

ETHICS = DATA = INFORMATION: EVERYTHING IS INFORMATION

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7.1 The School of Athens

‘In the beginning was the Word, and the Word was with God, and the Word was God.’ In the beginning was the information, and the information was with God and the information was God. In the beginning there was the Big Bang¹⁸². This is the idea (information by human perception) that the universe began as a single point and then expanded and stretched as large as it is now and is still expanding.

¹⁸¹ Arend von Campen, MA, MCybs, Researcher, Switzerland. Research towards sustainability: www.sustainability4all.com. The article is an excerpt of a longer manuscript. © Globethics Publications, 2023 | DOI: 10.58863/20.500.12424/4276015 | CC BY-NC-ND 4.0 International.

¹⁸² Big Bang Theory: NASA Space Place, <https://spaceplace.nasa.gov/big-bang/en/>

The first step in this research will be to travel back in time and visit the School of Athens¹⁸³, because of Aristotle's emphasis on wisdom. Knowing why, hence discovering the first cause and effects of an information deficit on living systems, the environment and social cohesion. To establish empirically the hypothesis' anthropogenic failure due to information deficit, this research endeavours to seek knowledge of the first cause.

The School of Athens had four main goals or purposes:

Seek knowledge of Causes

Divine Inspiration

Knowledge of the Divine

To each what is due

This research will apply number 1.

... In the 1991 movie 'Mind Walk' written by Fritjof Capra¹⁸⁴ and directed by his brother Bernd, three people, a poet, a failed candidate for the US presidency and a physicist roam the island of Mont Saint Michel in France pondering over and discussing the world's existential threats, problems and ideologies such as religion, geopolitics, scientism and threats such as wars, conflict or pollution. They agree and decide that these issues have in fact one cause which is how people perceive reality. 'A crisis of perception' writes Fritjof which he repeats often in his books, courses, talks and presentations. The movie was based on his book 'The Turning Point' (1991): '*are we now at one of these turning points*' one of the characters asks at the end of the film. When exploring the first cause principle the following question is necessary to understand the nature and origin of our perceived and experienced reality, resulting in probable harmful actions; what is information? Recognizing probability patterns is key in this research. On one hand people have unlimited creativity to design art, observe and visit space or build the

¹⁸³ School of Athens: <https://www.britannica.com/topic/School-of-Athens>

¹⁸⁴ Capra, Fritjof, Byars, Floyd and Capra, Bernd, *Mindwalk*, Brass Tacks Press, 2021, 1st. ed. 1991.

Sagrada Familia and on the other hand destroy life, the environment and social cohesion. This research will endeavour to establish that the first cause destructive tendencies and harmful design are unawareness and ignorance of the value of information.

7.2 What is Information? What is Entropy?

7.2.1 Information is physical, related to entropy

These questions are asked by several late and contemporary physicists. Rolf Landauer stated that information is physical (Landauer, Rolf, 1991)¹⁸⁵ and related it to entropy, which leads to disorder in systems, describing the measure of entropy in a number of bits which are often regarded as binary units of information but according to James V Stone¹⁸⁶ in his book 'Information Theory' (2015) can be understood as: a bit is the amount of information required to choose between two equally possible alternatives e.g., left or right, true or false, up or down, wet or dry, etcetera. and a binary digit is the value of a binary variable, which can adopt one of two possible variables (i.e., 0 / 1). Information is expressed as a quantity next to a quantity of mass and a quantity of energy, all three of them interrelated, interconnected and interdependent. The mainstream consensus is that the universe consists only of matter and energy, which as we shall learn here, is a fundamental misperception, the one which Fritjof Capra talks about. It leads to a misunderstanding of reality that information is not always deemed important and therefore can be ignored, while, as this research will endeavour to establish, information is as or even more fundamental than physics and therefore also must be the foundation for and of physics and our experienced reality.

¹⁸⁵ Landauer, Rolf, Information is physical, *Physics Today* 44, 5, 23 (1991); <https://doi.org/10.1063/1.881299>

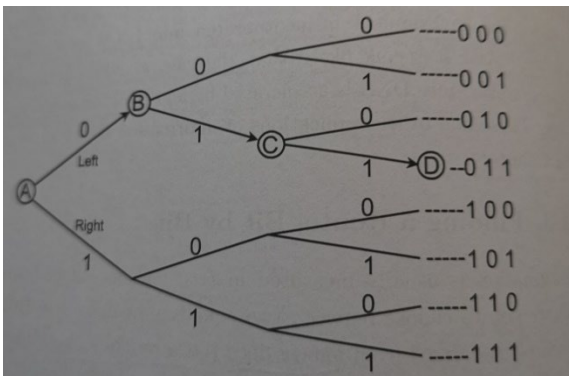
¹⁸⁶ Stone, James V, *Information Theory, a tutorial introduction*. <https://doi.org/10.48550/arXiv.1802.05968>

7.2.2 Twenty questions

Let's play the game of 20 questions, mentioned by Carl Sagan in his series *Cosmos* part 11, (1980). This is a method to quantifying the information, by reducing the number of choices after each question to reach an answer: for example: 'is it alive or not alive?' 'Is it an animal?' 'Is it big enough to see?' 'Does it grow on the land?'

This method of questioning is a form of information or data collection to reach a solution or find an answer to the question: 'what is it?' After discovering the answer, it must be interpreted by human perception by all human senses, not just by the brain, in order to process the information into an experienced and viable reality. After each question and answer one ends up with 1 bit of information which allows one to make a choice between 2 equally probable alternatives (yes or no, 1 or 0). When one finds 2 bits of information, one can choose between 4 probable alternatives, 3 bits means 8 probable alternatives and so on. Increasing alternative probabilities also increases the quantity of information and thus the prospects to find an answer.

In twenty questions one can obtain 20 bits of information (Illustration below from the book 'Information Theory'). This allows for the



empirical scientific method is that it does not ask all the questions, but limits itself to test scientifically by allowing the use of the physical human senses like 'sight, touch, smell, taste and hearing, which are mechanistic, analytic and reductionistic. They won't allow 'all relevant information' nor synthesis, which renders the results, although usable, no longer scientific due to a paradigm change.

Here is a listing of the overlooked or ignored importance of allowing and learning by a changed perception. The fresh insights and sciences to do this are available. Please find new, but not yet implemented scientific and logical probabilities which are needed to understand the whole, rather than the parts;

1. Relativity eliminated the Newtonian illusion of the absolute
2. Quantum mechanics eliminated the dream of a verifiable measurement process. Mechanistic thinking had played tricks on the human mind. It gave people the illusion of being objective and in control (looking in from the outside), but subjectivity (the observer effect) is confirmed by Quantum Mechanics and Quantum Consciousness.
3. Chaos Theory eliminates the fantasy of deterministic predictability, but discovered that order from chaos is a natural phenomenon.
4. Systems theory: everything is interconnected and interdependent (the observer effect).
5. Cybernetics. Norbert Wiener, Gregory Bateson, Stafford Beer and Ross Ashby et al. understood and used this notion of non-linearity and came up with the solution of the required diversity a.k.a. as requisite variety, namely maximising learning and the use of information. They realized that they can't control systems, but steer with feedback to direct energy and matter through the human mind and actions. Von Foerster talked about always maximising the number of questions to maximise the number of choices or options. Paul Pangaro talks about "conversation" in confirmation of a communicative physical existence which keeps living systems viable.

6. Information is physical. Claude Shannon, Rolf Landauer, Jim Khalili and Seth Lloyd discuss that information is "physical" and cannot be separated from universal reality. 'Information is the resolution of uncertainty'.

7. The term butterfly effect had to be introduced into science to understand chaos and complexity theory as unpredictability (non-linear effects).

7.3 Communication and mRNA

Awareness and understanding of the natural criteria of and for functionality of man-made systems is vital for all life on earth.

Claude Shannon ¹⁸⁷ (1948) provides a mathematical definition of information and describes precisely how much information can be communicated between different elements of a living system and the limits of communication transfer rates in any system, whether man made or biological. Fact is that this quantification method demonstrates that information indeed is a physical substance. In biological living systems communication for gene expression is not regulated, but again 'steered' by DNA to produce the exact and correct proteins all the way from our genes to the functionality of large entities such as whole countries. The working of DNA and Shannon's theorem can be deemed equivalent regarding the transmission of information. DNA is understood as the source of the message and or transmission and proteins are the receivers. The message in the form of information must be structured. Lila Gatlin¹⁸⁸ of the University of California, Berkeley wrote 'Evolutionary

¹⁸⁷ Shannon, Claude. A mathematical theory of communication. The Bell System Technical Journal, Vol. 27, pp. 379–423, 623–656, July, Oct. 1948. <https://doi.org/10.1002/j.1538-7305.1948.tb01338.x>

¹⁸⁸ Gatlin, Lila. Evolutionary Indices, Volume 5 Darwinian, Neo-Darwinian, and Non-Darwinian Evolution, April 9–12, 1971, edited by Lucien M. Le Cam, Jerzy

Indices' to understand entropy in DNA messaging in higher and lower organisms and came to the conclusion that they are the same because of the uncertainty principle. DNA stores the hereditary information in a particular sequence of symbols from an alphabet of four letters: A.T.C and G, which means this is a language. For this study is it very important that we understand that entropy in the form of potential information, an unknown number of messages that were not sent, plays a role. Meanings can be misunderstood. If DNA is an information process and a theory of information exists, then it is reasonable to suppose that scientists can at least make a start of sketching out a theory of living organisms, in the full sense of the word (Campbell, Jeremy, 1982)¹⁸⁹. When symbols of DNA are translated into the substance of proteins, communication takes place. In Gatlin's 'second-theorem selection' fitness is not dependent on strong body or reproduction, but of genetic information coding according to Shannon's principles.

Systems regulating genes are influenced by events in the outer domain of the cell, i.e., environment, which is demonstrated by the physics of subatomic unity. Also, the programs themselves depend for their functioning on the finely adapted sequences of structural genes, which evolved to their present state of high efficiency over long stretches of time, should not be underestimated. In some cases, structural genes are also regulator genes; they produce protein molecules which are instrumental in switching other genes on or off. The issue with messenger RNA ordering which is specifically targeted to a type of virus protein, is that a risk of destabilization of the natural DNA sequencing code is probable, which is dependent on all information input i.e. real time communication within and outside of the cell (environment) and can't be switched off, because it is a dynamic, living, thus complex system. (van

Neyman and Elizabeth L. Scott, Berkeley: University of California Press, 1972, pp. 277-296. <https://doi.org/10.1525/9780520313897-013>

¹⁸⁹ Campbell, Jeremy, Grammatical Man. 1982. Simon & Schuster, 319pp.

Campen, Arend, 2021)¹⁹⁰ The synthesis of these findings may indicate that mRNA vaccines are a form of genetic coding, which, due to their linear design, can't function or risk the stability in and of a non-linear biological living system due to the complexity which could lead to potential misunderstanding of message transported by the mRNA. This could lead to destabilized protein production. Because this too is information, it would have to be taken into consideration to clarify the number of excess deaths that are currently being observed by the (ONS) Office for National Statistics in the UK.¹⁹¹

Uncertainty is expressed as entropy. What is needed here is to distinguish data from information because they are not the same. Data means a combination of (useful) signals and (useless) noise. This could be a number, or a symbol, code or graphs, whilst information is data put into context. In other words, information absorbs data towards meaning.

Jeremy Campbell described it as follows in 'Grammatical Man'(1982).

*'Information is a word that has never been easy to pin down. In its most familiar sense, information today is news, intelligence, facts and ideas that are needed and passed on as knowledge. But a more active and constructive meaning as something that gives a certain shape or character to matter, or to mind; a force that shapes behaviour, trains, instructs, inspires and guides. Information gives form to the formless, DNA codes are information and form human thought patterns. In this way, information spans the disparate fields of space computing, classical physics, molecular biology and human communication, the evolution of language and the evolution of man. Nature can no longer be seen as matter and energy, but must be interpreted as matter, energy and information.'*¹⁹²

¹⁹⁰ Van Campen, Arend, personal website, <https://arendvancampen.blogspot.com>

¹⁹¹ Office for National Statistics (ONS). 2023. Deaths Registration.

¹⁹² Campbell, Jeremy. Grammatical Man, op. cit.

Another point of interest to this research is to understand the distinction between bits and binary digits. James V Stone describes them as follows: a binary digit is the value of a binary variable where the value can be either a 0 or a 1 but a binary digit is not information per se. A bit is the amount of information required to choose between two equally probable alternatives (e.g. left/right) whereas a binary digit is the value of binary variable, which can adopt one of two possible values (i.e. 0/1).

In contrast a bit is a definite amount of information. They are different types of entity. So, if a person knows where he is going and is offered an alternative which confirms that he is given a binary digit, but no extra information. On the other hand, if a person has no idea where to go next, and is handed a choice, he is given information in the form of a binary digit and has gained one bit of information. This means that a binary digit gives half a bit of information. In 1948 Claude Shannon said; *'information is the resolution of uncertainty'*, which he demonstrated by developing a method of communicating noiseless information in digital format, which presently allows this research to be typed on this computer. This noiseless, undisturbed communication was made possible by adding redundancy to the transmissions which can be understood as a constraint, an extra ration of predictability limiting entropy. Redundancy reduces error by making certain letters and groups of letters more probable, increasing predictability. It can be understood as information density. (Gatlin, Lila, 1971)¹⁹³ A sentence of more letters can be reduced to less letters as long as the coherence stays intact e.g., 'lge lv rm, 2 br, basmt'. These early efforts to improve communications were the foundation of computer compression, now enjoyed by all of us in music, documents transfer or online videos.

¹⁹³ Gatlin, Lila. *Evolutionary Indices*, op. cit.

7.4 Entropy: Energy Cannot be Created or Destroyed

To understand probability patterns by the use of information, we must explore the notoriously difficult concept of ‘entropy’ and therefore must return to the fundamentals of physics. Entropy comes from Greek and means ‘transformation’.

The process of understanding what information entails starts with the description of the two laws of thermodynamics. Information understood as energy obeys the same laws of physics, the 1st and 2nd law of thermodynamics (Clausius, Rudolph 1865)¹⁹⁴. The first law is the Law of Conservation of Energy. It states that whilst energy does not alter its quantity, it may lose its quality.¹⁹⁵ The second Law is described as follows:

There are two kinds of processes, heat and work, that can lead to a change in the internal energy of a system. Heat always flows from hot to cold regions. For Clausius entropy was a relation between heat and temperature. When a quantity of heat flows out of a hot body, its entropy decreases by the amount of heat divided by the original temperature. When that same quantity of heat flows into a cool body, its entropy increases by the amount of heat divided by the original temperature of the cool body.

This is the same as saying that any change in the energy of a living system must result in a corresponding change in the energy of the surroundings inside and outside that system. In other words, quantified energy cannot be created or destroyed. Information influences matter and reality because it always is a part of them. In fact, matter, energy and information form one physical reality because every particle, atomic or

Calculate ΔS for this process

$$\Delta S = k_B \ln \frac{\Omega_2}{\Omega_1}$$

$$\Delta S = \ln 1.38 \times 10^{-23} \ln \left(\frac{16}{1} \right) = 3.83 \times 10^{-23} \text{ J}$$

¹⁹⁴ Clausius, Rudolf. 1850, 1865, 1st and 2nd Law of Thermodynamics.

¹⁹⁵ Campbell, Jeremy Grammatical Man, op. cit.

subatomic, which form the fabric of all existence contains information. Information can't therefore not be disconnected nor separated from the structure of reality. (Khalilli, Jim, 2017)¹⁹⁶

With physical information in the form of feedback as an influencing, but needed energy through cognition, processes that use all relevant information are adaptive whilst processes that not using all relevant information become non adaptive. A quantity of information = a quantity of energy in living systems because they are interdependent. Lacking information means needing energy to maintain and self-organise. Entropy is the measure of order or disorder in a process or living system by the availability or unavailability of energy = information. Information answers to the same laws of physics, namely that natural entropy can be influenced by information which is used by our universe, planet, nature and us (living systems) to create order and structure whilst ensuring sustenance. Information can't be destroyed because it is connected and a part of quantum reality i.e. the fabric of existence. Order depends on a minimal required quantity of energy in the form of information to do work. We now can work with two laws;

The energy of the universe is a constant.

The entropy of the universe tends to a maximum.

This brings this research into the realm of Ludwig Boltzmann ¹⁹⁷ who as an atomist studied the phenomenon of entropy as an increase of disorder among atomic particles, rather than heat. At equilibrium, the state of maximum entropy (think of totally dissolved milk in coffee turning it from black to brown) there is the most disorder there ever will be. Chaos or disorder is easier to create than order, because it takes work to create order. Entropy tends to increase over time. Entropy is the result of maximum mixing of elements, whilst negentropy contradicts this by breaking down entropy in separate parts in order to create order. The

¹⁹⁶ Khalilli, Jim, Information Technology, op. cit.

¹⁹⁷ Boltzmann, Ludwig. 1872.

dissolved milk that can't be separated from the coffee anymore is a probability pattern of entropy because the probability of ever returning to order is too complex. Boltzmann designed an equation using his Boltzmann constant which calculates the quantity of entropy ΔS in joules in living systems. Therefore, as well as information is quantifiable, entropy is also quantifiable, which confirms them as physical substances and the probability of the irreversibility of natural processes. This is a significant 'finding' which allows and substantiates the probable continuation of this research, because the relationship between laws of probability, irreversibility and entropy also apply to anthropogenic conceptions within societies. On his grave stone we find his famous probability equation: $S=K \log W$ (S=entropy of an ideal gas, K=Boltzmann's Constant, W=the number of microstates related to the macrostate of the gas) For 16 microstates the entropy of the macrostate is calculated as above.¹⁹⁸

Entropy applies to all living systems. The confirmation that laws of physics consist of information perceived by human beings, acknowledges that William Blake was correct; information is infinite, because the door of entry of, for and as information can only be the human capability of perception through all senses, not just the empirical one or the human brain.

The Universe is a physical system that contains bits of information. Each elementary particle carries bits of information. Electrons carrying information work together in a systematic way to perform a quantum logic operation. For example, a computer and our cell phones operate like the universe because they are part of the universe and to operate, they must obey the same physical laws. Computers and the universe are information processors. To narrow it down, this study will also aim at on how computers can function only when /if sufficient 'input' results in adequate 'output', questions and answers, to find a result. Output de-

¹⁹⁸ Source of the illustration: Shawn Shields, Entropy, Micro States.

depends on the quantity and quality of relevant, applicable and used information i.e., the energy needed to run computer programs. Entropy can be described in numerous ways, but for the sake of this research it will be limited to being a measure of uncertainty, using the definitions; ‘disorder’ (entropy) and comparatively the definition for ‘order’ i.e., negentropy.

An example is cleaning up a messy room; the information feedback that is available: ‘the room is messy’ triggers internal and external energy to do something about it and changes the entropy (disorder) into order, but only until natural entropy takes over again and leaves the room going back in entropic state (dissipation of energy i.e. losing energy over time) if meanwhile no information in the form of energy (picking up things, placing things where they belong) is applied. This confirms the second law of thermodynamics that says that the entropy of any isolated system always increases. Isolated systems spontaneously evolve towards thermal equilibrium—the state of maximum entropy of the system. More simply put: the entropy of the universe (the ultimate isolated system) only increases and never decreases, unless information feedback is used to shape negentropy in living systems. Information and energy are profoundly linked. Another example is a library where the books are only categorized by the colours of their covers. It is highly improbable to find the book one wants to read there. The probability of finding the right book increases if the librarian categorizes the books first by title, second by author, third by genre or ISB Number, because the added information decreases the entropy and restores the negentropy. Human creation needs energy in the form of information by which beauty, structure and order can be built. Information can never be divorced from the physical world (Khalilli, Jim, 2017).¹⁹⁹ Information is not just an abstraction, it is carried by something, a stone, a cd, or a book, a mind, a quantum particle and can’t break the laws of physics. Information can be stored in any

¹⁹⁹ Khalilli, Jim, Information Technology.

system to give it unique properties. DNA, genes, neuron synapses, electrons. neuro peptides are operating as information messengers and can also be understood as messages on their own, (Pert, Candace, 2005).²⁰⁰ Quantum particles, as fundamental building blocks of all matter, are energy which are not separately acting, but form a unity, a unified field with consciousness. The world is a display of information (Hagelin, John, 2007).²⁰¹ The tiniest initial conditions such as personal thoughts (information) are therefore elemental building blocks of reality. Human action and its causality or the relationship between an event (the *cause*) and a second event (the effect) influences reality (Radin, Dean, 1997)²⁰² (McTaggart, Lynn, 2007).²⁰³

This was proposed by Maxwell's Demon (Maxwell, James Clerk, 1871).²⁰⁴ He envisaged a gas initially at uniform temperature within a box separated into two compartments, where a tiny being was controlling a shutter between the two compartments. By measuring the energy consumed through the feedback and actions by the 'demon' as the tiny being was called later, this consumption led to a net increase in the system's entropy (Szilard, Leo, 1929).²⁰⁵ He formulated an equivalence between energy and information. This would explain universal expansion based on the same Maxwell type demon converting information into

²⁰⁰ Candace, Pert. 2006. Documentary film: "What the Bleep! Down the Rabbit Hole" Available from: <http://www.youtube.com/watch?v=usMsTPg-hHk>, (Accessed January, 12, 2009)

²⁰¹ Hagelin, John. 2011. "Is Consciousness the Unified Field", YouTube video, available from: <https://www.youtube.com/watch?v=xjNjxDtLOjk>

²⁰² Radin, Dean. 2009. "The Conscious Universe Insight in PSI" , Harper Collins, New York, 2009, ISBN 978-0-06-177899-5.

²⁰³ McTaggart, Lynne. 2007. "The Intention Experiment", Published by Harper Element, London, 2007, 30p. ISBN 978-0-00-719459-9.

²⁰⁴ Maxwell, James, Maxwell's Demon.

²⁰⁵ Szilard, Leo. 1929. 'Equivalence between Information and Energy' (Online) <https://physicsworld.com/a/information-converted-to-energy/> (Accessed, May 2020)

energy (Faus, Antonio Alfonso, 2013).²⁰⁶ This was later confirmed by an experiment called the spiral staircase by (Toyabe et al, 2010),²⁰⁷ by which they showed that they could convert the equivalent of one bit of information to a value of energy (kT). It suggests a new fundamental principle of an ‘information to heat’ engine that converts information to energy by feedback control. Information as an equivalent of energy can be also understood by the following rhetorical question: Will a man be able to safely cross a busy road by not transforming the observed information in energetic action about traffic coming from the right, but only using the information as energetic action about traffic coming from the left? Information can be understood as energy which (in)forms experienced reality. The human capability to perceive through observation determines the observed as information ‘if the doors of perception were cleansed, everything would appear to man as it is; infinite’ (Blake, William, around 1800). When uncertainty is reduced, we gain information.

7.5 Quantum Information Processing as in Universe

Quantum computing is currently being developed to be made possible by information; the universe already works that way (Lloyd, Seth, 2016).²⁰⁸ Quantum information processing analyses the universe in terms of information: The universe consists not only of photons, electrons, neutrinos and quarks, but also quantum bits or qubits. Professor Lloyd says the universe is a giant computer, processing information in

²⁰⁶ Faus, Antonio Alfonso. 2013. Fundamental Principle of Information to Energy Conversion (online), <https://arxiv.org/ftp/arxiv/papers/1401/1401.6052.pdf> (Accessed May, 16, 2020).

²⁰⁷ Toyabe et al. 2010. Experimental demonstration of information-to-energy conversion and validation of the generalized Jarzynski equality, <https://www.nature.com/articles/nphys1821> (Accessed 18.05.2020).

²⁰⁸ Lloyd, Seth, Quantum Information Science, <http://web.mit.edu/2.111/www/notes09/spring.pdf> (Accesses June 02, 2020).

quantum bits (qubits). In an article by Brian Siegelwax²⁰⁹ in Quantum Computing Business called ‘*Inside Turing*’, he reports on a Start-up by Prof. Seth Lloyd and Dr. Michele Reilly called Turing. Their aim is to solve societally useful problems by quantum computing. The hardware has been designed, but the software to run quantum logic programs is in development. They are talking about RAM in the form of qRAM- Quantum Random Access Memory and Artificial Intelligence to build large scale fault tolerant quantum computers that run quantum algorithms in practice. In other words: to be able to store entanglement, but what is entanglement? This is explained in an article by Caltech²¹⁰: ‘*what is entanglement and why is it important?*’ as follows: two particles such as photons or electrons are unbreakably correlated even when they are separated over large distances and is an emergent property.

This entanglement – relationship or interconnectedness can be quantified as *information*. What is important to know for this research is that Albert Einstein in the 1930s said that the observer can only learn about this hidden information until the measurements were made. In the context of this Project, man observes a quantum spin of particles only when they spin. This confirms the observer phenomenon which states that objects, in this case electrons or photons, provide information as soon as an observer observes. This is logical, because human perception is the first door to understanding. The dependent relationship with a quantum universe on the human perception is key. The observed ‘information’ enters a person’s experience in the form of intrinsic communication. If that person would be unable to observe, the quantum entanglement won’t take place. Entanglement can be used to transmit quantum information, for quantum games, as well as strategies in a way that is beyond

²⁰⁹ Siegelwax, Brian, Lloyd, Seth and Michelle Reilly *Inside Turing* (online) <https://thequantuminsider.com/2022/04/14/inside-turing-a-startup-by-prof-seth-lloyd-and-dr-michele-reilly/> (Accessed Jan, 09, 2023).

²¹⁰ Caltech. What is entanglement, from <https://scienceexchange.caltech.edu/topics/quantum-science-explained/entanglement> (Accessed Jan. 09, 2023).

what we can do in our classical world state Dr. Xie Chen and Dr. John Preskill²¹¹, Professors of Theoretical Physics at Caltech. John Preskill explains the value of entanglement by taking a book as a metaphor in a video embedded in this article. If information is written on each page you can read the book page by page. If however the book is a quantum book and the pages are highly entangled with one another there is a lot of information in the book but not stored on the individual pages. The information will be stored in the correlation among the pages. The essence he says, that one can have a quantum system which stores a lot of information but if you look at the part of the system, you can't see the information at all.

James Gleick in his book *The Information* (2011) explains Quantum Computing as simulating quantum physics with a computer accessing every quantum variable. The number of information bits can then become the same as the number of points, i.e., selected mathematical objects and selected relationships in space, re: the universe. Quantum computing would enable to calculate probabilities, making use of the entanglement of qbits, not just multiplying computing power but exponentially increasing it. Confirming Seth Lloyd's goal of solving previously unsolvable complex problems could be made possible by quantum computing because then they can make use of the corroboration of entangled particles, dramatically increasing computer power through correlation of particles in the universe. A point of concern would be as can be derived from the context of this research project, is that a quantum linear approach can't work in a non linear quantum universe. Quantum computing is not yet available at the time of this writing.

At Casio a 2kb RAM card was used to store just enough information enabling BASIC programming up to 2kb – 2000 bytes of random memory to be stored. Information Storage capacity has been exponentially increased during the last 40 years. Quantum information storage

²¹¹ Video: use of entanglement

would increase the memory storage capacities and related computing abilities, but only when all 'relevant' INPUT in the form information, and maximum number of questions (re INPUT) are asked. If our synthesis of computing is correct and functionality depends on all relevant information in the form of quantum information, it corroborates our two metaphysical equations. Information is perceived thru the observation of a person (consciousness and all senses) and processed as a real time physical reality (the particles are correlated). But only if all relevant, including non linear quantity and quality of information is processed, functionality of that system can be ascertained. If an error message occurs, more or different information is needed to ensure or restore functionality. This information forms the energy a quantum system runs on. Disorder or entropy (non or semi functionality) will be the result of an information deficit in all computing machines. Because quantum dynamics results will be probabilistic, rather than determinable, this confirms that living systems are in a constant flux of being and becoming. Extracting information can only be done by human observation which influences quantum outcome and determination. Artificial Intelligent computing systems can determine probability, but the final reality can only be determined by the interaction of man's perception thru consciousness and quantum reality by the collapse of the wave function, although this is becoming a moot statement. Collapsing the wave function means than an observer, thru measurement, alters the outcome of quantum experiments, confirming that reality rests on human observation to be determined. Later research finds that this process of quantum collapse can also occur without human presence in the universe. But what is important for this research is that this measurement process or the acceptance of unmanned quantum wave collapses are both information which again enters the doors of human perception as either fact or probability. The information collected with or without having been there to measure wave collapse, does not mean that the information is gone. Both can be used to take maximize the number of choices of reality and are to

be therefore considered as dynamics of existence, constantly to be steered by feedback.

Increasing memory storage capacity in qBits or qRAM allows for more computing power, but only if all relevant INPUT is allowed be used can harmless functionality be expected. An important, not to be overlooked issue in these matters is that reductionistic, linear programming, even in an unlimited RAM capacity, can't control non linear, complex living systems. Can computers that are linearly programmed solve non linear societal issues? This is a rhetorical question which at present must be answered by 'not yet' due to complexity. Societal, complex problems can only be solved when the first cause of them is eliminated.

Dr. John Hagelin explains that this unified field, or Grand Unified Field Theory is not separable from man, it is man's innermost self which he calls an ocean of existence or intelligence as the basis of the nature and diversity of the universe. This is not only a philosophical theory but is based on mathematics and physics. Quantum mechanics demonstrates that the deeper one goes into the understanding of the fundamental building blocks of living systems (at subatomic level), the more dynamic it becomes *(waves). Human consciousness completes the unified field- or field of intelligence by its natural connectedness, dependence and the human ability to perceive the difference between right or wrong, yes or no i.e., 1 or 0, just like computers can do. The difference however between a linear computer and a non linear person in a non linear universe is formed by human consciousness. Both the universe and a person are conscious and a computer can't ever be, because it lacks self-reflection and the Zoa's, i.e., the senses beyond brain and heart: imagination, feeling, sensation, intuition. They are one total consciousness and non-material, local and non local at the same time. (Hagelin, John 2011)²¹² This synthesized phenomenon confirms Gnosis, which is Greek for

²¹² Hagelin, John, Is consciousness the unified field, op. cit.

knowing i.e., epistemology, reconnecting the Chinese TAO with physics. When we read in the ‘Asclepius’ by Hermes Trismegistus translated by Dr. Gilles Quispel²¹³ (1996) : ‘A great miracle, o Asclepius, is man’. This inspired the orator / philosopher Pico Della Mirandola to write his lecture which he wanted to deliver in Rome by addressing the Pope; ‘De Hominis Dignitate’ (1486) (About the dignity of man). He was not allowed to express these ‘blasphemous thoughts in Rome. His lecture is, until today, regarded as the Magna Carta of Renaissance and Humanism. What he did, was to search for, contemplate and allow for all the relevant information, philosophy, science, religion, etcetera, he was able to find into his vision of the status of an inhuman society in the 14th century. The reason why this research is mentioning this is that the part of humanity, the value and necessity of human reasoning capability can be considered as intrinsically connected to the universe as both are messengers, distributors and receivers of information. Gnosis states and confirms the spiritual relationship in the form of inner knowing between man and the universe, which is demonstrable as a human perception and should also be used as relevant information.

Modern physicists like Fritjof Capra²¹⁴ have been combining philosophy and science because he understands and accepts that they cannot be separated. Capra arrived at a next level of knowledge about quantum mechanics or quantum theory. Via quantum mechanics and quantum theory, physicists try to understand the universe as a whole by connecting actions of the smallest pieces of an electron to the very actions of the largest objects in the cosmos such as black holes. This includes the interaction and the interdependence of human beings with the cosmos. People are a part of a whole universe and have influence by conscious and subconscious processes such as action and observation on matter and therefore determine, for a large part within the realm they can con-

²¹³ Quispel, Gilles. 1996. *The Asclepius*, Bibliotheca Philosophia Hermetica, Amsterdam. ISBN 90-71608-07-7

²¹⁴ Capra, Fritjof, *Tao of Physics*, op. cit.

trol or steer, their experienced reality themselves. Cosmos is the patterned whole of all existence.

Capra understood that a mutual interrelation of all things and events and the experience of all phenomena are manifestations of a basic oneness. Confirming unity and the unified field. He said that in an ordinary life people are not aware of this unity, but divide the world into separate events and objects. (the perception problem). Capra claims that concepts of separate things and events are an illusion. His work on atomic physics shows that subatomic particles can only be understood as interconnections between the preparation of an experiment and the measurement.

7.6 Steering Complexity with Cybernetics

7.6.1 Complexity

What is complexity and why is it so important? Complexity is a consequence of a myriad of unknown factors, relationships and reliance which nevertheless have a direct impact on organisations and can only be ‘controlled’ by learning and actual adaptation in real time. These so-called non linear effects or non causal stimuli from often unknown, but interconnected and interdependent sources, can’t be controlled by old-fashioned linear measures of control such as regulations or compliance, but can be ‘navigated’ by the use of positive and negative feedback, i.e. amplifying and correcting information. Cybernetics is needed here to make sure all information is used. To steer a living system, rather than trying to regulate it, it is wise to use the Law of Requisite Variety, a.k.a. Ashby's Law, to build resilience by obtaining variety in the form of capacity, capability, knowledge, tools, information enabling to respond to risk. When only linear control systems, such as law enforcement, empirical verification, physics, mathematics or iso standards are used, they won’t be able to cover a non-linear or complex reality which consists of a linear (cause & effect) part, but for a larger extent, of a non-linear, non causal or dynamic part, which is much greater. This can’t be

known in advance, for example people's behaviour or preception, because it constantly changes due to unforeseen and unknowable actions by the entire, also dynamic, network of which it is a part and on which all forms of organisation are dependent. In short; behaviour of the parts in a network can't be predicted. Awareness of such behaviour is needed but needs a new, systemic point of view. Linear control systems are unable to regulate living systems because they lack information. Result: entropy.

It is crucial for human and non human survival that we understand complexity and learn how to deal with it. Control systems we have tried such as bank regulation, industrial compliance demand, trade tariffs, ecological restriction, lockdowns, law or even wars, have not been able to maintain equilibrium or homeostasis just like nature does, because they attempt to escape the laws of thermodynamics and of entropy, as they can't have enough energy (information deficit) to 'steer' or 'navigate'. Quite the opposite has been caused by them; economic, cultural or environmental collapse, poverty, mass emigration, crime, biological annihilation of species upon we all depend, pollution of soil, water and air, all of them can be listed as entropy (disorder), because the same cause applies: information deficit.

Nature works according to cybernetical principles and cognition. All we have to do is to learn from and copy nature because we are a part of and dependent on it. Stephen Hawking (2006)²¹⁵ was looking for a Theory of Everything. This hypothesis on which this research is based is that 'Everything is Information'. The language of the universe is information.

When an organisation, corporation, industry or political process are understood as living systems, their interconnected and interdependent relationships within and outside of their networks change all the time. This complexity, due to dynamic and perpetually changing information feedback loops, can't be managed by direct causal action (cause and

²¹⁵ Stephen Hawking. A Theory of Everything, op. cit.

effect reactions) but can only be maximally controlled by steering with that information in real time. Adaptability to constantly evolving changes by using all information directly is needed

7.6.2 Cybernetics

Kuber (Cyber) is the Greek word for helmsman, the person steering the ship. Keeping a ship on course, can only be done, that is if the ship intends to reach its destination, by information in the form of feedback. It also translates in 'governance' based on its Greek origin. This corresponds with our earlier findings that information obeys the universal laws of physics and therefore information during a sea voyage about waves, tide or wind, is real and can't be escaped by ignoring it, because if it is, the ship will probably run aground, sink and not reach its port. It is therefore of importance that information is acknowledged as the energy which makes things work and that universal energy adheres to the laws of thermodynamics as well as Shannon and Boltzmann's concepts of entropy. Information is part of the construct of reality which can be observed, interpreted by human senses, but not escaped from. Cybernetics is about setting a goal, e.g., sustainability or long term continuity of living systems and the method and requirements of how to achieve it.

Norbert Wiener understood that the human body and as he called it then; *computing machines* worked in the same way; they both depended and used information, input and output, to operate and function, but that the value of information always depended on the perception of human beings before it could be put into practise in computing machines. He knew that human bodies were automatic learners, but also saw that the information learned would alter behaviour, and that sense organs as information absorbers, were limiting the communications within and among individuals. He wrote in his book *The Human Use of Human Beings* (1957); *'Like any form of information, these commands are subject to disorganisation in transit. They generally come through in less coherent fashion and certainly not more coherently than they were sent.'*

In control and communication we are always fighting nature's tendency to degrade the organised and to destroy the meaningful; the tendency for entropy to increase'. This relates to earlier observations about entropy by confirming his research and acknowledgement of natural entropy to exist. The process of giving and receiving information was in his eyes the natural adjustment of living systems to live effectively within their environment. Condition is that equilibrium and balance is sought instead of enforced growth by power by way of ulterior motivation for example: economic gain, political clout, greed, which become dependent on ignoring information. This contradicts stability by its disturbance of equilibrium by increased entropy. The above suggests that ethics is information, confirmed by innate, autopoietic human protection and survival mechanisms in the form of conscience. Without ethics i.e.', truth or goodwill, living systems are vulnerable and can become non viable. It is conversation and information, as well as communication and cooperation, a.k.a. circular causal and feedback mechanisms which measure the degree of entropy. The importance of conversation is to have access to a maximum number of choices by ethical imperative. (Von Foerster, Heinz 1973).²¹⁶ These are the foundations for it. (Pangaro, Paul, 2019).²¹⁷ Maximisation of choices as a condition for risk management and stability. This was researched by Dr. Ross Ashby who developed the Law of Requisite Variety, a.k.a. Ashby's Law; Only variety absorbs variety.

²¹⁶ Von Foerster, Heinz. 1973. On Constructing a Reality, in *Environmental Design and Research*, (Online) <http://www.semiorganized.com/resources/other/Foerster-constructingreality.pdf> (Accessed May 25, 2020)

²¹⁷ Pangaro, Paul. 2019. Introduction to Cybernetics and the Design of Systems' (online) <https://www.pangaro.com/design-is/Cybernetics-minimized-v8b.pdf> (Accessed May 2019).

7.7 Ethics is Information

This first project ends in an observation derived from writing this paper that a renaissance of information theory is needed to deal with complex issues we, as a species, endured and continue enduring. The findings could alleviate the suffering experienced in nature and society. I will add a listing of important extras. It starts with the interpretations of reality and the Value of Philosophy by Bertrand Russell who wrote, and this lists the first causes seamlessly of and for non or harmful functionality of anthropogenic living systems: *'Unfamiliar possibilities are contemptuously rejected'* (Bertrand Russell, The Value of Philosophy, 1912)²¹⁸ due to a crisis of perception, includes the consensus of pursuing an Empirical Reality – by the 5 senses; touch, taste, smell, sight, sound, which is proven to be insufficient. Because this research demonstrates that all relevant information should always be use, we can reduce uncertainty and entropy by re-designing or correcting currently harmful conceptions by the elegant solution of adding information, as follows:

Total Reality – Empirical + 4 Zoa's; imagination, intuition, feeling and sensation, heart and brain and universal consciousness; this would be a total reality based on *all information*, not just a part. A holistic, systemic, synthetic reality, including gnosis, consciousness, Jung's archetypes, noetic pre-cognition, quantum particles, intention, entropy, which in fact are all information, but are dependent on human perception.

- Accepting that natural limitations of reality are the boundaries of and for non harmful functionality

²¹⁸ Russell, Bertrand. 1969. "The problems of philosophy, the value of Philosophy". PDF, (online) available from <http://www.skepdic.com/russell.html>, (Accessed January 12, 2012).

- Information can't be separated from our physical reality because it is a fundamental entity which can be measured and quantified in Bits of Information.
- Information is not just a message, it is physical and 'in forms' our lived and experienced reality, whilst safeguarding existence towards survival.
- Information deficit or shortage e.g., fake news, misinformation, disinformation, suppression of information by censorship, overload of information; they all can be categorized as deception and an attempt to escape reality. This is not allowed by physics and causes entropy.
- Per definition (symbol \triangleq). This is a law of physics confirmed by information theory: Information Deficit \triangleq Entropy (Disorder).
- Goals that are enforced in a linear manner can't be attained because nature can't be forced by man without consequences to the enforcers. An information deficit will prevent such goals to be ever achievable. An enforcement of them will cause great harm to life, the environment and social cohesion (as we observe now).
- Complexity can't be regulated by enforced rules, restrictions or laws without causing destabilization in the form of entropy (disorder). E.g., the weather can't be regulated or controlled by man without destabilizing weather patterns of which outcomes are unpredictable. (i.e., Butterfly effect).
- The outcome of armed conflict is always entropic (causing disorder) in the form of harm.