

## Article

# Utilitarian Qubit, Human Geography, and Pandemic Preparedness in the 21st Century

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**Abstract:** Human actions are ambivalent in nature and this in turn has an impact on all components of socio-ecological systems. Their ambivalence results from the fact that human actions have both positive and negative outcomes and properties, which occur and manifest concurrently in the ontological realm of human existence. In terms of space–time, both micro-geography and macro-geography of human existence are intertwined during the COVID-19 pandemic, thus affecting pre- and post-pandemic space–time continuum. The *utilitarian qubit* can be used to describe the nature of human existence, i.e., *Homo sapiens* has always been experiencing a state of existence where pain and pleasure are co-extensive. In this state, it is impossible to establish to what extent pain, and to what extent pleasure, will have a definitive impact on our status as individuals and humanity as a species. In this article, the authors explore how the record of an individual’s life before and after the COVID-19 pandemic has been impacted by the wellbeing and actions of other humans and prior to one’s existence. Drawing on the utilitarian qubit, the COVID-19 pandemic, and its impacts on the members of *Homo sapiens*, can be understood as a partial outcome of the cumulative actions of humanity on the biosphere and other elements of the global ecosystem (the Age of the Anthropocene). We argue that this paper is also useful to foster disaster preparedness and resilience in the pandemic and post-pandemic era, at micro- and macro-geographical interfaces of human existence in the 21st century. The existence of individual members of *Homo sapiens* and humanity as a species is unfolding at the boundary between two levels: fundamental reality and situational reality. The result is the historical accumulation and ontological interconnectedness of humanity’s activities with one’s own actions. Pain and pleasure resulting from the COVID-19 pandemic and the Age of Anthropocene, as well as the right and wrong consequences of humanity’s actions, are posited here to be symptoms of the *Anthropocenic (phase of) epidemiological transition*.

**Keywords:** Anthropocene; phase of epidemiological transition; micro-geography; macro-geography; COVID19; South Africa



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## 1. Introduction

### 1.1. Contextualizing Geography in Terms of Space and Time

The ‘geo’ in geography refers to the earth’s surface (Couclelis, 1999) [1]. Every human being has to interact with this surface (space) over the course of their life (time), however, geographical entities and phenomena do not fall into a single category as there is still uncertainty on the issue of inexact spaces [1].

*“We are learning that the geographical is not just the mappable, the spatial is not just the visible, the temporal is not an independent domain, and not all users see the world through the same eyes.” [1]*

This above quote shows there is an opportunity to create dimensionless definitions of these inexact spaces. These inexact spaces can be observed on a small scale or large scale, termed micro- and macro-geography scales, respectively.

*“Time-geography is a mode of thinking that helps us understand change processes in society, the wider context and the ecological consequences of human actions.” [2]*

A factor to borrow from time-geography is that time and space are recognized as unified [2]. Humans all experience time, **differently** [2]. In the socio-ecological system, this experience of time is reflected as different outcomes at different timeframes. If time and space have a certain unity, this means space and its reality are also experienced differently. The geography of the world at a certain point in time is not constant and is a limitation that geography deals with [2]. This limitation is seen in maps that are 2-dimensional drawings of our 3-dimensional reality where time is seen as a fourth dimension. These maps have a limited scope and cannot go beyond their purpose, hence them being 2-dimensional [1]. This is why geography needs to be contextualised in terms of its reach and risk, as many geographical phenomena are defined with respect to certain geographical entities [1]. Spatialization speaks into being the concept of micro- and macro-geography as arbitrary ‘n-dimensional’ spaces that are transformed into and analysed as spatio-temporal (geographical) entities and phenomena [1].

COVID-19 had the potential of a macro-geographical range, as well as a micro-geographical range. The coronavirus started off targeting micro-geographical entities classified as localised and were contained in the spatial sense, e.g., Wuhan ‘wet market’ in December 2019. However, the nature of these geographical entities (COVID-19 hotspots) and their associated risks caused macro-geographical consequences that effected the globe. COVID-19, a macro-geographical phenomenon, is now an international, global spatial entity. The distinction between when COVID-19’s spatial reach was either micro- or macro- was its timeframe and the reality of the temporal trends it experienced/caused. Space was restricted as a mitigation method; however, time was still independent and could not be completely halted. Therefore, the effects of its macro- and micro-geographical risks were still experienced, even if its physical space was limited and restricted during lockdown.

*“the establishment of the information age challenges absolute physical space as the sole, undisputed framework for representing geographical reality.” [1]*

Due to COVID-19 lockdowns experienced worldwide, the concept of the space that humans interact with has evolved. The digital spatial reality became increasingly important for humans to maintain social relations and therefore extended the spatial reach of risk. This digital spatial reality became a temporal anomaly as individuals in this digital reality lived in different time zones and interacted in the digital realm for varying timeframes. With the physical limitation of geographical entities, the ‘record of humanity’ during the COVID-19 pandemic was controlled by the digital space where time unfolded outside of a human’s normal daily life. COVID-19 became a lived experience of how the space individuals live in can become distorted by geographical phenomena that defy these individuals’ idea of space and time. This means the spread of the coronavirus showed temporal and spatial characteristics, as COVID-19 was observed to be an abstract concept that had moving characteristics that changed with space and time [3]. COVID-19 showed the constraints of time and space in the socio-ecological system of humanity as its distribution was classified to have numerous ‘heterogeneity in its locational and temporal preferences’.

### 1.2. South Africa as a Study Site for This Special Issue

There are over 200 countries and territories across the globe which have been impacted by the COVID-19 pandemic. Cases have been detected in many countries and continue to be present in communities, at the time of writing of this article (see COVID19.who.int

for details; website accessed on 17 November 2022). South Africa is one of those countries and it is located at the Southern-most tip of the African continent [4]. In the global system, South Africa can be classified as a semi-peripheral country [5], i.e., the government and the people of South Africa are partially in charge of their destiny but are also exposed to the global and geopolitical forces. The ability of a semi-peripheral country to deal with impacts and outcomes of major disasters such as the COVID-19 pandemic will be a problem, due to fact that the response of the government in charge of the disaster will not be able to significantly influence some of the important parameters that triggered the coronavirus pandemic disaster. In addition, major trials of vaccine candidates, which were approved for human administration during the COVID-19 pandemic, had been tested in South Africa [6]. However, many of the vaccines only arrived in the country belatedly after developed and other countries around the globe were allowed to pre-order excessive doses. Finally, South Africa, or at least a large part of its population, has not been free in the true democratic sense until 1994. Even after the onset of the democratic dispensation, large parts of the population still live in poverty, e.g., the Gini coefficient for South Africa is the highest in the world and stood at 63 in 2014, without any significant change since 1994 [7]. Many of the citizens are living in conditions that make them highly vulnerable to impacts of disasters and this was already in place before the onset of the COVID-19 pandemic [8]. As a result, the coronavirus pandemic would have unfolded against this background and the lives of ordinary people would have been impacted by the pre-COVID-19 challenges and disaster risk management implications.

Many South African citizens were the subject of historical land dispossession and exclusionary policies in terms of resources access before 1994 [9]. The space in which many South Africans could and do still exist in today is limited. Limitations include spatial geographical inequality [10]. In this context, the living conditions and the impacts of the COVID-19 will be likely experienced by the South African population as a mixture of past/historical/legacy issues and the present reality of the coronavirus pandemic. One could say that South African citizens will be exposed to conditions that are not ideal for their desired existence, one in which all the injustices of the apartheid past would be undone. In other words, the geography of today's existence is heavily affected, controlled, and even pre-determined by the conditions of the past. Space-time, in the geographical sense, is determining the existence and the disaster/pandemic reality of the South African population. Their immediate surroundings are almost completely pre-set and might also be pre-determined by the space-time of apartheid and the lack of sufficient undoing of its outcomes by the democratic era in the country. Therefore, COVID-19 provides a unique opportunity to study the interaction of the immediate living surroundings or space of personal existence of one South African, and the wider implications and impacts of the pandemic on South African society. The current article seeks to explore the wider implications of the settings and space-time geography in which the COVID-19 lockdowns unfolded. Links to preparedness for future pandemics are made and the geographical understanding of space-time will be applied.

## 2. Methodology

In the current article/essay, the authors attempt to provide a perspective on space and its impacts and interactions with the lives of everyday people during the COVID-19 lockdowns. The spatial contexts are explained in terms of the impacts of long-term separation of individual humans from the previous lives they led before the coronavirus pandemic. The authors attempt to provide a link to the historical burdens that are the result of anthropogenic processes and activities, and that have been having ever-increasing impacts on humanity. The epidemiological transition theory is drawn on, along with the principles of spatial understanding of geography and sociology, to provide a conjecture or rather theoretical view, in essay format, about the possible way to interpret the balancing act that a human being such as a South African citizen must juggle, when faced with the impacts of COVID-19 lockdowns.

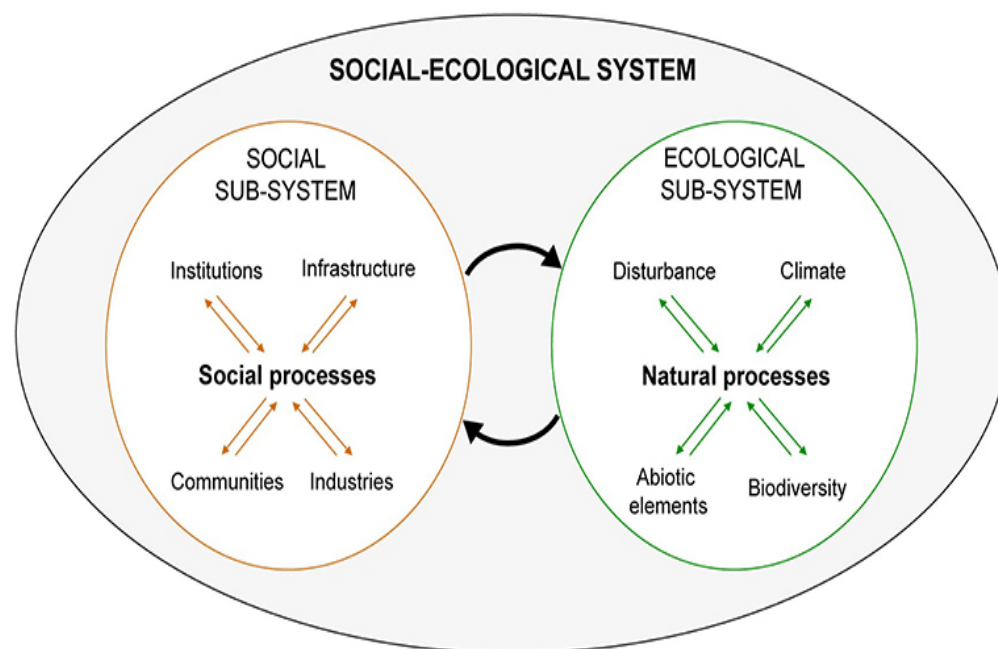
### 3. Results and Discussion

#### 3.1. Micro-Geography, Macro-Geography, COVID-19, and the ‘Record of You’

Space ‘around humanity’, the space that humanity exists in, is constantly changing and being further developed/transformed. The geography of human space is in a state of fluidity, which is in part driven by biological, social, and physical factors [11]. From the viewpoint of an individual, space can be described or examined at various scales, using various concepts. At the level of a single human or a small human collective, the description could be based on the concept of micro-geography. In that sense, micro-geography is seen as the record of an individual; the ‘record of you’. The concept and origins of *micro-geography* can be dated back to the 1930s, more specifically when Platt started looking at small geographical units as research areas, e.g., in studying soil erosion in the time of British Guiana [12]. Blaut [13] defined a *microregion* as “a basic building block unit of area or an arbitrarily-defined unit of convenient size”. More recently, the micro-geography concept has been used to analyse the various types of geographical topics such as innovation entities and their spatial relationship to tertiary educational institutions [14]. The title of the last article cited states it best: “Micro-geography: a fundamental organizing attribute”. This leads to micro-geography being defined as the descriptive study of very small spaces. The immediate space around each member of *Homo sapiens* at the time of COVID-19 could be the subject of study by application of this micro-geography concept. This micro-geographical unit is present in the current high-paced and highly interconnected world, which is the building block of reality of every human’s being and their existence. Such a unit would, however, also be interlinked and permeate into a wider geographical space and could be linked to the function of recent developments in globalization. The increased mobility of humanity and the side-effects of globalization, such as the spread of the COVID-19 pandemic, are important to be mentioned. It is also clear that recent limitations on human rights such as the ability to move around during lockdown [15] must be considered. All these factors have been impacting the micro-geography of human existence for each member of *Homo sapiens*, and it is argued here that it applies to the micro-geography of all human beings. The limitation of a single human’s perspective is that the individual’s ignorance can influence and impact the space humanity as a whole exists in (humanities macro-geography). However, such a perspective is important in the current hyper-connected world of humanities existence as the introduction of this social perspective opens up the debate of subjective perceptions and the multiple views of spatio-temporal (geographical) entities and phenomena it creates [1].

Another concept that can be used to study the space of human existence is *macro-geography* which is a holistic description of the entire space of Planet Earth, of a country, or another large and well-defined “classical” geographical entity [16]. Before and during the COVID-19 pandemic, the macro-geography of human existence and our ability to study it was redefined in leaps and bounds, e.g., through the GIS and digital mapping technologies and their resultant data collection [16]. Macro-geography widens the perspective of space from a single human’s ontological realm to multiple realities classified as the collective. Outcomes of human activity, the impact that the changing nature of space and the COVID-19 pandemic has had on humanity make the concepts of macro-geography and micro-geography relevant in understanding human spatial reality in the 21st century. Changes in the dimensions of 3D space, and the addition of new dimensions such as cyberspace, have gained more importance in recent years. Therefore, the space—time continuum of geographical reality for members of *Homo sapiens* has been changing. Human reality now exists throughout time, space and cyberspace, through the impacts of the environment on humans and vice versa. Thus, human beings must adapt to a multi-dimensional paradigm of existence, one where space and time are no longer static and dimensionless. One’s identity remains in the physical world where it is subjected to the binding forces of the daily activities of one’s life as represented in the ‘record of you’ (based on the interpretation of the freedom and liberalism by Sokol [17]). In addition, an online/cyberspace dimension of human existence and one’s self is created

through one's voluntary and self-driven activity on social media. It is also the result of one's involuntary digital dust being left behind from online activities such as e-shopping, sending and receiving emails at work, etc. In this voluntary and involuntary mix, an individual human being's self is experiencing a multiplicity of its microregions of existence; an individual's self has a multi-dimensional micro-geography. Geographical entities interact with individuals in their daily lives and follow the same concept of an individual human leaving a carbon footprint by small seemingly insignificant activities. Access to the digital dust or footprint of a human being in cyberspace is accessible through social media from anywhere in the globe and to just about anyone. Time has become unique to the person interacting with this digital dust and that which was seen as a small geographical entity has become a part of the 'record of humanity'. Thus, the macro-geography of a human's existence has overlapped in the time of COVID-19 with the micro-geography of it. The overlap manifested in physical and digital geographical spaces. One or more humans and their journey through the space-time of COVID-19 represented the link between micro- and macro-geography. Individuals, each with their own micro-geographical realities, experienced the same symptoms of the COVID-19 pandemic and their collective experience shaped the reality of the global macro-geographical phenomenon that is/was COVID-19; their individual 'record of you' transformed into a collective experience that manifested in the socio-ecological system. Figure 1 represents this dualism of human nature with geographical entities in a socio-ecological system. Human existences, both micro- and macro-geographic, interact, and can now be said to overlap, e.g., industries (social sub-systems) need to control and manage their carbon footprint that interact with the climate (ecological sub-system). This overlap of micro- and macro-geographical entities/phenomena is happening in *Homo sapiens'* socio-ecological system and is seen as a result of the emergence of the Age of the Anthropocene (which will be further elaborated later on).



**Figure 1.** Socio-economic System Theory (retrieved from: <https://www.frontiersin.org/articles/10.3389/fpubh.2019.00085/full>, accessed 18 November 2022).

The consequences of the micro- and macro-geography overlap can be further developed as follows. Tracking of cell phone data and GIS fingerprints of individual human beings have made reality: now, here, and everywhere all at once—they have become an ontological realm of *Homo sapiens* and its members. There has been an ongoing space–time compression in the physical sense [18] and a simultaneous expansion in the digital sense in



the present, during the time of COVID-19. Borders between macro- and micro-geography are being lost, as almost any human with a digital presence can be traced in space and time continuously, i.e., humanity is undergoing both space-time compression and expansion concurrently. GIS has made the known world seem smaller due to its ability to quantify Earth's spatial reality. Expansion in the digital sense due to the innate power of digital—cell phone—data in the hands of a GIS data analyst.

The overlap between one's own space and macro-geography is an indication of or is interlinked to the temporal and spatial reality of human existence that is becoming compressed through hyperlocalisation. This hyperlocalisation is an extreme geographical restriction of one's existence in time and space [18]. Hyperlocalisation has been enhanced through the recent COVID-19 lockdowns and travel restrictions. These measures were needed to contain the COVID-19 pandemic spread through limitations on certain human rights [15]. Lockdowns, as well as the COVID-19 pandemic itself, have had impacts at the micro-geographical level—the hyperlocalisation of a member of the *Homo sapiens*—as well as on the macro-geographical level. The macro-geographical impacts affected nation states and the global socio-ecological system as a whole. It could be said here that the expansion of the impact of hyperlocalisation became global during COVID-19, which was classified as a global disaster. This expansion of hyperlocalisation has led to a global compression of the space-time of individuals and humankind. To understand the COVID-19 disaster in terms of the reality of a human, of society, and of humanity's existence in the time of COVID-19, the micro-geography and macro-geography of the disaster impacts and outcomes must be studied together as two aspects of the same reality and of the same ontological realm of existence, in the current space-time continuum.

Based on the reasoning and line of argument so far, human existence during COVID-19 can be interpreted as an example of the ontological reality that will be a manifestation of overlap between micro- and macro-geography for an individual and the continuum of *Homo sapiens*. The micro-geography and macro-geography of the disaster impacts and outcomes of COVID-19 must be studied concurrently. The coronavirus disaster has uncommon features, as it unifies diarrhoeal and respiratory symptoms in one. The symptoms require common measures, in terms of public health, and factors controlling their spread. These include hand-washing before and after food preparation/consumption, after using the toilet, and sneezing into a handkerchief or a flexed elbow. It was not the rule, but rather the exception before the COVID-19 pandemic, for the symptomatology of an infectious disease [19] to be a combination of respiratory and diarrhoeal/GIT elements to the extent we observe now. The SARS-CoV-2 virus 'united them under one infectious genome', and this virus spread rapidly in the micro- and macro-geographical sense. Humanity has been struggling to discover the complete symptomatology of this infectious disease ever since. The space of humanity and the disaster impacts of COVID-19 continue to be uncovered daily, e.g., the rapid expansion of the number of published articles on the pandemic alone is astronomical (e.g., the recently discontinued COVID-19 Knowledge Hub on Researchgate.net, 2020–2022). Some information comes in the form of individual reports [20] or other reports such as clinical trials on vaccine efficacy [21], while social media is also being used as a source to track information [22]. Thus, the COVID-19 pandemic and its impacts on the micro-geography of individuals and the macro-geography of the global human space-time is complex. Its examination and causality, or causalities, will be complex as well.

The sense of distance, time, and society of space-time have been fundamentally altered during the COVID-19 pandemic [23]. Distance has been compressed, and the individual's world is becoming hyperlocalized inside their homes, quarantine facilities, or in the array of things they can do daily. However, distance has also been removed in significance as the COVID-19 pandemic has impacted everybody, i.e., micro- and macro-geographical overlap in the COVID-19 pandemic space-time means all of humanity is affected. Time during the pandemic has been passing on a slightly different scale as we have lost boundaries between homes, work, and life before the pandemic [23]. The effect of the coronavirus on socio-ecological systems and humanity has been profound. There is now a new reality that

members of *Homo sapiens* live in. The micro- and macro-geography of human existence have been fundamentally altered and the outcomes are only going to be seen in the coming decades (based on the author's interpretation of thoughts by Mansouri and Sefidgarbaei [23] and other reports from the literature).

There have been theories about the origin of the SARS-CoV-2 virus, the causative agent of the coronavirus pandemic [24,25]. Natural selection vs. a lab-spillover theory are some of the leading theories. Their analysis and debate have been taking place in the public sphere, in the realms of geopolitics, as well as across various scientific fields. Various driving forces are behind these discussions, but probably the most important one was to find tools and means by which humanity could cope with and adapt to the new reality of the during-pandemic world and the post-COVID-19 space-time landscape. This points again to the complexity of space-time in which the coronavirus pandemic has been unfolding and how it has altered the human being's micro- and macro-geography. The complex causality of the COVID-19 pandemic is likely. In this context, which perspective does humanity take to adapt and tackle the pandemic outcomes? The perspective below is proposed as a result of the shift in the micro- and macro-geography of human existence, taking micro- and macro-geography of human existence into account.

Fugitives from danger in the non-criminal sense, such as refugees, internally displaced people, and migrants (designated as FRIDOMs in the further text of this article), are terms that have been in the news and on the minds of people around the world for a long time. FRIDOMs have been a part of human civilization and their histories for millennia. Some people became FRIDOMs due to triggers such as war, armed conflict, an uprising, pillaging, or a natural catastrophe. Natural disasters have been a contributing factor to the start of the fluid existence of a human being and FRIDOMs' uncertainty, similar to that of the COVID-19 space-time. There have been improvements in the treatment and maintenance of the dignity of FRIDOMs throughout recent history. However, some stories of FRIDOMs are often anonymous, many times tragic, and often not told at all in the macro-geographic space in which humanity exists as a species. FRIDOMs, as the main protagonists of such silent stories, suffer in silence in the confines of their own micro-geographies. However, some stories do get told. Stories of FRIDOMs can include the inner emigration of one's self in the face of cataclysmic events, i.e., a member of *Homo sapiens* continues to live in denial in spite of the changing macro-geography around them and in the geographical sense. This FRIDOM continues to dogmatically believe in the consistency of their micro-geographical circumstances. Denial and anti-vaxxer campaigns could be considered a form of this. Whatever the story, FRIDOMs, as their story's protagonist, can often but not always share their lived experiences nowadays through social media and the digital dust of unchanged habits, when compared to the situation before the COVID-19 pandemic.

Famous people, e.g., thinkers or scientists who had moved to escape either prosecution in their home country or based on their objection to the powers in charge in their country of birth, from one location move to another. An example could be Albert Einstein, as well as many of his scientist peers, leaving Germany for the USA just before World War II [26]. The global stature of Einstein and others, a sign of their macro-geographical reach in time and space, makes their FRIDOM stories visible and louder than other FRIDOM stories in the macro-geographical sense. Those other stories are stories of people, which unfolded in their micro-geographical space, trapped inside their existences, such as people living in their homes during the COVID-19 pandemic lockdowns. Such stories are those of suffering due to lack of resources, lack of a voice to express their needs/opinions, and without the ability to make choice(s) or change. Choices during the COVID-19 pandemic would be made along the lines of the freedoms of Sokol [17]. In more detail, stories of FRIDOMs suffering are those who lack the freedom to move away or towards other humans at will, in other words, their freedom from barriers (freedom of advertising) is limited. FRIDOMs do not have full autonomy to make choices in their everyday lives (freedom of the supermarket; [17]). Finally, FRIDOMs generally lack the freedom to explore the macro-geographical space of possibilities, the freedom to reach their potential, and to explore their inner greatness at

the boundary of their micro-geographical sense of self and macro-geographical space of humanity (freedom of game; [17]). Based on these conjectures or lines of reasoning, what is the real nature of a FRIDOM in the space–time of COVID-19? Furthermore, who are they really?

The above-mentioned paragraph explains the challenges that each member of *Homo sapiens* could be exposed to, which is influenced by and needed to then be perceived as a fact of life in the space–time of COVID-19. The fluidity of physical circumstances in this disaster space–time can lead to the fluidity of identity, the fluidity of a reference system on which existence of a human or a group of people is anchored too. For example, the changes in the binding forces of everyday lives of people. This can result in the development of what is physically an antithesis of one's previous existence. One member of *Homo sapiens*, a single human being, can become a refugee, a displaced person from reality. This displaced reality is from one's former life before the onset and the ongoing manifestation of the impacts of the coronavirus pandemic. The person can become a refugee, i.e., a non-citizen stuck in a foreign country due to COVID-19 pandemic lockdown measures and/or border closures. An internally displaced person, in the time of the COVID-19 pandemic, is anyone alive who has been cut off from their ability to move around, who is unable to go to work and earn a living, and who has become unable to see friends and family. It is everyone who is internally displaced or stuck in the coronavirus version of their existence where they only exist as an apparent prisoner in their own life. Their freedoms, as defined by Sokol [17], are limited or completely nullified. This elimination of freedoms will then apply to most of humanity during the COVID-19 pandemic. Thus, the perspective to use when studying the micro- and macro-geography of the COVID-19 disaster space–time will be the FRIDOMs' perspective of most of humanity. However, is the cumulative perspective of all FRIDOMs during COVID-19 the best way to examine the influence of the pandemic on the micro- and macro-geography of our existence as a species? If so, what are the questions to be asked?

It could be said that the shifting nature of the reality of a FRIDOM and a member of *Homo sapiens* can be linked to questioning and wondering about the essence of the priority principle [27]. This is related to the question “What does one human being know about their existence and their self, their place in humanity's space–time in the non-derivative sense during the COVID-19 pandemic?”. Where does the fundamental epistemic authority of existence for a particular human being lie? Does it reside with one's self, is it missing completely, or is it hidden in the circumstances of one's own COVID-19 pandemic existence? Or does this fundamental epistemic authority reside in the surrounding sources of agency, in the non-human parts of the socio-ecological system of the coronavirus space–time? What is the source of the fundamental epistemic authorities of a FRIDOM's identity and reference system of their existence in the COVID-19 space–time? How does this apply to a refugee from their pre-coronavirus life, an ambivalent or unwilling participant of their own COVID-19 existence, an internally displaced person in their micro-geographic space? Finally, how does a refugee deal with the fact that they have no apparent agency in creating their own status of a refugee in the space–time of their personal COVID-19 existence?

Voices of each individual human, their access to resources, and their ability to reach individual inner greatness through the freedom of game [15,17] will be a function of the nature of incorporation of the individual's micro-geography in the COVID-19 space–time. Data must be collected on this to establish the boundaries of a new reality. Therefore, the stories of FRIDOMs and their data on the micro- and macro-geography of the human population living through COVID-19 are necessary and should be documented; the source of the human's voice should be heard. These will then serve in creating new reference points to help members of *Homo sapiens* understand and (re-)define their identity(ies) and state(s) of existence. These reference points will become the new anchors for the identity of members of *Homo sapiens* in the COVID-19 and the post-COVID-19 space–time. This will in turn be linked to the recalibration of the FRIDOMs' ability to resist changes in distance, time, and society after COVID-19 compared to the pre-disaster reference point(s). In this way, the questions linked to the priority principle of a new existence in the time



of COVID-19 can be developed for members of *Homo sapiens* in the micro-geographical and macro-geographical sense/space-time (as based on the application of the work by Bailey [27]). Answers can be also found as a follow-up on this process and the resulting set of questions.

In- and post-COVID-19 space-time for any and all humans will be different, and they will exist in different micro- and macro-geographical landscapes from the pre-COVID-19 one. The sense of constancy in conditions of living was altered and removed for the most part. In other words, the predictable nature of the binding forces of one's everyday existence has ceased to exist in the micro- and macro-geographical sense, i.e., there has been a shift towards a lack of predictability. Thus, and in a sense, the engineering resilience of human reality and its resistance to change, as based on the relevant definition by Barrett and Constan [28], has been removed. Some parameters of the in- and post-COVID-19 space-time might and will even be the same, as prior to it. However, other variables will be outside of any known intervals and the complexity of the COVID-19 pandemic as a disaster would have likely created some variables, which humans are not familiar with in either the micro- or macro-geographical sense. The ecological resilience of *Homo sapiens* must be recalibrated from scratch, i.e., the humans' ability to deal with and adapt to the unpredictability of disaster perturbations must be recalibrated [28]. Reference points for understanding one's micro-geography and the bi-directional cross-influences on the macro-geography of humanity must be understood in more detail [28]. This is an extension and application of the priority principle to human reality of and in the COVID-19 space-time.

The COVID-19 pandemic has been at the center of human existence since 2019. It has encompassed the entire world, with cases detected in more than 200 countries and territories around the globe (see COVID-19.who.int for details). All impacts, the impact beyond health and the first-generation disaster viewpoint, at the level of the world community, the ecosystems around the globe, in a region, in a country, and in the life of a particular human being are just now being detected, data on it collected and analyzed, and the changes required being done. The micro- and macro-geography boundaries of COVID-19 are blurred and full of unknowns. The space of one's self and the space in which humanity exists overlap in the physical and temporal senses. Thus, all members of *Homo sapiens* have a vested interest in gaining an accurate understanding of the space-time of COVID-19 and the overlapping micro- and macro-geography boundaries. Therefore, all members of *Homo sapiens* should be involved in gathering data on this interaction and the overlapping of micro- and macro-geographical descriptions of the impacts of the coronavirus disaster. As a result, the authors posit here that the role of scientists and scientific investigators as a driving force in gaining and creating new knowledge is being challenged in this COVID-19 space-time. From the micro-geographical point of view, all humans collect data on the characterization of the COVID-19 space-time within their lived experiences. This data is often shared and published as social media posts and is seen as digital dust. From this viewpoint, each human being is a citizen capable of being a 'scientist' in the COVID-19 space-time [29]. The idea of citizens being scientists gives importance to the 'record of you', where individual *Homo sapiens* can enact social change due to the potential they have to interact with the digital dust to either prove or disprove theories.

The priority principle, the reference point of the COVID-19, and the post-coronavirus human existence will be understood by using each human being as the comparison, evaluation, and data collection agent in the study of the 'record of you'—the record of one's existence. This is the record of an individual's life before and after the onset of the pandemic which will show us the existence and transformation of humans from before and during the pandemic, in a process of becoming FRIDOMs. This 'record of you' for all or some members of *Homo sapiens*, depending on the number of FRIDOM stories that are heard, is an important source of information for tackling the outcomes of COVID-19 in the macro-geographical space-time continuum. The question is if the 'record of you', the record of one's existence as part of the entire *Homo sapiens*' macro-geography, is good enough to be a data source to describe this COVID-19 space-time and to study the relevant

implication on the post-COVID-19 micro- and macro-geography. In the authors' opinion and based on interpretation of vast amounts of literature, recent history of human activities and development will play a role here too. This line of argument is developed and linked to the 'record of you' for all members of *Homo sapiens* in the next section.

### 3.2. Anthropocene, the 'Record of You' and the 'Record of Humanity'

Around 7.936 billion people are alive on Earth at the time of writing this article and that number is continuously climbing [30]. Kaneda and Haub [31] estimated that the total world population stood at 7,772,850,162 in 2020, with this figure accounting for 6.80% of the total number of humans who have ever been born on Earth, i.e., estimated at 116,761,402,413. The *Homo sapiens* species are about 180,000 years old, with the majority of the human population living a hunter–gatherer lifestyle for that period [32]. Due to the nature of the hunter–gatherer lifestyle, most of the human population could be classified as migrants during that period [33]. During the hunter–gatherer period of human existence, the total population of *Homo sapiens* was small in numbers, as well as in terms of population density per km<sup>2</sup>. The agrarian transition, about 100,000 years ago [32], led to minor improvements in the quality of human life, but life expectancy during this period was estimated to range from 10–12 years of age [31] to 17–35 years of age until about 1650 ([34], p. 734). The migratory nature of hunter–gatherer societies, the unstable nature of food supply, risks from animal attacks, and other factors resulted in high mortality and low life expectancy for humans in this period. This trend started shifting from the agrarian transition, more substantially from about 1650 (see below for details) and from the onset of the industrial revolution [34], p. 734). Further improvements followed with subsequent industrial inventions. However, the population growth of humanity was slow, as modeling estimations have indicated that 2,030,625 people lived on Earth around 50,000 BC and 500 million around 1650 [31]. Most of the everyday human existence was unfolding in the micro-geography of a small space that could be fluid, but the macro-geography of migration might be significant on a larger space–time scale.

The first period of human history, which was mostly a hunter–gatherer one, ended at the so-called first (phase of) epidemiological transition, where food supply stabilized, and the overall "pestilence and famine" had started to recede [35]. Agriculture and large parts of the human population settling in fixed locations led to social and geographical changes in human society and the expansion of humanity's reach [32], which ultimately resulted in the second (phase of) epidemiological transition. There was an onset of growth in life expectancy and receding pandemic occurrence among *Homo sapiens*, but mortality remained high [35]. Infectious diseases continued to be a problem and the mortality/birth rates of humanity were mostly balanced in relative proportion to each other [35]. In the second epidemiological transition, agricultural expansion has been theorized to have prevented the onset of a new ice age about 8000 years ago, while a significant amount of today's greenhouse gases, namely CO<sub>2</sub> and methane, were released into the environment about 5000 years ago [32]. Humanity had profound effects on the surrounding environment such as coastal areas and localized forests, but the significance was always micro-geographic in nature during the second (phase of) epidemiological transition [32].

Life expectancy increased to between 30 and 50 years, and the total worldwide population of *Homo sapiens* reached 1 billion around the start of the 19th century [31], more specifically in and around the year 1804 (Population Connection, 2021). The physical and geographical spread of humanity also increased [32] with the exploitation of resources, armed conflict, and colonization contributing to that significantly between the 1400s and the 1900s. The anthropogenically transformed area had accounted for a significant part of Earth's surface before the industrial revolution, while the energy increased about three to four fold between the hunter–gatherer era of human development and agricultural times [32], i.e., between the first and during the second (phase of) epidemiological transition [35]. Energy consumption in the form of fossil fuels increased the potential for reproduction among humans and the population boom followed, i.e., energy production increased from

400 to 500% by the industrial revolution when compared to the pre-industrial revolution [32]. The 1800's geographical expansion was a catalyst for 'human development', in the Western sense of the term's understanding, and lead to the macro-geographical impacts mentioned above.

Industrialization mostly in the Northern hemisphere since the 18th century and colonialism/territorial expansion of some members of *Homo sapiens* was also a catalyst for hardship in the developing world and the Global South. The impacts of those processes are still relevant today and one could argue that the current COVID-19 pandemic has brought to the forefront the residual and ongoing effect of the Western-style progress [36]. The micro-geography of one's existence was thus more localized and less fluid after the second (phase of) epidemiological transition. At the same time, the macro-geography of humanity grew in significance across the space-time of *Homo sapiens* with a shorter time scale. However, the micro- and macro-geographies of humanity were still largely separated in terms of direct impacts on the individual members of *Homo sapiens* in their everyday lives during these first and second (phase of) epidemiological transitions. Merging and overlapping of the micro- and macro-geography boundaries of individual humans were already underway though. The nonhuman agency of macro-geography started affecting 'the record of you' and 'the record of humanity'.

Towards the 19th and 20th centuries, there was a substantial improvement in the quality of life for members of *Homo sapiens* due to progress in areas such as biomedical sciences. Thus, the third (phase of) epidemiological transition has been taking place where non-communicable and degenerative diseases started becoming the major cause of human mortality, in place of infectious diseases [35]. Growth of the human population to the above-mentioned 6.80% of the historical number of all members of *Homo sapiens* living today [31] was, at least in part, the result of the demographic gap, i.e., the increase in the life expectancy and the radical decrease in human mortalities [35]. The demographic gap has not been observed concurrently in all parts of the globe, but rather has been related to the local levels (micro-geography) and the nature of human development, public health status, and geopolitical arrangements at the time [34]. Kabudula et al. [37] reported on the results of verbal autopsy and their statistical modeling of mortality causes in certain rural parts of South Africa. Results of that study indicated that the third epidemiological transition from communicable diseases, including maternal and childhood diseases, to non-communicable diseases is still underway in (parts of) South Africa, a middle-income country [37]. The main cause of the delay was the occurrence of the HIV/AIDS pandemic and TB infection rate increase between 1993 and 2007, and the subsequent decline in mortality between 2007 and 2013 due to the introduction of anti-retroviral drugs [37].

There has been a disproportionately high impact of the global HIV/AIDS pandemic on the population in Africa, as 68% of the 37.6 million people living with HIV worldwide in 2020 resided on the African continent [38]. HIV/AIDS is hypothesized to have originated on the African continent [39], but was first detected in North America through stories of FRIDOMs such as famous Hollywood celebrities [40]. The disease seems to have spread from Africa to the USA and back [41]. The impact of HIV/AIDS on the micro-geography in Africa has been much higher than in the developed world, where the first FRIDOMs of the HIV/AIDS pandemic had their voices heard publicly and resources were then put in place to help bring the pandemic under control through anti-retroviral drugs. Large parts of the population of African countries have been decimated by the impacts of HIV/AIDS [42]. However, the HIV/AIDS pandemic has also become an example of some positive Global North-Global South links in healthcare, e.g., the PEPFAR program [43]. The micro-geography of individual humans and the macro-geography of the humanity space-time have clearly overlapped in the current and ongoing stage of the third (phase of) epidemiological transition.

The third epidemiological transition could have been the last one, but various factors contributed to the fluid nature of the causes of death among the members of *Homo sapiens*. Thus, there is another transition pending that could already be underway, as the third (phase

of) epidemiological transition is not yet finished in some countries. This is supported by recent results from the modeling study by Hazra and Gulliford [44], who reported that the loss of cognitive function, dementia, and diabetes rates were increasing pretty much among the entire over-80 population in the United Kingdom between 1990 and 2014. The authors suggested that the data and modeling results indicated the onset of the fourth (phase of) epidemiological transition which is the so-called era of “age-delayed degenerative diseases” [44]. An extended lifespan and increased significance of human morbidities in public health have been suggested to form a significant element of the fourth (phase of) epidemiological transition.

Progress in biomedical sciences and processes of globalization have, one could posit here, resulted in major shifts in the nature of human existence in the late 20th and early 21st centuries. Human development has accelerated since the last decade of the 20th century, as 1.2 billion people have been lifted out of extreme poverty [45]. Due to such factors, the fourth epidemiological transition will require a stronger public health focus on the significance of morbidities and polypharmacy for ages over 80 [44]. The overall life expectancy at birth has been generally increasing since the start of the third epidemiological transition and continues to the present day. However, it has fluctuated in some countries such as South Africa [8,46]. Those fluctuations have been the result of certain infectious diseases coming back in recent decades due to the overuse of antimicrobial medicines and therapeutic agents (e.g., [47,48]). This can cause the complicated and multi-dimensional nature of the current (phase of) epidemiological transition, as well as the public health setting in which it is and will continue to unfold. Is the third (phase of) epidemiological transition still underway or has the fourth (phase of) epidemiological transition commenced already? Or are humans and public health stuck in between the two? The duality/ambivalence and changing landscape of the micro- and macro-geographies in the socio-economic system have created boundaries that are no longer bound by space and/or time. The current and post-COVID-19 space–time continuum for any and all humans is different from the pre-COVID micro- and macro-geography. The compression of the micro-geography and the expansion of the macro-geography means the boundaries and context of human resilience can no longer ignore the record of an individual, as the predictable nature of the binding forces of one’s everyday existence has ceased to exist.

From the discussion above, it is clear that the geographical location of a particular member of *Homo sapiens* can play a significant role in the impacts and challenges that a human being will face on the public health front in the micro-geography and through considering the impact of macro-geography, e.g., of a given country. Based on a health systems point of view, a balance has to be struck between considering what the major public health threats are and their multitude of controlling factors. Diseases such as HIV/AIDS and TB have been spread across the world and in many countries, and they overlap as co-infections in the same human being. HIV and AIDS being classified as HIV/AIDS stand testament to this [49]. People affected by these infectious diseases did not choose the resulting suffering. Their micro-geographies have been impacted by the globalization of some infectious diseases such as HIV/AIDS, i.e., the micro-geography and macro-geography of disease are intertwined in terms of impact in the scope of the ongoing third (phase of) epidemiological transition and the onset of the fourth one. Therefore, the micro-geography of *Homo sapiens* members has been improved somewhat. Globalization has, in part, contributed to this where the macro-geography of humanity has overlapped, at least in part, positively with the micro-geography of some *Homo sapiens* members in the 21st century, before the onset of the COVID-19 pandemic. However, this overlap of geographies at various scales has had side effects. In other words, the impact of the ongoing fourth epidemiological transition is taking place at the micro- and macro-geography interface and through complex cause and effect relationships, as well as compounding effects.

The increased reach and success of humanity have led to the creation of unpredictable and new/ever-more complex risks which are endangering the gains made by humanity as a species [50]. Pain and pleasure have been united in the course of human actions and



the results thereof. This pain and pleasure unity could be posited to be the result of the total sum of actions of 116,761,402,413 people who have ever been born into the species of *Homo sapiens* and speaks to ‘the record of humanity’. Some humans have had and continue to have a stronger voice, more access to resources, and higher chances to reach their inner greatness/full potential in the micro- and macro-geographical sense. Therefore, all ‘current’ humans are experiencing the pain and pleasure, the cause and effect of the micro- and macro-geography interface, and of the total ‘record of humanity’. The current 6.80% of humans ever to be born have had their ‘records of you’ most affected spatially, across geographical scales, by the historical and cumulative actions of humanity. The success of every human achievement has unknowingly contributed to the creation of new hazards that can trigger (complex) disasters and undo the developmental achievements of humanity since about 1650. It could then be stated that based on the line of manufactured risk reasoning by Beck [50], the cumulative actions of *Homo sapiens* have led to the age of Anthropocene.

The Anthropocene Working Group [51] update on the definition of the Age of Anthropocene indicated that there was consensus in the geological, earth science, and other relevant academic fields that human activity has reached the level of anthropogenic influence that warrants the designation as a new era in the geological time, dubbed ‘the Age of Anthropocene’. At the same time, Leinfelder [52] stated that the Anthropocene is underway at three levels, namely at the level of the Earth’s system, at the level of the geological deposits/sediments, and at the level of societal changes and tools to manage the transition. The same author clearly indicated that the shift in human attitude toward the global ecosystem is needed at a social level, at an ethical-scientific level, and other levels of human existence [52]. The authors of the current paper posit here that the Age of Anthropocene is a manifestation of the ‘record of humanity’ and shows the side effects of it at the macro-geographical scale. At the same time, there are manifestations of Anthropocene at the level of individual humans, in the realm of the micro-geography of single human beings across the current globe.

The ‘record of humanity’ would be mostly the result of the actions of the members of *Homo sapiens* since 1650, i.e., the onset of the industrial revolution. Some have argued that the onset of the Anthropocene could be traced back to the invention of the steam engine in 1784 [53]. Therefore, the timeline of the ‘record of humanity’ is explained here based on the following reasoning. Kaneda and Haub [31] estimated that between 94,392,567,578 and 97,564,499,091 people had been born by 1650–1750. At the same time, 116,761,402,413 people were born between the hunter–gatherer era of human existence and the year 2020 [31]. The ‘record of humanity’ will be an outcome of the manufactured risk of cumulative human actions and/in the Age of Anthropocene [53]. Those cumulative actions will have a direct impact on the ‘records of you’ of the 6.80% of all humanity ever born, who are alive today. Using the estimates of Kaneda and Haub [31], the ‘record of humanity’ is the result of the cumulative actions of 16.44–19.15% of all members of *Homo sapiens* to have ever lived. These percentages are based on the differences 94,392,567,578 (80.84% of all humans ever born) and 97,564,499,091 (83.56% of all humans ever born) and 116,761,402,413, converted into the percentage of 116,761,402,413. Thus 6.80% of all humans alive in 2020 carry the impacts of the “extra” 9.68 to 12.39% of all members of *Homo sapiens* who have been born since the onset of the Age of Anthropocene. Does this “simple calculation” reflect inequality between the people living through the COVID-19 pandemic and its aftermath and the “extra” humans from the total Age of Anthropocene?

Equality among members of *Homo sapiens* has been an ideal for humanity through various time epochs. However, what does equality among of all humans mean in practice? Is equality defined through access to resources? Are the voices in the discourse of human activities equal? Does it relate, i.e., to the term equality, to freedoms by Sokol [17]? Are the resources that all humans should have access to the basis for assessing this equality? Have disasters shifted the equality among humans towards a balance or towards a disequilibrium? What does the Age of Anthropocene mean practically in this context, and how does



it link equality to the relationship between the ‘record of you’ and ‘record of humanity’? To answer those questions, more than one approach can be taken. Some cultures take equality to mean equal access to resources, while others take everyone’s opportunity to carve out their own path, as our path in life. In numerical terms, there are examples of human endeavors where the equality of individuals can be achieved. For example, in the field of sports, the Wilks coefficient for powerlifting [54], and/or the Sinclair coefficient for weightlifting [55] can be calculated to equalize and assess the absolute strength of competitors across weight classes. The idea of both coefficients is to continuously update a scale where athletes from different weight categories have their achievements evaluated on an equal basis. Thus, the strongest weightlifter in history was the ‘Pocket Hercules’ [56]. After World War II, the Universal Declaration of Human Rights was adopted by the United Nations, and it remains in force [57]. However, overall equality remains elusive among the individual members of *Homo sapiens*. A few examples are presented below.

A recent essay by Brown [58] indicated that the use of certain medicines, e.g., such as antidepressants, can be sometimes questionable and indicate ethnic bias rather than therapeutic benefits or need, i.e., even though unintended this transhumanistic “improvement” might lead to inequality. The COVID-19 pandemic has re-created and accentuated the dichotomy of equality on Earth. On one side, the entirety of humanity is impacted by the coronavirus and lockdowns were omnipresent regardless of the GPS coordinates where individual humans resided at, hence the compression of the micro-geography in a global view [15]. However, the existing inequality still persists in not completely equitable access to some resources, e.g., vaccines. That access and vaccine development are complicated by vaccine imperialism/nationalism, and even donations of vaccines by the Global North were mostly made or reached the most developed countries in the Global South [59]. This snapshot, along with the FRIDOM examples which had already been presented above, indicates that micro-geography might be a constant factor, as all humans should be equal in terms of their universally guaranteed rights. However, macro-geography also has a significant influence on equality, wellbeing, pain, and pleasure of the particular individual member of *Homo sapiens* across the globe. Where one lives indicates how much access to vital resources one can have, indicating some level of inequality across the globe.

Lack of equality can be deduced to be one of the side-effects of the ‘record of humanity’. The COVID-19 vaccine case clearly supports the conclusion that the ‘record of humanity’ influences certain features of the COVID-19 space–time. In other words, the authors of the current paper state here that the COVID-19 space–time is an expression of an imbalance at the micro- and macro-geographical boundary/boundaries of COVID-19. The imbalance is the lack of equality across the space of the COVID19 pandemic, among humans from various parts of the world. The imbalance is a combination of the COVID19 pandemic and its impacts on the ‘records of you’ for people in the Global South, but also of the impacts of the ‘record of humanity’. Said boundary imbalance in turn likely increases the pain and suffering of some individual members of *Homo sapiens*. The degree of pain/suffering will be a function of the GPS coordinates of their existence. FRIDOMS in a particular location will have their voice not necessarily heard, and their freedoms by Sokol [17] and their access to resources might be restricted. Can this be resolved? Can we approach an equality and balance between the ‘record of you’ and the ‘record of humanity’ in the lives of members of *Homo sapiens* who are classified as FRIDOMS in the COVID-19 space–time? The micro- and macro-geography interface will play an important role in any such considerations.

In order to achieve equality from a developmental point of view and in the post-COVID-19 world, equality must be seen as overlapping with developmental resilience, which is defined as “the ability of the population to have the tools and ability to prevent poverty or falling into the poverty trap” [60]. Leinfelder [52] stated that the Anthropocene is underway at three levels, namely at the level of the Earth system’s, the level of the geological deposits/sediments, and the level of societal changes with the tools needed to manage the transition. As a result, work by Leinfelder [52] clearly indicated that the shift in human attitude toward the global ecosystem is needed at the social, ethical–scientific, and other

levels of human existence. The need for such a shift is required at the level of each member of *Homo sapiens*; at the level of societal action, there must be an elimination of the dichotomy of solutions, i.e., human actions being classified as either right or wrong only [52]. The complexity of human existence, as an integral part of the global socio-ecological system, needs to be reflected in tackling the manufactured risks of the 21st century [50]; [52]. The micro-geography and macro-geography must be considered here; as must be the balance between the ‘record of you’ and the ‘record of humanity’; and their implications/impacts on equality. In more detail, the following quote can be used to summarise and finally make the point [50,52] and the quote below):

*“In- and post-COVID-19 space-time for any and all humans will be different from the pre-COVID-19 micro- and macro-geographical landscape. The sense of constancy in conditions of living was altered and removed for the most part. In other words, the predictable nature of the binding forces of one’s everyday existence has ceased to exist in the micro- and macrogeographical sense, i.e., there has been a shift towards a lack of predictability. Thus, and in a sense, the engineering resilience of human reality and its resistance to change, as based on the relevant definition by Barrett and Conostas [28], has been removed.”*

What this means is that the COVID-19 pandemic created unknown variables in the micro- and macro-geographical sense. Thus, the resilience of human reality (their ecological resilience) needs to be recalculated in order to promote disaster preparedness and prevent future risks created in the socio-ecological system. Barrett and Conostas [28] call for better understanding of the reference points of one’s micro-geography and the bi-directional cross-influences it will have on the macro-geography of humanity.

### 3.3. Utilitarian Qubit and the Micro- and Macro-Geographical ‘Balance’ in the COVID-19 Space-Time, Specifically the Post-COVID-19 Realm of Human Existence

Human actions have led to changes in the global ecosystem, as well as the global socio-ecological systems. Current state of scientific knowledge indicates that some of the changes might be irreversible, if human actions are not more integrated into the environment and space around them in general [61]. More conscious integration of an individual’s micro-geography into the Anthropocene’s macro-geography is also needed. Irreversibility and the need for a shift are required, as the increased concentration of greenhouse gases can lead to a positive feedback loop in the homeostasis of Earth, as indicated/suggested in the Gaia hypothesis [62]. This might negatively impact all life, as defined by Lovelock who proposed and formulated the Gaia hypothesis about the planetary homeostasis, namely that [62]

*Life is a “self-preserving, self-similar system of feedback loops like Humberto Maturana’s autopoiesis; as a self-similar system”.*

A statement that could be made here that the homeostasis of nature is being shifted by the driving force of the life of *Homo sapiens* and its species members. Human activity is affecting the whole planet’s ecosystem and human over-mightiness [52]. A shift is needed from the dichotomy of human action, i.e., human development has led to benefits for some members of *Homo sapiens*, but it has, at the same time, led to suffering of other human beings. The shift that the authors talk about here is the need to shift human action of duality, i.e., further and future development of *Homo sapiens* must be done as to foster the development of all humans equally. Concurrently, the duality action should drive the protection of the biosphere and the abiotic components of the socio-ecological system. In this context, it is necessary that impacts of any human actions must be judged as an integrated expression of the human, or rather based on humanity’s agency in the socio-ecological system. Any action must be also focused on facilitating or achieving equality among humans under the conditions of balance between the ‘record of you’ and ‘record of humanity’. Balance and equality must also be linked, and human actions driven, in relationship to the micro- and macro-geography interface. Action of duality must lead to maximising the extent and

geographical distribution of pleasure to humanity, while minimising the pain to humanity and the socio-ecological systems.

In terms of this shift, humanity needs to choose between the potential destruction of the socio-ecological system and its significant deterioration at the global and local levels. A symptom of this would be that humanity sticks to the space–time where human (unequal) development is the only driving force behind human ‘progress’. Alternatively, humanity can seek transformation of its attitude and space of existence of members of *Homo sapiens* to an integrated and post-humanist space. In this second variant, there is increased focus on the links between humans, the biosphere, and the abiotic components of the environment. Non-human components of socio-ecological systems are given ethical consideration, and in doing so, humans can provide long-term sustainability to their existence in a just, economical, and ecologically-balanced manner [63,64]. The need for the second option is driven by the Age of Anthropocene and the linked processes at the micro- and macro-geographical boundary of human existence. The ‘record of you’ of 6.80% of all humans who have ever lived must be given equal and just priority, while the long-term implications of the ‘record of humanity’ must be managed, and humanity must take responsibility for them in its relationship to the global and local socio-ecological systems. Data on the impacts of Anthropocene on the socio-ecological system must be used as a basis for the development of new, just, and relevant reference points of the just/equal/developed existence of members of *Homo sapiens*, who are alive today. Engineering and ecological resilience of humanity could so be achieved. The continuum of our species must take stock and ownership of the impacts that previous generations and in mostly the Global North have had on planet Earth. At the same time, humanity cannot ignore, but rather it must actively try to undo/rectify the injustices in the continuum of micro- and macro-geographies of individual members of *Homo sapiens* and throughout the continuum of it.

Further evidence for the need to choose such an approach is demonstrated by the COVID-19 pandemic, where the nature of the space in which human existence and wellbeing is profoundly affected by humanity’s ongoing and constant interaction with pathogens. As pointed out by Alloggio [65], philosophers have attempted and partially succeeded in explaining where the SARS-CoV-2 came from. However, major challenges remain in the discourse among the various philosophers to provide a just and balanced approach in dealing with the ethico-philosophical dimensions of the past human actions and its geographical drivers must be now counteracted by justice being achieved through recalibration of narrative and distribution of action impacts throughout the micro- and macro-geographies of the globe (based on the work of Alloggio [65]). The ‘parasitic nature of the SARS-CoV-2 virus’ and its similarities to the injustices that members of *Homo sapiens* had exerted against each other, must be eradicated by giving each member of *Homo sapiens* an equal voice, an equal standing. Admitting to ourselves that we are now all FRIDOMs in the reality of the post-COVID-19 space–time, marshalling all our data from the micro-geographical perspective of ‘record of you’, and combing those with the macro-geographical data of the ‘record of humanity’

This is a wider demonstration of the links between human wellbeing, the very existence of the members of *Homo sapiens*, and the other parts of the socio-ecological systems around the globe. Thus, the Age of Anthropocene in the history of Earth is characterized by the ambivalence of human actions, which are positive and negative at the same time. Human actions during the Age of Anthropocene have resulted in some pleasure and have driven a massive level of development. However, many members of *Homo sapiens* have also not benefited from the ‘massive development’. Ecological parts of the socio-ecological systems have been stripped of resources by a small group of humans, stripped of the resources which should have benefited more people, and more members of the Anthropocene humanity. The accumulation of greenhouse gases and the negative impacts of the ‘record of humanity’ has been wreaking havoc on the ‘records of you’. Human existence, at the individual and societal/species levels, is just a mixture of pain and pleasure on an ongoing basis. At the micro- and macro-geographical levels, it is often very difficult to distinguish between where

pleasure starts, and where pain ends, and vice versa. The ambivalence of human action going forward must take this into account.

Therefore, during our current existence, the space we occupy as a species of *Homo sapiens* is contested in a way. The contested nature of our space originates from the sense that human development has pushed humanity to a point that it has major and substantial impacts on the destiny of itself, but also planet Earth as a whole. The Anthropocene is a result and an opportunity to reshape the Earth by members of *Homo sapiens* [52]. An example of this can be the management of natural resources, as well as the continuous maintenance of the imbalances in human societies and the environment [64]. The pain and pleasure coexistence are with us at every turn, they are a part of our everyday reality. The authors introduce here the notion or term of *utilitarian qubit* (as originally proposed and here further developed from the recent paper by Iheanetu et al. [66]). The utilitarian qubit is a state of human existence where the pain and pleasure are with humans, at the micro- and macro-geographical levels, at all times. Pain and pleasure would be part of normal and everyday human existence. What is different in the state of *utilitarian qubit* is that it is impossible to distinguish at any given time, whether a human is experiencing pain or pleasure, or whether they are experiencing both at the same time. The authors imply here that utilitarian qubit is experienced by humans in the ‘record of you’, in the micro-geographical realm, and also by humanity as a species of *Homo sapiens* in the macro-geographical realm. The utilitarian qubit would be the result of the cumulative impacts of the ‘record of humanity’, and it is reality of the Age of Anthropocene. One of the manifestations of the *utilitarian qubit* would be the lockdowns and the COVID-19 pandemic. The spread of the virus was, at least in part, the result of anthropisation of space and the overall global impact of humans/humanity [25,67]).

Humanity reached into areas of planet Earth, which it previously had not. This led to human exposure to the genetic elements of viral nucleic acids which might have contributed to the evolution of the SARS-CoV-2 virus, the original alpha strain that had been the original causative agent of the coronavirus pandemic. Integration of humans into every corner of the macro-geography of the globe had led to the evolution of the first pandemic virus of the 21st century—the one virus which brought humanity to its knees [68]. Humans have integrated into the environment in an aggressive way; humans are shaping their macro-geography and in turn they have ultimately reshaped their micro-geography; they have triggered the COVID-19 pandemic and the lockdowns that came with it. Humans and the environment, micro- and macro-geographies have integrated. Therefore, the *state of human existence in the utilitarian qubit* will require an integrative view/action(s)/approach to solve. The integration will encompass the voices and knowledge of all human beings and *Homo sapiens* as a species. Understanding and combining the perspectives of the ‘record of you’ and the ‘record of humanity’, use of the FRIDOMs’ perspective from the micro- and macro-geographical balance point of view needs to drive humanity towards finding the right, equal, and just/sustainable way to deal with the *utilitarian qubit*. The integrative approach could be seen here as following the principles of the ‘gardening of the Earth in the Age of Anthropocene’. Such ‘gardening by humanity’ should be done positively/constructively. This is a good starting point, as humans have had a strong influence on creating the ontological realm of the Anthropocene. Therefore, individual human beings and the continuum of *Homo sapiens* have to now manage the complexity of the Anthropocene in a newly sustainable manner. This ideal can be summarised in the notion of knowledge gardening where the integrative science is seen as a simile to gardening [69]:

*“At different times, the gardener(s) will engage in a variety of activities, sometimes ones that serve to maintain or enrich the nourishing abilities of the soil and sometimes ones that involve planting seeds, nourishing young plants, moving established plants to different locations, encouraging new groupings of plants, harvesting materials, etc.”*

As a result, there is a practical call for a meta-level integration of human actions based on the principles from social sciences, humanities, and natural sciences, along with ethics



and knowledge generation to achieve management potential in the world of 21st-century manufactured risks [50,52] and [63,64]).

It might take time and be difficult for members of *Homo sapiens* to accept this integration and its practical implications, as there are hurdles in the way. For example, the power imbalance in the global geopolitical systems, [36], and the later/current indication that climate change is mostly affecting the people and countries which have not historically contributed significantly to its causative greenhouse gas emissions [70]. Given the ambivalence of human action, the management of manufactured risks should aim to create an ontological realm where the faults of the past are integrated into the solutions for the near future, where the moral residue against nature and parts of humanity is undone to undo the compromising of the ‘record of you’ of individuals globally, who are alive today, by the ‘record of humanity’. The inequality and the unequal impacts of the ‘record of humanity’ on ‘records of you’, is thus a function of macro-geography. In the micro-geographical sense, there could be a resistance of human beings in the Global North to adjust their lives to mitigate to global situations, to manage the impact of the Age of Anthropocene at the micro-geography and macro-geography interface/boundary. In a way, such considerations would be, in part at least, related to the ‘moral residue’ [71]. Moral residue can be classified as an extension of moral distress, i.e., a member of *Homo sapiens* knows what to do but cannot act on this knowledge due to circumstances outside of their control. That knowledge of what action to take and not be able to act on it leads to uneasiness or moral distress. If such necessary actions cannot be executed due to the limitation of the action’s success based on practical limitations, the resulting moral unease is internalised and becomes part of the human being, a member of *Homo sapiens* [71]. The internalization of the burden of festering hardship of no action possibly leads to the persistent moral, physical, and psychological anguish. This can be summarised with the following quote by Hylton Rushton [71]:

*“Over time, the negative effects of repeated instances of unprocessed moral distress can accumulate in both mind and body. Although the intensity of distress may dissipate to some degree after the crisis is over, a “moral residue”—also referred to as the “crescendo effect”—often lingers. In addition, there may be other types of residue, including physical ... emotional ... and cognitive ...”*

The circumstances are outside of the individual’s control and impact/manifest at the micro- and macro-geographical interface. The Gaia homeostasis is at risk, the ‘record of you’ for many in the continuum of *Homo sapiens* is at risk due to the ‘record of humanity’. The individuals that are experiencing moral residue suffer from continuous pain, regardless of whether they are originally from the macro-geographical space. The pain permeates their existence whether they are from the area that had triggered the ‘record of humanity’, or whether they reside in the GPS location that did not. The ‘record of you’ becomes the source of continual pain in the micro-geographical realm of the bearer of this moral residue, even when they are in a state of happiness. Globally, the micro-geographies of the 6.80% of all people, who have ever been alive on Earth, are now being impacted by residue (moral, human, and environmental) that had been created since the onset of the industrial revolution by the just-preceding “extra” 9.68 to 12.39% of all members of *Homo sapiens*. Therefore, the micro-geographies of the current members of *Homo sapiens* are negatively impacted and integrated into the moral residue of the ‘record of humanity’. That record is still unfolding in the macro-geography of the Age of Anthropocene.

As mentioned extensively already in this article, the authors here understand and will use ‘record of humanity’ in this article as the combination of the history and development of humanity since about 1650, the development of human thought, improvements in human industrial capacity, and progress in medical science as indicated by the extended life span and falling maternal/child mortality and by the demographic age gaps to name but a few non-exclusive examples. In the geographical sense, the ‘record of humanity’ is the way the Age of Anthropocene has redefined the surface of Earth, its biosphere, and the very nature of human existence. Furthermore, from the geographical point of view, the study of this space will follow the same basic understanding of principles of geographical science.



The history of space, humanity, and the surrounding nature is that of global and local translational networks, where anthropogenic action has reformed and remoulded existing space. It also contains an example of new spaces being created, e.g., brownfield land.

Life itself has been driven by various processes, and humanity still does not perfectly know how life came to be, at least not in the biological sense anyway. There are hypotheses, such as the RNA hypothesis, which indicates that RNA was the primary genetic material in primitive cells in the early stages of life's development on Earth [72]. It has been criticized, but recently simple systems based on ribozymes have been shown to replicate and even maintain certain homeostasis [73]. Ducarme and Couvet [74] recently reviewed the meaning and definition of the word 'nature'. One of the most important points here is that nature is the "specific force at the core of life and change", which is the result of a combination of the philosophical traditions of Heraclitus, Hegel, Nietzsche, Darwin, and vitalism [74]. It could be used to explain, in part, the drive of humanity to develop linearly and continue to exploit the natural resources of Earth, i.e., members of *Homo sapiens* use the need for resources and utilize them to improve and achieve their life's goals. Based on this reasoning, the Age of Anthropocene could be seen as an outcome of the nature of humanity. At the same time, the molecules such as RNA have evolved since their suspected original role, as the primary code of life, into 'facilitator molecules' of transcription and translation in all cellular organisms. RNAs have been integrated into the very nature of the life on Earth across the continuum of *Homo sapiens* and the biosphere—an argument could be made that they are important at the micro- and macro-geographical scale of global existence of the socio-ecological system.

Besides RNAs, integration of some micro- and macro-geographical aspects of the socio-ecological system and humanity can be presented even at a more fundamental level. The very essence of life on Earth is that the building blocks of living organisms are six major elements, so-called macronutrients, and these elements are carbon, nitrogen, phosphorus, sulphur, oxygen, and hydrogen. During the geological history of Earth, the infinite numbers of atoms of these six macronutrients have been subject to synthesis, degradation, and recombination into an infinite number of chemical molecules, such as proteins, nucleic acids, their monomers, etc. In addition, there has been cycling of macronutrients between the abiotic and living parts of the global ecosystem, and today, the socio-ecological system. Examples include the acido-basic contributions of the abiotic parts and the oxido-reductive roles played by living organisms [75]. These macronutrients, in various shapes and forms, are the very definition of the essence of life as humanity knows. Chemically-speaking, these atoms make life possible; they are a source of the space-time and scaffolding in and on which life exists and operates. The way life is translated from one generation to another is intricately linked to these atoms. The six macronutrients and their cycling amongst the components of what is today a socio-ecological system is probably the most concrete manifestation of the integrated nature of life, and mutual links that go along with it, on planet Earth. In ethical terms, the integrated nature can be represented by the layers of the land ethic of Leopold, where layers such as soil, plants, animals, and so on, create the macro-geography of life as outward permeating concentric physical and phenomenological layers (based on the authors interpretation of work by Rozzi [76]). In addition, the nature and level of human understanding of it, the relationship of the individual and the continuum of *Homo sapiens* do develop over time and they can change the ethical approach and the attitude of humanity to the socio-ecological system and its management [76]. Therefore, integration and continuum of *Homo sapiens* are fluid in nature and across the micro- and macro-geographical space-time. Such geographical fluidity allows humanity to adapt and to promptly solve the problem of the global socio-ecological system. Humanity is integrated with other components of the socio-ecological system, and it must integrate and modify its actions accordingly.

Given the integration of humans, their micro- and macro-geographies, as well as their chemical nature, with abiotic components of planet Earth, their chemical, physiological and mechanistic link to other living organisms mandates complete integration into the mainte-

nance of the Gaia homeostasis; it demands integrated action at the societal, ethic–scientific, and at other levels [52]. This is even more important, as in the Age of Anthropocene, the ‘human over-mightiness’ over the atoms of carbon, nitrogen, and hydrogen in particular have played a role in altering the fate of the most essential building blocks of life. This ultimate level of human integration is the ultimate source of pleasure and pain, which the continuum of *Homo sapiens* experiences in the current status of *utilitarian qubit*. It can be argued that the *utilitarian qubit* is a symptom of the human integration into the socio-ecological system at both the micro- and macro-geographical levels. Human control of, or rather partially steering, the very essence of life is at the chemical level and the manifestation of this steering occur at micro- and macro-geographical levels. The space and the natural world push back against the effects of human actions, giving rise to manifestations such as the COVID-19 pandemic. They can be seen as side-effects of the negative outcomes of the ambivalent agency and human conduct in the Age of Anthropocene [77,78]. Diseases such as COVID-19, the overall condition of the global ecosystem, and their impacts on human wellbeing, the manifestations and impacts in the micro- and macro-geographical space–time, and the existence of the 6.80% of all of members of *Homo sapiens* indicate that a specific and new (phase of) epidemiological transition is underway. Humans and the environment are integrated and there are multiple feedback loops and relationships between them. At the same time, members of *Homo sapiens* have a strong, and an ever-increasingly important role to play in the steering of the global socio-ecological system at the micro- and macro-geographical levels. This results in the state of *utilitarian qubit* and is a symptom, with disease such as COVID-19 being the boundary manifestations, of this Anthropocene (phase of) epidemiological transition. Given this role of humanity and to ensure an existence of the members of *Homo sapiens* without, or rather attenuated utilitarian qubit, what steps should we all take at the micro- and macro-geographical scales? How should the Anthropocene phase of epidemiological transition be managed?

### 3.4. Examples of ‘Positive Anthropogenic Gardening by Humanity’ to Manage the Record of Humanity and Minimise Impacts on the ‘Record of You’ for Current Humanity

The starting point of the Anthropocene period has been disputed [79], but it could be agreed upon by humanity that one of the main culprits of the onset of the Age of Anthropocene has been the use of fossil fuels to meet the energy demand of humankind [80]. The Age of Anthropocene has been driven by the massive impact that human activities have had on the global ecosystem. However, there have been examples of the ‘responsible gardening of the Earth by humanity’, where the anthropogenic impacts on the global socio-ecological systems have been addressed successfully. Examples could include the increased presence of radionuclides in the environment in the second half of the 20th century, or the use of chloro-fluorocarbons (CFCs) that have been used in cooling applications up to the second half of the 20th century [81]. In the same timeframe, CFCs and their release into the atmosphere contributed to the depletion of O<sub>3</sub> in the stratosphere and threatened the entire survival of humanity at the macro-geographical scale. The wellbeing of individual humans on the micro-geographical scale was also at risk through the increased risk of development of skin cancers from the lack of neutralisation of the incoming harmful UV rays in the absence of O<sub>3</sub> in the stratosphere. Such threats have led to the banning of the use of CFCs and the recovery of the ozone layer is well underway and expected to be complete by 2060 [81]. This estimation of the O<sub>3</sub> stratospheric layer recovery is based on the adherence of state parties to the treaty banning the use of CFCs globally, i.e., the Montreal Protocol [81].

One of the products of the Anthropocene, specifically the great acceleration in the second half of the 20th century [82], was the invention of weapons of mass destruction, e.g., nuclear weapons [83]. The intense geopolitical arms race in the second half of the 1900’s also led to the development and escalation in the design of (new) biological weapons [84]. As a result, there was an imminent threat of potential global impacts of biological weapons use and this led to the major world powers adopting and ratifying the Biological Weapons

Conventions (BWC [85]). The BWC has aimed to curb the spread, manufacturing, and threat of biological weapons to the global community [85]. As a result, the BWC has been subject to periodical and ongoing reviews, updates in its structures, e.g., monitoring and investigative functions, and to maintain the spirit and containment of the biological weapons threat globally [85]. The ‘low-cost’ of producing biological weapons could lead to a major threat from them, but the world community seems to have come together and successfully minimised the risk of biological weapons proliferation. Hence, this is a second example of how the continuum of *Homo sapiens* was positively stabilised by humanity limiting the potential of its destructive power of its actions on the global socio-ecological system. This realisation, such as that with the Montreal Protocol, led to the limitations of the micro- and macro-geographical and potential impacts of the threat from biological weapons development and use. The *utilitarian qubit* of human existence at least one of its dimensions, was limited and potentially eliminated.

Finally, climate change and its negative impacts have been in the headlines for several decades. Oreskes [86] already reviewed the literature at the time to find that authors of none of the 928 papers, which the author had reviewed abstracts of, and had disagreed with the conclusion that manmade climate change was real. Climate change being only one of the Anthropocene outcomes that had impacts on the entire global socio-ecological symptoms. It took *Homo sapiens* another 11 years until the Paris Accord was ratified and binding targets were set to achieve carbon neutrality in the world’s economies [87]. The accord aimed to limit the emission of greenhouse gases, to limit the anthropogenic influence on climate change and the Earth’s ecosystem as a whole. The accord is not perfect, and its implementation is still in its infancy, but it does demonstrate the potential for positive changes that are possible with humanity’s will to act and to undo some of the impacts it has had on the environment and abiotic components of the global socio-ecological system. In the Paris Accord and the other two treaties, humanity showed the willingness to draft, adopt, and implement potential ‘positive gardening tools’ to minimize its negative impacts on the global socio-ecological system. The accords could and are, in the authors’ opinion, a sign of the collective will and desire of the continuum of *Homo sapiens* to positively influence the progression of potential negative impacts this Anthropocene transition could have on human wellbeing at the micro- and macro-geographical scales. All voices of individual members of *Homo sapiens* and the collective voices of the FRIDOMs we all are today, of all the 6.80% of all humans who have ever lived, were heard. This can be seen as a way to control which ailments and diseases become the determining factors controlling human wellbeing, which means humanity can influence the unfolding of the Anthropocene (phase of) epidemiological transition. Is this a blueprint for addressing the issues and challenges that have arisen during the COVID-19 pandemic?

### 3.5. Preparedness and Lessons Learnt during COVID-19 and the Effective Management of Future Health Challenges in the Anthropocene (Phase of) Epidemiological Transition

Integrative science and disaster risk management have contributed to the assessment and elimination/proactive management of some outcomes and manufactured risks from the Age of Anthropocene. During COVID-19 and its impacts on the micro-geography of single members of *Homo sapiens*, resilience of human populations around the globe have been tested and interlinkages have been highlighted. For example, the economic status of a household and its micro-geography might have had an impact on one’s wellbeing during coronavirus lockdowns, e.g., access to public goods such water, sanitation, and hygiene. Low-income settlements and those residing in them would have been more impacted by the limitations of their freedoms, as defined by Sokol [17], compared to higher income micro-geographies. Limitations of the freedoms for people in these low-income settlements, even tighter squeezing of their micro-geographies would have highlighted the multi-dimensional vulnerability, that such members of *Homo sapiens* suffer from. The epidemiology of COVID-19 is likely caused by the intrusion of humans into the territories that they have previously not occupied and the overlap between the ‘record of you’, the

continuum of the *Homo sapiens* space–time and ‘the record of humanity’. A balance must be struck between the situational reality of human existence in the COVID-19 space–time continuum and fundamental reality, which humanity is starting to alter, to facilitate the survival and prosperous existence of *Homo sapiens* in the post-COVID-19 space–time, during this Anthropocene epidemiological transition, where each human’s ‘record of you’ is affected by ‘record of humanity’ [66,68,88].

COVID-19, however, impacted all humans and this was apparent at the macro-geographical level. All 6.8% of all humans that ever lived, were FRIDOMs from their pre-coronavirus existence. As all of humanity was impacted, based on the fact that anthropisation of space likely contributed to the development of the pandemic, it is critical that only a collective action of humanity can save it. Only if all FRIDOMs’ voices are heard, only if all members in the continuum of the 6.80% of *Homo sapiens* are given equal weighting in the data analysis and sourcing, only then can humanity develop a resilient society and contribute to the ecological and economic resilience of all humans, regardless of their micro- and/or macro-geographical considerations. The pandemic and its aftermath are therefore to be looked at as a challenge in the Anthropocene (phase of) epidemiological transition, which is well underway and cannot be stopped. This transition can only be managed effectively, justly, and with the transition that is all-inclusive in mind. All-inclusive means that all needs, desires, and voices of members of *Homo sapiens* are taken into consideration. They are listened to, evaluated, and incorporated into a compact that will govern the wellbeing of the socio-ecological system at the micro- and macro-geographical scales and boundaries. A just and equal transition project must be launched across the continuum of *Homo sapiens* in order to develop, increase, and maximise the geographical homogeneity of the ecological and economic resilience to pandemics of the future. In this way, humanity will decrease the pain inside the socio-ecological systems, and it will give itself a tool to separate and experience the pleasure separately from pain once again. Using all the data, across various time, societal, and spatial scales can provide humanity with tools to make the *utilitarian qubit* a transitory and not a permanent state of human existence and wellbeing.

*“In time-geography, accordingly, now is regarded as the constant transformation of future into past and thereby now constitutes the only point in time when actions can be taken and changes made.” [2]*

We are no longer looking at a simple linear problem contextualised in a specific area and timeline. Everything experienced in the COVID-19 pandemic can be seen as a symptom of the *Anthropogenic (phase of) epidemiological transition*. As mentioned above, once this reality has been accepted as factual, this transition can become a semi-permanent reality that future risk understanding can negate going forward. This creates the idea of disaster preparedness and mitigates the risk of the Anthropocene on the socio-ecological system. If the Anthropocene is seen as an opportunity to reshape the Earth by members of *Homo sapiens*, then this opportunity needs to be grasped with our understanding of space (micro- and macro-geography) or the future landscape of this Anthropocene transition will be automated by non-human agency. The above quote of time geography warns about the consequences of not actively participating in the now. The narrative of the geography that members of *Homo sapiens* share (‘geo’ is seen as the surface of the Earth) has ‘past, future, and now’ consequences on humanity’s health. The micro- and macro-geographical terms are used in this article to narrate this shared human geography (which is multidimensional).

To conclude this article/essay, the authors state that challenges such as those described in this article are common for humanity everywhere. They clearly indicate that humanity is linked together, as a species, and to the outcomes of its actions that it had committed in the past. Across the space–time, the geography of humans is impacted by the current actions of *Homo sapiens* and by the outcomes of the actions of previous generations of humanity. Micro-geography of members of *Homo sapiens* during the COVID-19 lockdowns will be determined by the geographical location of where they live, or where they were born. Macro-geography plays a role in the micro-geography of the individual human, e.g., a South African citizen. The past and the present are linked to the existence of the

human being who must be empowered to exploit their knowledge and resources and their disposal to cope, while also source the information from outside of their micro-geography. The continuum of *Homo sapiens* is at the centre of those changes, where the actions of humanity have largely contributed to the evolution of COVID-19 and the conditions under which humanity experiences the pandemic. At the same time, humanity has the power to change the likelihood of disease evolution in the future, to control the space–time in which pandemics do or do not unfold. In the Anthropocene (phase of) epidemiological transition, it is possible for humanity to influence the conditions under which all members of *Homo sapiens* that live through the pandemic impacts. During this epidemiological transition, it is possible for humanity to follow the principles of justice, to listen to all the voices of FRIDOMs across the geographical space–time, to change the conditions so that the next pandemic can be prevented, or its impacts lessened. In this Special Issue, we seek to demonstrate and document such changes, and analyse data from FRIDOMs for South Africa. It is a country integrated into the global macro-geography, but where the local space–time and micro-geography of its citizens determine the everyday existence and where the living conditions and the experiences, the disaster profile of South Africans, provide potential to develop new lessons for preparedness and disaster risk reduction in the context of potential future pandemics.

#### 4. Conclusions

Based on the reasoning in this article, the *utilitarian qubit* is used and seen as being underway, or rather as a way to describe the reality of human existence in the socio-ecological systems. This state of human existence is characterized by the fact that pain and pleasure are with each member of *Homo sapiens* at all times. The essence of all the human actions in the scope of risk society, as defined by Beck in the late 20th and early 21st century, is combination of two. The utilitarian qubit manifests at the interface of the ‘record of you’ for each member of the *Homo sapiens* and the ‘record of humanity’. Based on these conjectures, the COVID-19 pandemic and its impacts on the members of *Homo sapiens* must be seen as at least a partial outcome of the cumulative actions of humanity on the biosphere, other elements of the global ecosystem, environment, and the overlap of the macro-geography of human existence and the micro-geography of the existence of an individual human being. COVID-19 is seen as an infectious disease that is a part of human life in the Age of Anthropocene. Cumulative effect and ambivalence of human actions can be a cause for pain, but also for pleasure, if disaster preparedness uses and exploits resources and data/knowledge of all humanity, i.e., the big data of members, of continuum of *Homo sapiens*. The current Special Issue seeks to contribute to this debate from the South African perspective.

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