mistrust in the actually or seemingly in-transparent mechanisms of the contemporary societies and leads not seldom to irrational and crude, “alternative” ideologies.

Looking for parallels to this situation in history, we can recognize a similar increment of social, economic and cultural complexity affecting larger populations - symbolized in the metaphor of the steam engine, heralding in the first industrial revolution. Considering the thinking, of this period (Smith, A., Marx, K.), which has fundamentally shaped the understanding of economy, we can recognize that the paradigms established back then are receiving still highly appreciations in contemporary. Rooted in the conviction that ethical, on mutual benefit oriented collaboration, trust, and fair exchange are the fundamental driving forces of human interaction, the ideas of distributed production-methods and unlimited, self-regulating markets have grown paramount. On the other side, we can find an analytic criticism of the relation between mechanized and human labor and the distribution of the in this way aggregated values. Also a consideration of the metaphor of the assembly line - standing for the industrialized uniformity of mass-production and contributing significantly to the ideology of an eternal economic growth, might help to set up a solid proposition, for the attempt to discuss the correlation between the digital industry and economy on one side and its impact on the commonly as “cultural” considered processes of art and design creation, distribution and education.

2 Proposition

Relaying the deliberations above to the contemporary situation we want to mention a couple of aspects, which are supporting the thesis of the similarity between the industrial and the digital revolution. Seen from the POV of a common person the picture shows at first thrilling but harmless attractions e.g. the computer-generated creatures in blockbuster movies (Tron, Jurassic Park, The Mask,...) comparable with the first mechanical androids e.g. buy Jacques de Vaucanson or Pierre Jaquet-Droz. Next, we want to mention the conflicts about copyrights between the classical music industry and the respective exchange platforms on the Internet in parallel to the emergence of trademarks as D.R.G.M. or MADE IN GERMANY rooted in the British Merchandise Marks Act from 1887. But also this got perceived by the majority to be only a concern of very specific peer groups. Much more severe developments in the domain of industrial robotics, predictive analytics, as well as the activities of security agencies have been for a longer period quite unacknowledged, not to mention the clearly criminal actions in conjunction with digital technology. Also here, we can draw a line to the Luddism in the late 19th century respective to the inventions of Herman Hollerith. In resemblance to the development of various technological supported propaganda methods in the first half of the 20th century, we can see the prosumer contents in the social networks and their influence on democratic and political processes, which has been widely ignored by broader segments of the population - leading now to an increasingly precarious awoken.

Focusing more the domain of industrial robotics and autonomous production it becomes clear, that the distinction between hard- and software describes the frontier where individual human factors as intellectuality, skill-fullness and creativity meets the mechanisms of a global economy and where fundamental changes are taken place. Has the metaphor of the assembly-line established the idea of mass-production as the key to economic efficiency and in extrapolation led to the ideology of a constant growth of welfare, it is nowadays clearly to see that this concept is about to expire. At first, we need to acknowledge that robots are surely able to build robots but never will buy robots. Second, the products of the future will be basically material-less. Since we are able to transfer almost any blueprint and production data in light speed to any place on earth, to any facility, which can generate the specific product without the use of anyone's hand, the era of the gigantic production plants is inevitable over - because the generators of the actual objects e.g. Maker Bots can be dispensed into the residential areas of the cities. This will deliver a major challenge to the concept of diversification of labor and the idea of expanding markets, which are already experiencing the limitation of the globalized economy. Also, the system-constituting concept of the individual effort as the promise for personal success within a community requires an urgent reconsideration. Since the availability of products will become gradually less a matter of shortage in number or overproduction, the paradigm of quantity will be more and more substituted by the qualities a specific solution can offer within a defined timeframe. Thinking about the already existing material-less products, as software, used in mass communication, media and the creative production we can perceive already a process of democratization. In a situation where a movie, can be made with a cellphone, where games and any other software can be developed on a tablet, where all of this can be distributed due to highly

effective digital, common accessible channels it become also in the domain of creative, digital production clear, that the people in future can only rely on their own material-less intrinsic values, their intelligence, creativity and maker skills, which brings us now to the core of this deliberation: education and in particular higher education within the domain of art and design, as a mean for the carbon beings to assert them self and to keep control of the digital spirits we have shouted for.

3 The Subject Matter

Art and design are commonly considered to be cultural subject matters, which are only exist in uplifted spheres, governed by logical non-predictable criteria. But facing a situation where art and in particular design has become increasingly a concern of accessibility, of perceptual narratives and dynamic interconnectivity, this appears to be a non-sufficient argument. When a negligent tip on a smartphone can cause economic turbulences, when a tweet can raise international tensions, when the sublime forces of pictures are commonly used to design opinions - it becomes clear that art and design are increasingly gaining relevance far beyond there traditional domains. Therefore newer ideas in art and design education unconditionally need to pay tribute to the highly interwoven structures and processes of the contemporary and expected societies. Not at least, the ethical momentum as the driving force of human interaction needs to be subjected to a deeper reconsideration.

3.1 Education in Art (Fine Art)

The freedom of art is a well conserved and repeatedly used argument to demand a distinguished understanding for a specific quality in human expression. But to find sufficient indications, justifying the specific difference between art and non-art or to define criteria for a genuine proximity to this subject matter, is everything else as trivial. A significant debate in this domain, which may serve us as an access point here, is the discussion between conceptual constituted art and the phenomenological approach, which refers more to perceivable qualities of certain art pieces. In an attempt of clarification between all the arguments and objections brought forward here, we want to distinguish between sublime narrations and manifest notations, between idea and sensation, between concept and percept. Although these criteria do clearly not matter to the processes of the contemporary art marked, on the other side freedom neither does.

In regard to education the separation between conceptual creativity and practical virtuosity, the ability to evoke the impression of speechless relevance in the spectator's mind, can nevertheless serve as a significant cornerstone. In contrast to the well-preserved myth that the origin of a significant art piece is a sudden idea, which the artists get aware by e.g. divine infusion and which she/he subsequently just need to bring in a manifest form, the reality looks usually quite different. In order to make intentions inter-subjective accessible a specific form of expression is necessary, which requires a transformation of an idea, a mood, a speechless certainty into a manifest piece. Since human perception (the artists as well as those of the audience) is extremely sensitive and

amenable to deception, widely governed by unconscious influences, the process leading to an expression, which subsequently can be considered to be of a certain quality, to be artistic or just breathtaking is everything else but simple. On the other side fine art, appeals in general to perception, to be sensual recognized and to have a certain effect in the mindsets of an extreme heterogeneous audience. Since everyone (except maybe those who suffer from specific physiological insufficiencies) is able to perceive and since any perception is widely governed by pre- and sub-cognitive judgments [1], it is basically not to comprehend why art in the first place should be a subject of highfalutin deliberations, which only can be conducted by peers of a particular domain, who are claiming not seldom to possess a specific intellectual, mostly not closer described access to the subject matter. The fact, that art is not dependent at all on reason and logical validity, does not support this kind of accords; moreover, it makes clear that art founds its existence fundamentally due to practical efforts. During the process of art production, the same fact of independence constitutes the actual freedom of art. But freedom itself is not a value of its own. It is an opportunity but also the obligation to make decisions. How these artistic decisions are made, how the results of these decisions are evaluated, corrected, emphasized, contrasted or even discarded is the fundamental duty of the artist. This is usually a demanding act and is not subjected to the guidance of a super oriented instance and according to the freedom of art neither dependent on theoretical figures. Moreover, it is the ability of the artist to create based on her/his specific skill-sets a form of expression, which gains relevance due to its sheer existence beyond any convention.

Following from this, we may agree that art due to its fundamental independence from any objective criteria cannot be a subject of systematic teaching. In contrast to this, the development of skill-sets and abilities surely can and must be the goal of a related education. Since creativity and virtuosity can be seen as implicit, tacit knowledge founded largely on sensomotoric constituted certitudes, the method of learning in this domain is less a matter of understanding relations between well-vindicated facts but much more a result of continuous experiments on form, values, contrast, form-ground-relations and so on. The question whether classical methods or digital technology are best suited to support learning in this domain should not be seen as a contradiction. Since the reception and appreciation of art is not a matter of, which methods have been used but how a certain quality has been achieved, classical and digital tools should be applied to supplement each other. In regard to teaching and learning the focus should be laid on the acquisition of the principals, which subsequently supporting the transformation of ideas by a creative act into a manifest form of expression. Since this process is governed to large extents by the application of tacit knowledge, studio classes, which are focused on the development of particular skillsets (classical as well as digital), and which are conjunct each other can be the mean of choice to impart the underlying principals and the advantages of each particular toolset/method.

3.2 Education in Design (Product, Motion, Interaction, Visual)

The distinction between design and fine art is commonalty reasoned by the specific way human creativity is respectively applied. In contrast to the fundamental rejection of any convention rightly demanded by the fine and some performing arts, the domain of design

is much more determined by concrete and methodic aspects. Nevertheless also here the common phrase used to appreciate extraordinary design is; to experience something new, a new look or style, a new approach to a formal or gestalt problem, a new manner of user interaction or the application of newer concepts of knowledge as e.g. cloud intelligence, procedural creativity or network distributed automata. Since we are facing a development of dematerialization, functional integration and common accessibility in regards to future products and services in contrast to an astonishing resilience of classical economic exchange methods, design today is less a matter of well established, reductionist approaches as form follows function, phantasy, fun, fiction, emotion and so on. Design today faces much more pivotal questions, referring to the eternal problem about the relation between the un-extended ideas (virtualities) and the actual, extended realms everyone is an inherent part of. The duty of design today (among of course other disciplines), is nothing else but to find practical solutions to define the relation between the increments of complexity we are facing in the interaction with the highly dynamic processes of the contemporary world and the fundamental needs of any individual. These needs are on the first hand not compulsory of an aesthetically nature. Moreover, they are increasingly defined by an individual's relation to it's particular and global environment, they are a matter of mutually beneficial interaction, of a meaningful, balanced life, of the cultivation of needs, of the conscious use of resources and of sovereign interacting within the contemporary society. Design today is a question of the relation between the forms of objects, the forms of dynamics and the forms of intuition.

Conducting an approach towards a contemporary design education - it might be useful for methodical reasons, to pay tribute to reductionism in order to distinguish 3 major elements of equal importance (creativity, virtuosity, intellectuality), which any design process is consisting of. At first and foremost we need to consider creativity. Creativity is characterized as the ability to generate something unprecedented, something, which carries a momentum of surprise, which delivers unconventional solutions and what therefore barely can be a subject of methodical teaching. But looking closer, we can define creativity as the ability to connect given or hypothetical figures in a manner, which can suffice the criteria above. To ignite and to propel this process, various side conditions and methodical measures can be found e.g. in the well establish rules of brainstorming. But using the brain only, which traditional deals with categorization to increase the effectiveness of thinking, might be not enough. When we want to overcome boundaries given by classical formalized notation systems as specific languages or subconsciously established traditions of thinking, it can be very helpful to interconnect the text with nonverbal forms of expression. When we start to scribble, to sketch, to knead a chunk of clay or to run computerized iterations on a simple shape, we can achieve figures, forms and types of connection of which, we would not have a word neither an idea before. Doing this in a team of equitable members in a non-competitive situation will increase the chances to achieve unique solution furthermore. If we complement the realm of rhetoric with the domain of nonverbal expression we are facing the next major element of our canon, practical virtuosity.

A sketch, an accord, a color scheme, a specific type of motion or interaction can trigger our perceptual system in most effective ways and push ideas in unexpected directions, far apart from the boredom of, the extensive use of prefabricated templates,

the coward attempts of “luxuryzation”, or the hesitantly conducted “brand-cosmetics” so often perceived today. Off course the development of skill-sets, virtuosity and craftsmanship in the domain of visual, procedural or product design is not limited to visual thinking, but moreover a major factor in order to develop ideas further, to gain confidence about a particular solution and to communicate process and status of a specific design project. To focus on the development of creative craftsmanship is, therefore, an unconditional necessity for a contemporary whole person education in any field of design. To draw a well tense line, to create constant curvature in freeform (A-class) surfaces, to achieve color consistency or complementary, to reach continuity in time-based media, or to provide smooth blends in interaction is definitely not a question of whether it has attempted but gains relevance when these qualities are just presented to perception. In particular when this takes place on a subconscious way, we can achieve a momentum of surprise, emphasizing the well known quote, which says: outstanding design is invisible. Due to the nature of the implicit, tacit subjects of learning here, we need to understand that the only way to develop mastership, to gain virtuosity is to conduct frequent exercises of the particular skills as e.g. sketching, perspective drawing, rendering, color composition, typography, animation and motion design, virtual and physical prototyping. Since we clearly can not accurately predict the final outcome of a virtuous creative process, since any methodical approach in this regard does not guarantee a specific effect, we want to suggest to consider the efforts leading to outstanding design solutions as non - reductionist. Facing the significant effect of nonlinear approaches conducted by creative virtuosity, the methodical methods (analog, digital or intellectual) applied here, can be clearly indicated as tools, which only gaining relevance due to their application within the creative process. So the question whether analog or digital techniques are the mean of choice within contemporary design education becomes finally subordinate.

Nevertheless, since we have characterized the actual processes within the realm of design as not linear constituted, we are now on the edge where creativity and virtuosity need to be supplemented and interwoven with intellectual, theoretical deliberations. The role of intellectuality within a state of the art design or applied arts education can in the first instance seen as the development of an open, whitely scoped mind, which is interested in various implications and relations. It is indisputable that an individual, which has developed a well-founded, heterogeneous and wide-ranging knowledge base possesses significant advantages when it is requested to generate highly integrated and unconventional constituted mind maps or to conduct creative explorations. It is also self-evident, that a person who can supplement thinking with visual expressions, emotional narrations and a procedural understanding of form and gestalt will much more likely be able to find sufficient solutions on particular design problems. Therefore theoretical and research-oriented approaches towards design related phenomena are already fundamental justified. But there is another dimension, which exceeds the traditional theory in the domain of design. Since we are facing a radical increment of the complexity of almost any aspect of everyone’s life, we are urged to find solutions at the edge between the overwhelming amount of virtual opportunities, granted by the digital domain, and the basic aspects, which are defining our self-concept as independent individuals. A strategy to find answers to this problem can be oriented in two main directions. On one side we

see the obligation of any one to define its own freedom by making well-founded decisions. In the process of contemporary creative design, this must be directed to the acquisition of individual abilities regarding to the creation of unconventional solutions, which are earning appreciations and getting considered to be of a certain, distinguished quality. The efforts to be undertaken in this regard are of an individual, practical nature as the continuous exploration of form, gestalt, interconnectivity, and the lifelong acquisition of knowledge. On the other side and interconnected with the point above, it becomes increasingly important and someone may say difficult, not only to keep up to date with the progressive acceleration within the digital domain. Moreover, it is eminent to define the essential ethical needs of the human being, as social-economical stability, mind- and meaningful interaction, mutual beneficial collaboration and the conscious use of resources as the conditions, which any technological development should be aligned to. The realms of art and design, in this regard are not the worst places to start on. Since predictive analytics are wildly considered to deliver quite reliable forecasts of behaviors within human populations and to model average personalities; the artist, the designer today is nothing else but requested to exceed this average in order to sustain a mindset, which is expressed in the term individual. The means to do so are provided to not insignificant extends by digital technology, but the ways to use them, to act in unpredictable manners are still in the hand of the carbon inter-agent.

In order to close this paragraph, we want to paraphrase the structure-defining elements; a contemporary education in art and design should be committed to. In the first place stands the idea, to focus the actual needs of the human being. Considering beneficial interacting as more important then profit making, brings the problem of how to make things in the focus. This is basically not a matter of numbers or data and conjunct with an emphasis to tacit qualifications, as creativity, virtuosity and the ability of unconventional intellectual reflection. Done frequently and various manners (classical and digital), this aims to a cultivation of sensitivity in perception, creation, interaction and subsequently is a prerequisites to achieve creative, virtuous mastership. By supplementing the practical efforts with theoretical activities in order to foster critical independent minds, which are assessing any promise made by technology, ideology or economy, the answer on the question of design today is a constant approach to the relation between the form of objects, the forms of dynamics and the forms of intuition.

4 Criticism

Coming back to the discussion above, regarding the increment of complexity pervading all aspects of anyone's life due to the progress in the realm of technology, we can identify a series of indications, which are delivering severe repercussions to the economic and social structures of contemporary and expected societies.

At first, we need to recognize, that the idea of an unlimited expansion of the markets is reaching an ultimate boundary, defined by the limitation of the nowadays-actual globalized economy. Facing a situation, in which any physical, as well as any virtual product, can be created everywhere on earth to any extent and subsequently can be distributed due to highly elaborate logistic networks anywhere, the classical merchant

doctrine of supply and demand as the ultimate regulating principal is becoming fundamental questionable. This leads to an emphasis on intensification, in order to sustain the increase of profit. The reaction to this problem, expressed from the standpoint of the classical intuition, is to demand radical deregulation. In particular custom duties, but also variations in technological, social or environmental protection standards as well as specific cultural implications of local markets are seen as significant restraints, detaining the unimpeded flow within the global economy, allegedly guaranteeing an eternal growth of profit and subsequently leading to an increment of common welfare.

On the other hand, we can find strong indications that the idea, which supposes, that common benefits can be only achieved due to the enforcement of individual self-interested behavior does not gain a common appreciation anymore. In conjunction with this, the classical theme of capitalism, insisting that individual success in life is a matter of pure determination, of self-optimization, of acquiring highest grades in education, and delivering maximal performance is losing charmingness. What has been a promise of chance, twists under the conditions of the global economy, automata production and highly distributed labor more and more into in a figure of linear thinking, which delivers sublime threads to the individuals, who are scattered around the globe and requested to offer their abilities to unrestricted marked conditions.

Looking in this regard closer on the economic concept of market prices, which suggests that the final price of a product is constituted, not by the actual expenses on raw material nor by intellectual effort or labor force applied in production, but by the amount a customer is finally willing or convinced to spend, illustrates the situation in which individual creativity, virtuosity, skills, and intellectuality are requested to be offered and applied. The criteria on which the decision to purchase a certain product is made, is in the most cases also less a matter of an actual need, but widely influenced by implications as limited availability, seasonal trends, the promise of exclusivity or a special discount. This is where the marketing and advertising industry derives its right to exist. Here we can perceive various methods and attempts to gain influence on the equilibrium between supply and demand. In order to achieve or to enforce the desired profit a scope of activities is applied, ranging from reasonable means of customer care over the application of predictive analytics and further to ethical clearly questionable measures. Thinking of production methods fundamentally relying on the exploitation of labor under precarious social conditions around the globe, of marketing mechanisms to enforce overpricing by establishing artificial shortages or alleged exclusivity, of actions which are in regard to existing market regulations are just illegal as price rigging or of even more severe criminal activities, as the conspiracy we have seen e.g. in regard to the “Dieselgate” emissions scandal [2], the unrestricted freedom of economy shows its dark flip side. An indication, that the mindset behind this kind of activities is not a regrettable exception, executed by a small number of ethical mislead individuals, but an inherent characteristics of an ideology, which refers repeatedly and with emphasis to the idea of the freedom of business and markets, can be easily found already by Adam Smith. *“People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the publick [sic.], or in some contrivance to raise prices. It is impossible indeed to prevent such meetings, by any law which either could be executed, or would be consistent with liberty and justice. But*

though the law cannot hinder people of the same trade from sometimes assembling together, it ought to do nothing to facilitate such assemblies; much less to render them necessary” [3].

Nevertheless, during the age of the uniformity of mass production the relation between supply and demand, of applied labor and more or less fair wages has been, at least within the industrialized nations and due to the constant altercation and strive in a social economical balance. But the character of the actual product has over time become subjected to significant changes. Has the products of the early assembly line helped to content dramatic needs, the capacity of the industrialized mass production soon provided oversupply, putting marketing and the question of the distribution of the generated values into the focus of the intellectual and political discussion. An indication of this development can be seen in the thesis of alienated work, by Karl Marx [4]. The product, which is created in an industrial manner, does not refer to any individual needs anymore. The relation a worker, who assembles just a part of a machine, develops to the product she/he is working on no direct relation but sees the time and energy spend in the factory as a mean to earn a specific salary. Seen from the other side of the table, a specific product also is not of a particular interest, since the quantity of mass production and its average quality deliver the key figures, in which the success of a company is measured. Due to the process of technology and automata in production, the relation between production, distribution, and consumption is drifting even further apart. On one side we can recognize a trend in the creation of value, which more and more finds its expression in virtual processes e.g. within the sector of the finance and reinsurance industry. On the other hand, we are facing a constant dematerialization of contemporary products and services. Conjoint with this development of virtualization we can also perceive an ongoing separation between the design, the development, the actual production process and the manner products and service are distributed and used. Thinking of an production-pipeline of classical machinery to day, it is not difficult to imagine, that a specific finance and business concept is be made in e.g. Great Britain or America, the design of the product and the interaction narratives might be made in Italy or Korea, while software components are developed in Finland or Japan, feeding production facilities in France or Brazil, from where sub-assembled units or the end-product will be finally shipped to the worldwide markets. Thinking further, of the productive collaborations applied in software development, the structure of the creation can be described in a similar way, but without the need of physical logistics already today. Imagining the extreme points of such a development, we may think about a situation where all design data of any product are instantaneous digital accessible everywhere around the globe, just in the way as the 24/7 accessibility to software products is already. Now the actual production of a specific good can be done on demand at the home or e.g. a digital prototyping center in the vicinity of the residential area, where the end-user is situated. This, in consequence renders vast production plants, storage and transportation facilities widely obsolete and brings the point of production to the identical place as the point of sale. The place where the actual design and development of such a product takes place is respectively also not necessarily located at a specific geographical area but can be dispersed to the home offices of the individual developers. Going one step further along this thoughts brings us to a situation, in which the actual physical product might become finally obsolete at

all. Since it is not a question whether but moreover when and how we will be able to achieve a level of technical, sensorial and motoric stimulation, which allows evoking any type of impression by seamless blending any kind of virtuality in our cognitive reality, this is not a tail from utopia. Soon, we will be able, by wearing a VT/AR device, or even further having a respective user interface implanted in everyone's brain, to face the opportunity to access any augmented immersion e.g. driving a vintage car on a scenic road, having an exclusive meal at the top of Olympus Mons on mars or to satisfying our deep interwoven desire of competition by fighting virtual creatures in breathtaking game levels, without the presence of any physical product, which is result of an classical design, development or production process. Apart from the idea of augmenting cognitive reality to the maximal extent, in which consequently any interface between technological virtuality and cognitive integrity vanishes away, delivering a singularity, where any discussion leads immediately to an infinite regress and to a denial of individuality, personality, and humanity, we can still find valid access points to think further.

Despite a situation where the concept of the actual product is increasingly less suited to justify a specific value (due to its instant and unlimited availability), we are facing a world full of overwhelming supply of virtual services and digital opportunities, which can be seen as an indication of the shift from expansion to intensification in worldwide economics. Since we just need to talk to Alexa, Siri or the Google Assistant in order to enter full-scale pampered living, questions pointing to the concepts of free will, independent mind, individual creativity and how to prevent that the human being is becoming in consequence, just an expendable appendix of the silicon logic, gaining relevance again. On one side the fully interconnection of any data a individual is "producing" due to the use of digital devices (smartphones, home pods, bracelets) offers great opportunities in regard to obtain living quality for larger populations. On the other side, the way in which the so acquired data are used, delivers serious conflicts in regard to transparency of social-economic processes and private autonomy. This becomes significantly lucid under the aspect of how those data becoming subjects of the traditional capitalistic economy. Under the paradigm, which sees those processes as a law of nature like technological evolution, any attempt to translate all kind of human activity into digital data, into the ultimate raw material for whatever algorithms, capable to predict, to steers and to manipulate social interaction are absolutely justified means to shape future societies. Following this ideology we can recognize a tectonic shift between the concept of quality and quantity, resonating the theme of the industrial mass production further to likes and followers into contemporary. But does this approach, of which the term predictive analytics is standing for and which fundamentally relies on the concept of the average deliver enough system-constituting significance to replace the idea of excellence? Is the logical methodology able to deliver a comprehensive, indisputable narrative, able to operate with any kind of frequently chaotic human behavior, social interaction and political opinion formation? At least the communist ideology, which has claimed similarly by the alleged or proclaimed descendants of Karl Marx, has been obviously proven wrong in this regard.

In a situation, in which the concept of the actual product as the carrier of a specific value is losing significance, where the question of raw material is expected to shift gradually from the exploration of natural resources towards an infinite reproducible and

expandable binary matrix, where any product is instantaneous and to any extent accessible, rendering classic merchant doctrine to zero and where computing power is undergoing an dramatic process of democratization, the only source which can be a subject of generating value or profit, in the classical intuition of capitalism is human intellectual and creative ability.

This seems to be formidable news for anyone who sees the field of excellent and lifelong education as the realm where meaningful efforts in the development of the human society can be undertaken. While this is basically not to deny, the contemporary situation delivers severe contradictions. Since we rightly can speak of a creative, intellectual proletariat in order to describe high educated, creative people who are requested to offer their energy and time to an economy which shows a quite stiff resilience to the technological, social and cultural development today - the criticism, which needs to be applied does not go to technology, art or design but to the concept of amount and eternal growth of profit, which is apparently incapable to deliver a commonly acceptable vision of the future.

4.1 Looking for Answers

Looking for answers to this unsatisfactory situation can be done along two premises. At first, we need to understand that all of us are subjected to the autopoietic processes of the social systems we are living in [5]. Thinking about the idea of the invisible hand [6] delivers another indication to understand this highly complex processes, as, non-linear and dynamic constituted. In addition, we also perceive a continuously dispute about how the various relations within a human population should be organized best. From the beginning of philosophy [7] up to now, many methodical approaches towards this problem have delivered a commonly accepted metaphor, leading to a coherent narration and further to an ideal constituted government. Despite this, the human society has been undergone significant developments, which usually just post factually have led to respective theories. Therefore we want to consider the processes within a human population as in principle chaotic. This does not mean, that we want to understand those processes as erratic, but neither to be sufficiently characterized in the figure of linear thinking [8]. Moreover, we want to consider the human society with its sub-domains as art, technology, economy, ethics... as a given situation, where a present status, within certain parameters determines the future, but an approximation of the present does not determine a holistic vision of the worlds to come.

Second, we want to consider the capabilities and the limitation of a pure methodical, algorithmic approach towards the non-linear dynamics of human societies. The mindset behind all the activities sub-summarized in the term predictive analytics relies fundamentally on statistics. By quantifying all aspects of human life, by processing this data, by recognizing the pattern in the behavior of a population or an individual, the fundamental conviction expressed here is, to reduce the human being into a quite predictable entity within a social swarm. The contradiction, which emerges from this conception, can be articulated in several ways. We can ask whether it is a good idea to approach social problems with ice-cold technocratic efficiency, whether a government should be organized like a business, whether the human being can and should be comprehensibly

measured in numbers and whether the measurable part of the world, represents actually the entire universe. Or is mathematics just a tool, developed by insufficient beings in order to project “Ordo” into their everyday chaotic life. What has been for centuries a practical mean especially of the merchants has grown over time to pure science. Mathematics claims rightly, to be the only discipline, which can make universal valid predictions, has become in the digital age the metabolism of the economy, which in its original meaning refers to counting, comparing, ranking. Since digital economy today is still largely relying on the application of human intelligence and creativity it is easy to understand, where this conviction is rooted and how it aims to the modeling of social-economic processes in mathematical terms. Understanding the processes within the human economy and society, as mentioned above as nonlinear dynamics, the logical approach today goes not to a certain individual (as in the age of enlightenment), or a specific class (as Karl Marx supposed), but “limits” itself to the behavior of any member of the whole population. This approach can be seen, and is not seldom characterized as the ultimate realization of democracy. Only the actual activity of each inhabitant (conscious or unconscious), will be detected, analyzed, evaluated and becomes part of the collective narration, written in binary language. Any need, desire, lust or action will be anticipated and assistance will be provided at any occasion. The only request of the system towards its inhabitants is system conformity, “Brave new world 2.0”. As compelling such a scenario may appear to certain people in the first instance, it is highly questionable whether it can reach conformity with the fundamentals of the human nature at all.

First, the basic narrative resulting from such a mindset can be criticized with the argument, that actually any ideology before has promised in similar but could never establish a commonly accepted and sustainable equilibrium within the human society. Second, asking the traditional question “Cui bono?” in this case logically would deliver the answer: everyone. Hard to believe, that in particular digital technology should be inspired by altruistic sentiments. And it is even more unlikely, that a larger group of individuals is willing or actually able to overcome the concept of the individual self (origin and precondition of self-interested, self-centered behavior), which has guaranteed the survival of the human being since the cave age on. Third and most important, if we would accept a social-economic situation, which fundamental relies on system conformity of its inhabitants, or moreover where this is factual enforced (thinking off pre-crime analytics), we would finally drown in boredom, mediocrity, arbitrariness, and conventionality. This would be the end of any ethical, political or intellectual discussion but also creative or artistic activities, because the interaction between humans under the paradigm of total system conformity would require a level of “political correctness” where any meaning, any thinking, any idea vanishes in subordination to the rules of grammar.

Any system in nature on the other side, any species, structure or intellectual concept, which is the result of an evolution, has post-factual proven its right to exist. Due to its ability to adapt to instability or to take advantage of the underlying randomness and noise perceivable at any empirical approach to science, the eternal driving force behind nature is rather to describe as constant alternation than static codification. The mutation in a DNA leads to new sets of abilities, which assessed by the particular environment

getting improved or extinguished, a minor deviation in gravity can tip the equilibrium of a cosmic body's trajectory, bringing it on a collision course to earth, a glimmer of hope can motivate people to fight and to overcome any hardship and a modicum of sense renders vast ideologies, committed to the idea of total stability and preservation of the status quo easily obsolete. The momentum of deviation, the unconventionality of creativity, the capacity to make and to understand pictures [9], the ability to overcome self-centered affection and to be inspired by mutual beneficial collaboration, the miracle of falling in love are factors, which are deeply interwoven into the fabric of which human beings are made from. Thinking about, how these aspects can be acquired and reliable transformed into the raw material for pure logical algorithms, can be an inspiring task for people who are looking from the technological side to this problem. There is not a shadow of a doubt that there are countless attempts in this direction (thinking about dating-portals today may illustrate this). To be not misunderstood, each of these attempts is justified in the regard, as it represents a deviation from the status quo. Which and whether an algorithm will gain relevance, is under this mindset largely a question of software Darwinism, isn't it? From the systems point of view, which is not committed to particular interests; this appears to be an example of absolute conformity. Supposed a machine, makes the algorithm, which is an entity of the same kind as the system, everything could be seen, to be quite coherent. If the algorithm is man-made, if it is a product of human labor, effort, of the transformation process of the widely chaotic human creativity into methodical applications, we are starting to sense the tectonic shift underneath. Having an ultra-efficient digital infrastructure on one side, interested in nothing capable to do everything and constituted to be total opaque in regard to the mechanisms inside renders the human being just irrelevant. It neither can compete in speed, endurance, means of perception, the extent of its formalized knowledge base or any other criteria, which matter within the digital networks, nor is it able to acquire a profound understanding of the processes situated behind the masks of the user interfaces. In particular, the last indication can be seen as quite critical. Since the in-transparency of such systems is on one side result of the concept of intellectual property owned and secretly hidden by the system carriers and providers, which theoretically can be overcome - on the other side opacity gradually becomes a contingent feature of such systems, due to self-learning algorithms. These algorithms, which are able to emulate evolutionary principals in order to process data sets of incremental complexity and non-linear dynamics, do apparently deliver logical appropriate solution to given problems. But no one is finally able to understand how these solutions are made (compare: AlphaGo against Lee Sedol, [10]) and which parameter are relevant and which not. This puts the human being under an immense sublime pressure, rendering the system constituting narrative of capitalism, that everyone can reach anything by determination, enhancing of performance and the acquisition of knowledge and skills just meaningless.

4.2 How to Deal with This Situation?

The typical reactions, which are resulting from the evolution of human creativity, in a situation which appears to be dominated by totality (technological, economical, ideological) is not seldom retreat or the establishment of private save-spaces (echo chambers)

and the development of idiosyncratic narratives. On the other side, it also can be perceived, that individuals are attempting to reach system conformity at all cost by denying their individuality, by the use of self-enhancement methods (medication on an individual base or e.g. prenatal diagnostic in regard of their descendants) or by employing measures, which are ethical even more questionable, as the implementation of distinct in transparent value systems (thinking about clan structures, lobbyism or nepotism). This can explain the urge for departmentalization and separation to be perceived in contemporarily politics, the boom of cosmetics surgery or respective medication and the rise of cybercrime. Since all these phenomena are indicating an alignment to the concept of intensification, following the leitmotif of the industrial age, of uniformity and mass-production, of an ideology of continues economic growth by piling up commodities and virtual values, it might be helpful to shift the focus in other directions. Being saturated with the idea of problem solving, of being committed to perform efficient accordantly incomprehensible criteria, is something, which narrows attention, limits understanding and extinguishes creativity, which is perceived to be unhealthy and not an expression of the fundamentals of the human nature. Due to the fact, that this unilateral point of view does not considers the unspoken and unspeakable (not meaningful formalizable) qualities of human existence, addressed by the implicit, tacit efforts undertaken in the realm of art and design, we want to understand this fraction of the human nature as the actual domain where a related education ion art and design can deliver significant contributions.

5 The Digital Age and Higher Education in Art and Design Today

Turning away from the idea of being surrounded by more or less critical problems, which need to be solved in increasing shorter timespans, in order to be efficient and therefor a valuable member of the society, we can ask: which particular problem have actually been solved by artistic expressions or iconic design pieces as e.g. the painting “Hauptwege und Nebenwege” (Highway and Byways) by Paul Klee (1929), the “Matteuspassion” (Matthew Passion) by Johann Sebastian Bach (1727) or the Lounge Chair by Charles and Ray Eames (1956)? To reduce the answer, to this question to utilitarian aspects, to a matter of prestige by the particular owner or to a question of entertainment will surely fall far to short in this regard. If we have the impression of getting inspired, enriched, touched, by an artwork or an iconic design, by a piece of music or performing arts we are perceiving something, which is not and does not need to be logical, precise or calculable. Despite this, the results from those clearly not problem-solving oriented expressions of the human nature do certainly deliver significant impacts to our perception, mindsets and doing. There is nothing to define in regards to the question, what actually can be the subject or outcome of a creative art and design process. People are interested to create, to express unspeakable certitudes, to transform thoughts by gestures of the visible hand into manifest art or design pieces - from the cave age on. Since then, the products of this deep inherent urge are gaining relevance to other individuals, who are getting inspired, enriched, challenged to do similar or to find new approaches, to change their mind or to provide insights to there individual thinking and doing.

Given a world, which offers any amount of binary raw material, any mean of design and production facility to transform data into physical objects and any kind of distribution channel, it makes no sense at all to compete with technology and the cadence of the machines (today measured in GHz). Also, the idea of mass production, the accumulation and concentration of nonproductive value to insanity, the ideology of an eternal growth of welfare by expanding into untapped markets appears to be increasingly less compelling. In front of this backdrop, the question of “what” to do in order to generate profit turns gradually into the question of “how” to make things, which actually matter to people - and this is basically the access point where education in art and design can connect to. Since the relevance of a product resulting from the creative process is increasingly less restrained from technological limitations, the side conditions under which art and design related efforts can be conducted best, shifts into the focus. Here we can think about concepts, which are aiming to obtain the living, and working conditions of any individual in order to unleash the creative potential, today most applied to suffice the paradigm of the number. This is everything else but trivial, but the three main premises, mention above can serve as a guiding idea.

First, we can think about an education concept referring to the development of interdisciplinary creativity. Since we have characterized creativity as in principal oriented to reach non-conventional results, the act of deviation needs to be emphasized. To propel this act, a high amount of professional and ethical integrity is required in order to establish an atmosphere in which individuals can go beyond their traditional thinking, cultural imprints and practiced behavior. Supplemented by means of visualization, the domain of implicit, tacit knowledge can be seamlessly integrated into the creative process, leading to a much more flow-like interaction with individual thoughts and within the inter-subjective communication. Developing the ability to create compelling visual, haptic or processual designs, which are deliver speechless perfection marks the second domain, in which respective efforts should be oriented. Since implicit, tacit knowledge and skillsets are neither a matter of logical thinking nor do they deliver methodical predictable outcomes, the concept of effectiveness is barely suited to be a guideline of learning a teaching within this domain. Moreover, it is the individual involvement, the relationship between the student and the person (the word teacher would fall to short), who has proven its ability to develop, to communicate and to exemplify the art of speechless expression, which matters most in this regard.

To close the circle, we want again emphasize the momentum delivered by a well-founded sense of quality, by a approach which puts more attention of the necessary instead of the possible, by being mindful and sensible for silence, vague, unspoken expressions and by sensing the manner, how Qualia [11] leaving significant traces in perception and mind, without being a stringent argument. Doing this, with an inner urge to understand the approaches, conducted over centuries, by people who are fundamentally more interested in knowledge than in profit, can constitute a mindset, which is critical against any ideology, interested in the deviation from the common, driven to achieve speechless perfection and resilient to adopt to “Innovations” proclaimed by any type of mainstream. Individuals, who can commit their self to this kind of endeavor, who are willing and able to adapt their perception and mind to the unspoken truth, will be best prepared to apply creativity, virtuosity and ethical principals in order to sustain

the independence of the carbon-being, in critical opposition and creative, virtuous conjunction with the silicon logic. Whether this can be achieved in total, is everything else but certain. And totality is not at all the mindset behind this article, but we shall never stop any attempt, to make the human society as congenial and adaptive to further developments, as possible and digital technology is a powerful mean to do so.

References

1. Frey, S.: Im Bann der Bilder. In: Zerdick, A., Picot, A., Schrape, K., Burgelman, J.-C., Silverstone, R., Feldmann, V., Heger, D.K., Wolff, C. (eds.) *E-Merging Media*. European Communication Council Report, pp. 137–151. Springer, Heidelberg (2017). https://doi.org/10.1007/978-3-642-18600-4_8
2. Dieselgate emissions scandal (The Guardian, 2015). <https://www.theguardian.com/business/ng-interactive/2015/sep/23/volkswagen-emissions-scandal-explained-diesel-cars>. Accessed 12 Feb 2018
3. Smith, A.: An inquiry into the nature and causes of the wealth of nations (1723–1790). Reprint, Originally published. Clarendon Press, Oxford (1979). (Glasgow Edition of the Works and Correspondence of Adam Smith; 2)
4. Marx, K.: Karl Marx, Friedrich Engels. Werke, Berlin 1968, Band 40, S. 510–523 (1844)
5. Luhmann, N.: The autopoiesis of social systems. In: Geyer, F., Van der Zeuwen, J. (eds.) *Sociocybernetic Paradoxes: Observation, Control and Evolution of Self-Steering Systems*, pp. 179–192. Sage, London (1986)
6. Smith, A.: *The Theory of Moral Sentiments*, vol. 1, p. 184 (1976). The Glasgow Edition of the Works and Correspondence of Adam Smith, vol. 7. Oxford University Press
7. PLATO, MENO 71e-72a
8. Laplace, P.S.: *A Philosophical Essay on Probabilities* (1951). Translated into English from the original French by Truscott, F.W., Emory, F.L. (eds.) 6th edn., p. 4. Dover Publications, New York
9. Jonas, H.: Die Freiheit des Bildens. Homo Pictor und die differentia des Menschen. In: Jonas, H. (Hg.), *Zwischen Nichts und Ewigkeit. Drei Aufsätze zur Lehre vom Menschen*. Vandenhoeck & Ruprecht, Göttingen (1963)
10. AlphaGo against Lee Sedol (The Guardian, 2016) <https://www.theguardian.com/technology/2016/mar/15/googles-alphago-seals-4-1-victory-over-grandmaster-lee-sedol>. Accessed 12 Feb 2018
11. Jackson, F.: *Philos. Q.* **32**, 127–136 (1982)
12. Nagel, T.: What is it like to be a bat? *Philos. Rev.* **83**, 435–450 (1974). see p. 436