A CALL TO ACTION FOR THE SYSTEMS SCIENCES COMMUNITY

Irma Wilson & Pamela Buckle Henning
irma@futuresharp.org & buckle@adelphi.edu

ABSTRACT

The world's systems scientists are crucial knowledge holders in this anthropocene era. This paper will put forth a deep call to action to the systems community. It is vital in this time that members of this community put themselves on more influential platforms, speaking in more audible ways. The message must be about what this community can see about the degradation of the living organism that is our earth, and what must happen in order to enable its survival.

This paper frames the systems community as keepers of vital wisdom about the macro effects of how the earth has been altered by humans. We will argue that such macro-level understanding must be joined with regional and local level meaning-making processes and actions already underway across the globe; it must inform those initiatives and be informed by them. As important, micro-level activities must have more ways to inform and influence macro level perspectives on how human activity is responding to the imperatives of the anthropocene. We will argue that this call to action is a call to develop fields of attraction – visible, plausible alternatives to the human behaviours that, in aggregate, jeopardize the likelihood that our future can be one wherein we can thrive. We propose there must be attractors with a wide variety of design paths, presented as narratives that invite and entice participation.

We will examine obstacles that members of the systems community face in taking up a call to action like this, along with ways to meet those obstacles, clearing the path to greater participation by systems experts in rising to the realities of life in the anthropocene age.

Key Words: anthropocene, change, systems community, commons, peer to peer, emergence, scaffolding

INTRODUCTION

Ours is a world in great flux. Yet the daily lives of those reading this article are embedded institutional anachronisms. These institutions are structured to create mechanisms to drive human behaviour and they teach us lessons about how to behave in order to create success; and so humans behave in habitual, predictable ways, like water flowing down particular, well-eroded pathways. These institutions are stuck in siloed ways of thinking and exercising power; they are insufficiently interconnected with one another, and with what is happening 'on the ground' – in the lives of those they purport to serve. Among masses of people there is growing awareness of the problems we face. In no time before this has excessive population growth and unchecked volumes and

concentration patterns of consumption so brought us to demand produced-for-obsolesce consumer goods, food, transport and carbon-based energy (to name a few). Yet we also see unprecedented waste: 40% of food produced is thrown away whilst hunger increases (Pogge, 2015). Vast sums of human behaviour is organized around distorting the publicized value of products and services – by, for instance, leaving out externalities such as the calculable costs of the nonrenewable fossil fuels involved in their transport and the incalculable costs of human wellbeing experienced by the originators of those objects and services. How we have to move beyond GDP (Fioramonti, 2013) and work wellbeing into our governance and decision making processes (Boik, Fioramonti, and Milante, 2015). Academics debate whether the natural environment should be considered a factor in decisions about a company's operation (Nash, 1990). Meanwhile, never before have we experienced such destruction of life in our oceans. Deserts are spreading at unprecedented rates as soil is being eroded (Wixon, 2008), and is becoming nutrient-poor. There are bulges of old age populations in the UK (Parliament, 2010), youth population bulges in Sub-Saharan Africa (Aning and Atta-Asamoah, 2011), with great dangers of societal tear in both places because of such demographics. The earth's population consumes more than four planets' worth of biosphere resources (Alexander, 2015). As our planet gets hotter, so too do expressions of dissatisfaction, seen in increasing acts of violent religious extremism, and non-state actors in possession of weaponry ranging from guns to nuclear and biological ways of killing large numbers of people (Martin, 2007b). Among masses of people there is growing awareness of the problems we face. Among other masses of people, there is little to no awareness of these problems. More than inequalities between "haves" and "have nots," ours is a place and a time of incredible unevenness in understanding among, quite literally, billions of people. More than a planet of people who speak in different languages, we are a planet of people that does not speak of the same things, not even the threats to survival that we share. No singular silver bullet will address the crisis.

These times are times of polycrises, in fact, ones we will not analyze here. What concerns us is that these crises are those of *our* making: crises with human decisions and human behaviour at their core. We care about them because together they are threatening the ability of our biosphere to support all complex forms of life on this planet. Scientists at Stanford University using highly conservative estimates announced in June 2015, "There is no longer any doubt: We are entering a mass extinction that threatens humanity's existence" (Jordan, 2015), entering "the sixth extinction" – the sixth time the earth has undergone a period of time when between 70 and 90% of the planet's species go extinct (Kolbert, 2014). The name proposed for this circumstance – the melding of human impact and planet-wide scale – is *anthropocene* (Zalasciewicz *et al*, 2008). Quite literally, it represents the first time that decisions people make can create continued life or end it, for our entire species. The central question of the anthropocene is this: will we choose for life or choose death? This is *the* central challenge of our lives, the most precious opportunity that is ours to face. Will we face it with concerted collective will, or with the poverty of imagination thus far exhibited?

Within hours of Ray Ison's August 1, 2014 announcement of this year's ISSS conference theme, the authors began discussing this opportunity-challenge together. These hours of

conversation spanned a mind-bending array of topics: the extraordinariness of these times, so ripe with potential and so very terrifying. The scale of our own miniscule years on this planet; alongside the vastness of geological epochs. Human freedom from the vicissitudes of nature; and our reliance on it. Innovative progress toward betterment juxtaposed with incidents suggesting retrogression toward the worse. At times it was a dizzying experience to hold together the many apparent polarities that seemed central, or at least crucial, topics necessary to hold a substantive conversation about the anthropocene. As our collaboration and friendship grew, we noticed how our approaches as individuals tend to differ: on one hand toward large-scale issues of social redesign, policy change, and facilitation of mass transformation (Wilson), and on the other hand questions about individual-level psychological capacities that would be necessary to effect such change (Buckle Henning). From both perspectives, what would it take for as many people as possible to get through the transition that is upon us? Just as our conversations juxtaposed wide-ranging topics and questions, we found our personal vantage points on those topics juxtaposed as well. We came to see that the macro-concerns and micro-perspectives that dominated our minds during and between our anthropocene discussions had important things to say to one another. It seemed to us that the extraordinary juncture on which we stand demanded both the best of meta-foresight and interior self-awareness we could muster as women and collaborators. The anthropocene-sized matter at hand was change – changes that have occurred to this place where we live, and those that are emerging.

The anthropocene represents an epic transformation in the source of influence on our planet. For millennia on this earth, "evolution has been in nature's hands. Now, suddenly, it is largely in human hands" (Martin, 2007a). Psychologist C.G. Jung reflected on this movement toward human centrality of influence, and the ways this transformation in turn influenced the human psyche. Thanks to human hands and human minds, many people are "protected from the most pressing necessities, and for that reason we are daily tempted to excel," he observed (Jung *CW7*, 1967, para. 428). We need not look far to see the exuberance this engenders, the vast numbers of people who believe that our advances are only productive and profitable, that by seizing control over nature we can do a better job of steering the ship than she. However, "much as the achievements of science deserve our admiration, the psychic consequences of this greatest of human triumphs are equally terrible," Jung believed: "unfortunately, there is in this world no good thing that does not have to be paid for by an evil at least equally as great" (*CW18*, 1977, para. 1365).

> Man is bound to follow the exploits of his scientific and inventive mind and to admire himself for his splendid achievements. At the same time, he cannot help admitting that his genius shows an uncanny tendency to invent things that become more and more dangerous, because they represent better and better means for wholesale suicide…. In spite of our proud domination of nature we are still her victims as much as ever and have not even learnt to control our own nature, which slowly and inevitably courts disaster. (Jung *CW18*, 1977, para. 597)

Our apparent advances, it seems, have neither resulted in corresponding advances in the ways we understand ourselves as a species, nor the way we make meaning and take action as individuals.

While the human species was once closely linked to nature through instinct (i.e. inclinations toward particular behaviours), the advancements that have unfettered us from nature have allowed those instincts to atrophy. None of us have to go to sleep tonight at sunset because it will get dark then, for example. Billions of humans today live in ways considerably decoupled from nature. Most people in the western world have never participated in what must be done to satisfy hunger: something has to be killed; a plant must be uprooted or an animal butchered. From the perspective of evolutionary psychology, the turning away from instinctual compulsions have enabled us to become conscious and reflective as a species (Jung *CW8*, para. 1969). This is good. Freeing ourselves from many of our instinctive concerns has enabled us the cognitive bandwidth to invent science, to invent this remarkable world we've created. With its inherent tragedies and dangers; among them, the atrophy of the instinct for human preservation and survival. By our decoupling from nature we have created an anthropocene-sized possibility that we could destroy it. And so, we and nature, together, are in trouble.

In 1945 Jung wrote,

> What science has once discovered can never be undone. The advance of truth cannot and should not be held up. But the same urge for truth that gave birth to science should realize what progress implies. Science must recognize the as-yet incalculable catastrophe which its advances have brought with them. The still infantile man of today has had means of destruction put into his hands which require an immeasurably enhanced sense of responsibility, or an almost pathological anxiety, if the fatally easy abuse of their power is to be avoided. The most dangerous things in the worlds are immense accumulations of human beings who are manipulated by only a few heads. (*CW18*, para. 1367)

Just as great power held in the heads of just a few is worrisome, we are likewise concerned about the problem of great knowledge held in the heads of just a few: namely, this community of systems scientists.

It is difficult to conceive of a single discipline of study that claims so wide a swath of existence as its subject of study, for so much of existence exists in systemic relationship with itself. And so it is difficult to conceive of a group of individuals more unique than this – who has made it their business to understand intimately the very nature of those systems. The knowledge generated by this community and its forebears is unique in its depth and in its scope. Physical systems, human systems, technical systems, idea systems – what other field of study has something to say about so encompassing a spectrum of existence on our planet? The unique insight of the systems science community is one crucial to these times, to this anthropocene era in which we find ourselves. The era and its challenges demand the engagement of humanity to an unprecedented degree, and we feel the systems community must step forth to a vitally important role.

People skilled in pattern recognition worldwide are detecting clear signs that innovations are emerging to address the polycrises of these times. They are arising in localized responses, in regional initiatives (Hawken, 2008), and in emerging global coalitions around "the commons" (Bauwens, 2005; Bolliers and Helfrich, 2012; Kaokostakis and

Bauwens, 2014). It is our view that hundreds of thousands of groups actively working today could become part of an exponential wave of growth toward inhabiting the anthropocene in generative, life-sustaining ways – *if the community of systems scientists brought its knowledge and skill to bear on the work these groups are doing.* We believe that no other community of individuals has such a crucial leveraging role at this time. At present, movements across the world are arising that, in isolation, are having effect. But how exponentially could their effects be magnified if systems knowledge could help these groups coordinate, could create structures of connection to organize and amplify their potency as individual efforts? What new narrative could become possible about how humans organize, govern, make decisions together? Most importantly, we believe, real and vast change can happen when people can *see what to change toward and where to participate*. At present, comparatively few micro-initiatives are known to one another; the grass-roots knowledge they possess is seen and valued by few macro-level organisations. Likewise, the information possessed by large-scale organisations is often untrusted or unavailable to grass-roots initiatives who could use that knowledge to meet pressing environmental, social, and economic crises in local contexts. The systems sciences describe and make systems understandable. For this reason, we view systems scientists as holders of vitally-important knowledge that could help build wisdom structures, using systems knowledge and methodologies to get this planet's brightest and most willing innovators, generative movements, and small actors visible to one another in ways that will strengthen the likelihood to steer us towards more generative future outcomes.

A challenge, we well know, is that we are largely a research community. And we well know that a great divide separates research knowledge from that of the rest of humanity. This systems community is alert to this difficulty, evidenced in the chosen theme for the ISSS's 2009 meeting in Brisbane: striving to "make systems unremarkable" in society (http://isss.org/world/brisbane-2009). Researchers in many disciplines besides ours have long lamented the distance between what science has discovered and what the world has put into practice (Carson, 1944): in community studies (Wandersman *et al*., 2008) and organisational studies (Carless, Rasiah and Irmer 2009), in training (Hutchins and Burke, 2007) and education (McIntyre, 2005). Medicine too (Bero *et al*., 1998). While dividing groups of people into specialized fields of endeavor, including academia, is a valuable feature of contemporary society (Parsons, 1960), divides are problematic. With divides comes misalignment. When a corporation becomes un-attuned to its surroundings, its survival comes into question. When humans become divided from their instinctual wisdom, they see the planet as a resource to be exploited rather than an awesome force of which they are one small part (a force to be *related to,* not extracted from and exploited for our convenience). When local organisations spend valuable time and resources developing solutions already tried and tested in other parts of the world facing similar problems, important time is lost. When international organisations operate absent local, contextualized knowledge, great opportunities for impact fall short. We are beginning to assess the costs of disconnection between local awareness and transnational resources. And importantly, we are seeing with greater clarity some of the consequences of living as a house divided both as a collective species and also as individual persons; we believe the

two are related, because we believe the decision the circumstances will demand of systems scientists are related.

In times when misalignment generates problems, a community faces a choice: take a path of "deep change" or "take the road to slow death" (Quinn, 1996, p.5). Management scholar Robert Quinn describes deep change in its contrast with incremental change: "In incremental change there is a desired goal with a specific set of steps for reaching it…Incremental change usually does not disrupt our past patterns – it is an extension of the past. Most important, during incremental change, we feel we are in control" (1996, p.3). Given the magnitude of planetary crises we face in this anthropocenenic age, it is questionable whether incremental change can shift the trajectory of challenges we face in a large enough scale in a quick enough time. Quinn posits deep change as our other alternative: "Deep change differs from incremental change in that it requires new ways of thinking and behaving. It is change that is major in scope, discontinuous with the past, and generally irreversible. The deep change effort distorts existing patterns of action and involves taking risks. Deep change means surrendering control… This is usually a terrifying choice… It is therefore natural for each of us to deny that there is any need for a deep change" (1996, p.3). We fear that the consequences are dire, should we choose to change nothing in how the systems sciences share their knowledge and the way we approach our systems work. A collective shift in the role this community takes in the larger world is imperative, and that shift will likely be risky, terrifying. Just as imperative, a personal shift must happen in the role each one of us takes in the larger world. And that shift will likely feel risky, terrifying as well.

DANGER

As a species, we've overcome countless dangers on this planet thanks to science and rationality. And yet, paradoxically, we find ourselves in a new geological epoch that has self-organized in ways largely outside the reach of best-laid rational human plans, evidence-based strategies, or corporate mission statements. Fundamentally, the anthropocene has emerged and is operating autonomously, decoupled from the authority of any elected officials. The Western intellectual tradition has long tended to avoid truly acknowledging that unintended new order can emerge spontaneously (Cilliers, 1998; Wheatley and Kellner-Rogers, 1996). Particularly, perhaps, when that order contains within it a very real possibility of extinction for our species.

En masse, we face the entirely plausible possibility of humanity's end. It is perhaps unsurprising that when we seek to understand how a situation of such a vast scale has come to pass, our minds take us to forces that have exerted influence on human behaviour on a vast scale: the media industry, for example, vested in encouraging billions of people to over-consume, believe in the inevitability of dystopic or utopic futures, and proliferate myopic, next-sensation entertainment; economic ideologies that become the status quo, become invested with a taken-for-grantedness that render them invisibly powerful (powerful in large part because of their invisibility); political and social structures across the world portraying a visage of reliability that belies how unprepared they are to meet the vast scale and pace of change before us. (For example, Boik, Fioramonti, and Milante

have commented that, "If forms of government can be likened to operating systems, current variants of democracy are a bit like early, primitive versions of Windows. They are neither optimally functional nor user-friendly — they are buggy, susceptible to malware, and lack desired features" [2015]). Without question, there are sound reasons why our minds turn to these big-picture forces. But in addition to this, we believe our minds must grapple simultaneously with something else. We feel the ISSS President, in his choice of conference themes for this year – Governing the Anthropocene – compels us to consider danger from another, intensely personal, order of magnitude.

How does anthropos – humankind – process the presence of danger? Fundamentally of course, we respond biologically through a variety of evolutionary adaptations that activate changes in the autonomic and endocrine systems, in our skeletal muscles, and our information processing behaviours. More than just physical beings, we have evolved psychobiologically, and possess a sequence of fear responses: freeze, flight, fight, fright, and faint (Bracha, 2004; Friedman, 2015). Throughout early human history, such emotions evolved as effective emotional strategies in a world that in no way guaranteed our species' survival. Today, more common than imminent dangers to our mortality, most humans live daily with non-specific psychological distress that individuals perceive with varying degrees of awareness, ranging from mildly uncomfortable anxiety to primal anguish. The psychological experience of danger is a *personally*-lived experience (Ridner, 2004), whether we recognize it or not. And for good reason. In the scheme of things, anthropocene notwithstanding, the individual human is, in many ways, "small and impotent, [feeling oneself] a tiny, defenseless speck, enveloped and helplessly dependent, a little island floating on the vast expanse of the primal ocean… a feeling necessarily of constant endangerment… One has only to know how great, even today, is Western man's primordial fear of the world despite his relatively highly developed consciousness" (Neumann, 1954, p. 40-41). Pervasive anxiety is a predictable and appropriate response to such a reality.

While it is true that "exposure to threatening situations activates fear conditioning" (Bracha, 2004, p. 11), and that this conditioning has enabled our species to adapt and survive, it also appears true that danger has deteriorating long-term effects on the human psyche. Regardless of our sophisticated reasoning power today, every human alive reverts to primitive modes of operating when under threat, reverts to the governance of brain functioning that is less informed, less nuanced, with less processing power (Bracha, 2004). When we feel unsafe, at best we lose the ability to focus on much beyond immediate personal survival; at worst we are incapacitated. Said differently, the part of an individual that is conscious of the degree of anthropocene-era danger we face as individuals and as a species is governed by modes of operating that are primitive – less informed, less nuanced, with less processing power – than if that threat were reduced. At best, that part is preoccupied with personal self-interest; at worst it incapacitates us, paralyzed in horror at the danger it perceives.

Nature has evolved a variety of psychological solutions to this state of affairs. Common among them are mechanisms of warning and strategies of withdrawal. Upon recognizing a signal of threat, the human psyche instinctively activates strategies to alter reality, so to

defend against feelings of anxiety (A. Freud, 1937/1966); in fine cybernetic fashion, our minds constantly monitor for signs of danger, and seek to steer us away from it. Whale scientist Roger Payne has said: "We have a choice… we can be the greatest villains in history for having sat on our hands and done nothing while the consequences of both our action and our inaction destroyed the natural world" (1991). Psychologically, "doing nothing" is not quite accurate: when we engage in the kinds of inaction he describes, we actually are very busy, dedicating considerable psychological resources to removing our mental and emotional focus on the object of fear in order to send it elsewhere, a process termed *decathexis* in psychoanalytic theory (Freud, 1990). Essentially, we humans exert much energy monitoring and titrating the intensity of our fear, and compensating our absorption in fearfulness by directing our energies elsewhere.

This selective attention and rerouting of energy manifests a variety of behaviours. Among them, we artfully deny the threat, or lose ourselves in distracting activities. We act as if we see and understand what's happening in dispassionate, objective-feeling ways; we intellectualize, avoiding focus on the uncomfortable emotions we would experience if we allowed them room to register. We downplay our weaknesses and instead emphasize our strengths. All such defenses are mechanisms of reducing our psychological functioning – in a sense, in order to allow us any functioning at all; we may be diverting our attention from the imminent threat, but we continue functioning more or less effectively, dulling our awareness of our fear to avoid paralysis.

Another way we avoid fear is turning to one another. "Because humans have always been at risk from a variety of dangers, survival has depended upon organizing successful strategies for protection… danger creates the need and occasion for humans' capacity to organize" (Crittenden, 1999, p.145). Developmental psychology (e.g. Erikson, 1980) points out that at least the first half of a person's life is spent adapting to the group, allowing oneself "to be molded by collective trends" (Neumann, 1954, p.426). There are, after all, safety in numbers, so modifying oneself to others is a smart survival strategy. Keeping one's attention fixed on how existentially alone we each are can be debilitating. Fortunately, the human psyche has evolved sophisticated ways to steer itself from becoming too aware of threatening realities, which undoubtedly protects us from overwhelm.

And it is also true that psychological defense has its disadvantages. Conscious focus on threatening situations can result in behaviour better adapted to them, in comparison with a strategy of sustained co-existing with those situations in a defended way. An individual can overuse biopsychological defenses against danger (Bracha, 2004). Defenses can be used maladaptively – that is, in ways counterproductive to physical and mental health. When a person defends against her own anxiety in a way that decathects too much energy from herself, for example by investing overmuch mental and emotional resource to a group instead, she risks self-alienation, impoverishing her ability to bring sufficient problem-solving resources to her own circumstances (Edinger, 1992; Hobson, 1955). Likewise, when a person defends against his anxiety by decathecting too much energy away from the collective, for example by investing overmuch mental and emotional resources in oneself to the exclusion of the larger group, the collective is

impoverished in ways that can put the entire species at risk. In both cases, largely unconscious, survival-oriented defense behaviour can become self-sabotage. Collectives of outliers often exhibit the latter qualities. This happens especially when they are bringing new knowledge to a world operating (profitably, thank-you-very-much) according to a narrower understanding. The system scientists have been, by-and-large, decathecting from the world, a world that now needs deep and strategic engagement from this knowledge set.

We could summarize the anthropocene situation in this way. 1: We live in a complex world that has self-organized into an accurate representation of our human capacities for impact. In the very term *anthropocene*, we acknowledge the epoch-making possibilities for good right alongside the breathtakingly horrific realities of human impact. In the anthropocene, we see a terribly accurate picture of the ways humanity has unconsciously created a reality that is both filled with possibility and dangerously unsustainable. The anthropocene itself – this era – is a material, biological, psychological structure that is itself a system that shapes our individual and collective cognition, our emotional lives, and our behaviour, probably more than we realize (Sulis, 1997). Given its complexity, it is questionable the degree to which this reality can be undone with willpower or threat-denying cleverness. Simultaneously, its trajectory is likely to increase to the extent humanity remains unconscious of it (Bella, 1997). 2: This circumstance is an affront to Western sensibilities that tend to presume the outcome of what people do is nearly-always good – or at least neutral in its effect. The moral imperative to stare our addiction to power and greed in the face, to look at its consequences, is being called out. For example, the year-long focus of (only) one main-stream newspaper in the U.K., *The Guardian,* to tell the stories around climate change is a development to note. So too, the recent encyclical of the Pope of the Roman Catholic Church added much weight to the marginalized voices calling for change to stop pollution and reverse the trends that have led to environmental degradation (Pope Francis, 2015). The anthropocene we see at the present time was shaped with the involvement of every one of us, intentional and otherwise – we are at once complicit and unwitting (Sandler and Sandler, 1987). Consciously recognized by some, unconsciously registered by others, pervasive dis-ease results from our involvement in the dangerous ways the anthropocene is playing out right now. 3: In response to the scale of the threat and our personal engagement in it – our own deaths and the possible extinction of our entire species, we are evolved (as individuals *and* as a group) to blunt our psychological functioning (with escapism industries adding happy oil to this fire). We are neurologically wired to defend ourselves from realizing too much the extent of the danger we are in. At this unprecedented time when we need as much of our whole human selves as possible to face this shared threat, our minds will urge us to find ways to shut down. (e.g. check cell phone messages, surf the internet, pour a drink, buy something, watch a movie, think of something else.) For if we were to allow ourselves to see, really see the anthropocene-sized risk we imminently face as individuals and as a systems community, there would be much darkness we would need to confront, much we would have to change, much to unlearn (Hudson, 1999; Latour, 2014):

> The thing about a crisis this big, this all-encompassing, is that it changes everything. It changes what we can do, what we can hope for, what we can

> demand from ourselves and our leaders. It means there is a whole lot of stuff that we have been told is inevitable that simply cannot stand. And it meant that a whole lot of stuff we have been told is impossible has to start happening right away. (Klein, 2014, p. 28)

The blunted awareness that saves us from being overwhelmed by danger can also stunt our ability to learn how to develop the psychological capacities we need to meet the situation. Almost certainly these will be psychological capacities including and beyond scientific rationality; it seems to us that as individual people we must bring to bear our entire psychologies – our whole-psychological system – on the demands that together we face.

SCAFFOLDING

Interior Scaffolding

Courage is needed to face the anthropocene. Courage is not a topic of conversation common in the systems science community. If a mass awakening were to occur among humans, on an individual and collective level, if the very real threats facing our species were to penetrate consciousness, a massive shift in human self-understanding would need to occur. We would begin to face the governance challenges of this epoch without many of the defense mechanisms that have reliably protected our beliefs in our potency, our sense of identity. Who would we be without them? What would strengthen and bolster the new version of ourselves as systems scientists and a systems community as we mobilized to support the emergence of a sustainable and thrivable planet? As engineers know, when a building is under construction, scaffolding is needed: extra, temporary support, acting as additional structure, an outer shell. Scaffolding is a necessary safety feature, needed to hold the building and the builders.

As we rise to the challenge of adjusting to the anthopocenic age and learning how to govern wisely, an important part of our scaffolding structure can be knowledge. What part of the knowledge we hold dear has actually contributed to getting to this devastating place and is continuing assisting destruction? What do we have to unlearn and what do we have to remember? Ancient Greeks observing the human healing process discovered sometimes-alarming challenges brought forth by the healing itself – *iatrogenic* crises. For example, most of us are familiar with the feeling when a body part has lost circulation for a while and has numbed. The un-numbing can be painful, but is a good sign, a sign of physical resources returning to a part of the system from which they have been blocked. Likewise, discomforts predictably arise as people reconnect with aspects of our personal humanity that we have allowed to atrophy. These are the aspects that allowed us to replace relatedness with comfortably distant abstractions about "others" who we didn't consider particularly relevant to our daily lives. The aspects that have never grieved the loss of living species of plant and animal that will never exist again. Iatrogenic crises can arise in the form of uncomfortable questions that arise within us: How do I cope with the realities of others' struggles alongside my own that I know so well? What living others that I never really thought about will now matter to me, in deeply personal ways? What made their suffering invisible to me? In what ways does their suffering matter to me now? Awkwardnesses and growing pains predictably occur

as we learn to un-defend – to contact and interact with individual and collective perceptual apparatus that we have underdeveloped up to this point in our lifetimes, as we learn an expanded repertoire of methods and standards of making sound judgments about who and what matters. We can expect crises of confidence and times of despair as we encounter predictable resistance from others to the ways we communicate our messages about the state of our anthropocene. Resistance from others can look like: "Why do you worry about things like that?" "There's nothing that can be done about it anyway." "Things really aren't bad enough to change how things are." "You worry too much." "You're exaggerating." We can expect resistance to our urgency and our enthusiasm, to new expectations for personal accountability and new requirements that we and others change our thinking or behaviour in substantive ways. One form of scaffolding is the understanding that such things will surely arise, and that they are in fact predictable symptoms of our shifting into more whole-human ways of relating within our systems community and with those outside of it. We must expect and manage those intra- and inter-personal symptoms with skill.

Another source of scaffolding is the recognition that considerable psychological fortitude is needed to survive iatrogenic crises – not strength in the sense of being impervious to perhaps radically changing our systems ideas and approaches to our systems work on the world stage. Rather, strength in the sense of resilience that is flexible and adaptable to obstacles in a way that learns and develops increasingly complex and relevant ways to relate to them (Brenner *et al*., 2010). In the language of psychology, central to this is an ability to metabolize obstacles, not "to the extent that resumption of the original level of psychic functioning becomes possible. This does not imply a literal return to the original state, since the pre-[obstacle] innocence is neither recoverable nor desirable anymore. Hence the resumption of functioning typical of resilience is an advancement; it assimilates the psychological consequences of [obstacles] and is accompanied by deeper insight into the self and its interpersonal context" (Akhtar, 2008, p. 5). Rather than asking one another and ourselves, "How do we get things back to normal?" In times of flux, a person operating with a resilient scaffold structure encourages a question something like, "What kind of 'normal' works for this current situation, *and* from the perspective of the life-creating destination?".

The experience of scaffolding on an individual, interior level can be bolstered when we feel confidence in outer circumstances. It is challenging to access a sense of security when those circumstances are fast-changing. Confidence can grow when we realize that amidst the myriad choices we face, the foundational principle of *life* can be our guidepost. Social entrepreneurship consultant Marjorie Kelly has highlighted that our global future relies upon making choices that are "generative," a principle she defines as choices "whose fundamental purpose is 'creating the conditions for life'," those that create widespread shifts in human values "from maximising profit to sustaining life; from growth to sufficiency; and from individualism to community" (Meegan and Prince 2014, pp. 1-2). A broad audience finds Kelly's grand vision inspiring:

> Redesigning the models of ownership that form the base of our economy isn't a mechanical, legal exercise. Ownership designs embody a worldview and a set of values. The dominant designs of our day are built around values of individualism,

> growth and the pursuit of maximum financial wealth. An emerging ecological sensibility is shaping a new set of core values, such as sustainability, community, and sufficiency. This value shift creates the seedbed for new kinds of generative ownership and a profoundly new kind of economy. (2012, p. 99)

What choices can I, can we make that create the choices for life? This is a touchstone question for some. However, others find Kelly's and others' visions of social redesign intimidating, mindful of the role human decisions have played in the emergence of many of the anthropocene's polycrises, and dubious that large-scale human-designed interventions can succeed. Not everyone will find core principles such as 'life' or 'generativity' a sufficient scaffold.

"Fortunately, nature shows a path forward," argue Boik, Fioramonti, and Milante (2015), pointing to the biomimicrist's argument, that very effective guides to social design can be justifiably adopted from the natural world, given their similar complex systemic structure.

> Complex systems exist in biology, too, where they have been tuned for robustness and function by eons of evolution. These systems share common characteristics such as decentralized power, redundancy, inclusion, and diversity that could inspire the creation of robust and functional human-made systems. Thus, our path to maximal wellbeing (and perhaps even survival) may well go through purposeful, consciously-designed, flexible decision-making systems that mimic what we find in biology. (Ibid.)

For some, scientifically-sound principles of general systems theory provide sufficient confidence to take action; design guided by nature's precedents will be a principle providing some with a more reliable feeling of scaffolding. This can exist as the very physical places and spaces we inhabit – our built environment and how these can connect us to regeneration (Hes and Du Plessis, 2015). Another source of confidence, for some, is an understanding of complex system dynamics.

Emergence as Scaffolding

The term *complexity* is widely understood beyond this community of systems scholars. That complexity overwhelms most people; "for the naked mind it's overwhelming" (G. Pór, personal communication, June 10, 2015). What is less widely-understood is that amidst the complexity of a dynamical system – like this world in which we live – new structures emerge even without a master plan. And in our world today, great possibility is emerging in response to the anthropocene, possibility that is quite invisible to most people. Environmentalist Paul Hawken (2008) has argued that thousands of existing local and regional initiatives dedicated to social justice and environmental protection and restoration amount to the single largest movement for change in human history. As the very term anthropocene reminds us, people and their choices and actions have become more influential than ever before in the unfolding history of this planet. The future is very much dependent upon people in large numbers choosing and acting in generative ways. For this to happen, people need to see generative structures within which they can choose and act in concert with others. Such structures are emerging, attracting the energies and commitment of pockets of people across the world. As systems scientists know, attractors can be amplified, strengthened, joined, and they can thereby change the workings of the entire system itself.

At this time, we echo what Bauwens sees as three important realms of responses to the polycrises of the anthropocene: initiatives centred around environmental sustainability, social solidarity/justice, and open knowledge (which can also manifest as non-digital creations, so is more broadly described as "openness") (Peer to Peer Foundation, 2015). These three responses are becoming contexts, becoming centres of meaning around which energy gathers, becoming causes to which people are channeling their abilities, and becoming viable alternatives to the human behaviour that has contributed to the global crises we now face:

> *Sustainability*: (examples: initiatives focused on energy, construction, design, recycling, cleaning up, adjusting consumption habits) The term sustainability draws attention to the ways in which accessibility to the basic resources necessary for life are in question. An array of interest areas coalesce in this subject: population growth and its impact on the qualities and quantities of water, food, and air necessary for human survival; the impact of humans on the planet's climate; natural disasters and social disasters; etc.
>
> *Solidarity/Justice:* (examples: civil rights movements, labor unions, occupy, the Arab spring, re-awakening of cooperativism) This refers to the various organisations, movements and actions of people expressing solidarity with other people. We see this most notably expressed through the World Social Forum. This includes theory and praxis for democracy, transformative politics and solidarity economic alternatives. It is an approach to the political that is relational, inclusive, and empowering: "I see a politics of relationality as a contribution towards an alternative model of politics in which plurality and inclusion are prioritized over economics, control, and unity" (Topolski, 2015).
>
> *The Commons/Openness*: (examples: initiatives focused on open design, processes for contributory participation) The commons refers to the co-creation or stewarding of a shared and universal good that can be used by anyone. Worldwide, there are individuals feeling a sense of mutual responsibility to one another for the use of shared resources, and are expressing that sense of responsibility in a variety of creative ways. In modern economic theory, the commons includes "the cultural and natural resources accessible to all members of a society, such as air, water, and a habitable earth" (wikipedia.com). But in the current-day sense it goes wider and deeper. Traditionally, caring for the commons has been operationalized as governmental regulation of their use and limiting their depletion. By contrast, the contemporary commons movement is characterized by people engaged in activities predicated on the idea that they all share a stake in what happens to those resources, and therefore take an active role in sharing them, contributing to them, and nurturing their strength and availability (On The Commons, 2015). Formerly exclusive knowledge, services, and spaces are made more equitably available by commons initiatives, arising from a belief that the ability to meet human needs is in the grasp of all people, rather than the

> hands of superior authorities (Barnew, 2006; Bollier and Helfrich, 2012; Hardt and Negri, 2011; Ostrom, 1990; Wolcher, 2009).

We believe that these three themes are no less than humanity's current responses to the polycrises.

Sustainability, solidarity/justice, and openness can further become more aligned to each other through "caring for the commons as the glue":

> Fortunately, there are many promising developments in each of these realms. Many parts of the environmental movement seek to go beyond the standard "market-oriented solutions." There is a growing body of open-source-inspired projects for software code, information, design and physical production, which is now spawning new types of global sharing of information with distributed local production. And there are many advocates and initiatives for social justice and fairness in the economy, such as cooperatives and the solidarity economy movement. (Bollier, 2015)[1]

For the past 10 years, the Peer-2-Peer Foundation has been observing and documenting the field of p2p-value creation, -production, -governance and –ownership, building the connections within and understanding of the field, and developing policy and legal recommendations that would further enable the development of and scaling of these ways of working and living in the world. From relative obscurity a few short years ago, the Foundation has grown to attract a central role in making commons work visible, worldwide. The wiki created by the P2P Foundation has been visited by over 27 million visitors. What has emerged as barely-recognizable initiatives on the edges has become a trend of massive interest that we highlight in this discussion of the anthropocene, in the context a) of signs of hope, b) as suggestions about generative trends to look out for, and c) as contexts where the systems science community can make invaluable contributions.

If the challenges of the anthropocene arose from the aggregate of billions of human behaviours operating in misattunement to one another, "peer-to-peer" is a term describing people working in attunement, together. Peer-to-peer is a relational dynamic. It refers to a system where people can contribute towards a common object, objective resource, or something they are constructing together. The project can be material or digital, local or global. The emergence of a knowledge society over the past 20 year, driven by how the internet works, has significantly changed modes of production, organisation and decision making. Peer-to-peer is a permissionless way of communicating and creating. In essence, peer-to-peer behaviour has existed since the beginning of human time on this planet. What is new, is that we see this being informed by present-day needs, addressing present-day problems, and in some cases aided by contemporary technology and scaled globally. Small group dynamics are being scaled up to build highly complex things that are having world-wide impact. For instance, projects like Wikipedia, a universal encyclopaedia

[1] From Bollier's website, interested readers can access a video describing a vision of these three themes in greater depth, local and global networks needed to advance them, and economic system developments required to further their impact (https://www.youtube.com/watch?v=sO-QJLDpHQ0).

available to anybody with internet access, in several dozen languages; the average number of people in a team contributing to Wikipedia is one. Similarly, complicated software projects like Linux, which is meant to be an alternative to Windows, has an average team of four people (Putnam, 2015). Since all participants are contributing to a commons, no one can claim proprietorship of the collaborative effort. What new form of participatory governance is appropriate to govern these commons projects? What do ideas like "property" and "ownership" mean in a commons-oriented context? At present, no clear definitions for these have emerged. Compellingly, in commons examples like these, although the end results are literally global in impact, the integrity of small group dynamics among the workers – such as trusting each other and knowing each other – can be maintained. An individual who freely joins a commons project as a volunteer does this out of his/her passion and can therefore not be dictated to by some authority; fundamentally, how people are motivated to work, and work together, is different. That which emerges from these peer-to-peer dynamics – commons-oriented peer production – is an important form of attuned human behaviour arising in response to present-day challenges. It is a global phenomenon; hundreds of thousands of known commons-oriented initiatives exist in countries all over the world.

Systems Scientists as Structure-Creators

The scale of impact such initiatives will have is our central reason for writing this paper. A problem – perhaps *the* central problem – is that peer-to-peer-structured initiatives are insufficiently visible. These fields are emergent; people worldwide are becoming entrained in sustainability, justice, and commons concerns, but they do not realize the scale or scope of the movements of which they are a part. Masses of people made visible to one another would give hope, strengthen resolve, and create a higher propensity for taking next steps with potentially better information.

The systems community is an undervalued knowledge holder in sustainability, solidarity, and commons arenas, although it has tremendous understanding of how to coordinate information within and among networks of systems, and an unparalleled ability to share theoretically-sound, empirically-tested best practices that are currently unknown to players in this work. More effective sharing of systems science could increase ability of people engaged in these movements to learn from one another, to discover more generative options than the ones they now know, to empower previously undervalued knowledge holders to educate one another. With more effective systems of communication, these movements would attract greater numbers. More and more people would become attuned to the possibilities these movements represent, become attracted to join, become mobilized to act. A great need exists for multiple, desirable paths to be laid out for people to choose, a diversity of waterways along which efforts and enthusiasm can flow toward a viable future for our humanity. A great need exists to give substance, authority, and credibility to already-existing efforts to meet the challenges of the anthropocene. They need to be interpreted and described to individuals, to organisations, to policy makers, to nation states. Contexts must be created with language and stories and symbols and rationale that help people make meaning of the great work underway to address the challenges we face. Assigning meaning gives weight to human activity. The systems community can meet this need.

Given the entirely plausible grim future for our species, it would seem intuitive to cry that a heroic response from the systems community is needed to rally troops to fight the forces that are destroying the planet and lead humankind from the brink of destruction. Fighting and leading are indeed roles the systems community could take in these early days of the anthropocene. Instead, we choose different metaphors, no less heroic. We envision for the systems community a role not positioned in the forefront. Rather, "Best Supporting Actors" in this unfolding drama is perhaps what we are describing. A role wherein every member of the systems community brings forth his experience, her wisdom about how effective systems function *and disseminates it.* Disseminates ways of collaborating other people don't know. Systems of cooperation. Effective rules for governing cooperative spaces. How to build global networks. How people make decisions together. How to teach people to be sensors who watch and learn and become informed and empowered by what happens in other parts of the globe. This kind of heroism we describe is the kind of heroism the systems community could claim as its own if it were to become the kind of potent structure-makers, community-enhancers, network-builders that would bolster the work of millions of individuals working to meet the crises of today.

What do we know of those millions who need the systems community's support? The first to be reached are all the imaginal cells, the dreamers. Most of them work outside the sciences, outside academia. Some of them identify as artists, and they have abilities to reach and inspire others to the fields of attraction we're describing. Some are indigenous peoples, from the Netherlands to South America, from the Artic to Taiwan, and they are developing federations and associations and working to extend their intimate understandings of nature and culture and history (Ross *et al*., 2011) There is, for instance, a massive plan at hand to gather up all the indigenous peoples of the world into a simple app. so as to give global collective voice to these (largely) marginalized small groups. (At the time of writing, this is not launched yet). The systems community must connect to the world's religions, whose leaders influence billions of adherents following their teaching. The recent (2015) landmark encyclical by Roman Catholic Pope Francis is a clear moral calling to how we look after the Earth. There are billions to onboard in this work of the anthropocene, a massive invitation to participation. The world's religious groups, indigenous groups and artists (including poets, film makers, song writers and game designers) all must be engaged with. (We have a *truly* massive communication job ahead of us). This motley crew with which systems scientists must engage will vary widely in their scholarly sophistication, the ideologies that inform them, and the values they espouse. They will respond to different ways of communicating. Some will be articulate themselves. Others will represent previously-unheard voices. Many have a nuanced understanding of local concerns unparalleled by any knowledge we outsiders hold (Fischer, 2000). And so our work is to learn *their* languages, to respect *their* expertise, to translate the wisdom we hold into *their* worldviews, to understand why they come to participate in this anthropocene work. For the systems scientist, vitally-important questions include these: Who am I talking to? How widely can my language be understood? What are *they* saying?

People's personal motivations are not insignificant, a truth that scientists sometimes overlook. Some players in these fields of attraction are coming together and turning toward one another because they are poor, or frightened, or hopeless. Others have been angry and competitive, standing with their backs toward one another, looking out at the institutions of our world that have not delivered the future they intended, and saying with a certain amount of entitlement, "You promised. You promised it, and you didn't give it to us, and now we're going to break rules and be destructive because we're not happy with what we are not getting." To get anger-mobilized people turning toward one another amidst the grip of their frustrations, across their differences in language and faith and ideology and education – this can be difficult. Creating culture that inspires participation in stewarding a generative present and future instead of rewarding extractive and exploitive behaviour will require ingenuity. Onboarding people, inspiring community coherence, getting informed participation, galvanizing local muscle, seeding groups for moments of collective resonance (Rich-Tolsma and Wilson, 2014), supporting contextually-relevant interpretation of how to meet the demands of this era – this is the systems work before us. Generating the meta-structures that can create nimble and strong networks among peoples engaged in meeting our anthropocene-sized challenge would be a unique and worthy legacy of this generation of systems scientists. We can think of no worthier.

Globally, we are witnessing the undermining of democratic values, the destruction of nature and the perpetuation of poverty and inequality. Much focus is given to 'the seemingly insurmountable tsunami' of problems in an effort to push various reasons why change should happen. In our opinion, the real innovation we now need most urgently, as a species and as individuals, is innovation in how we orient towards each other anew and how we come together around what matters most to us. Luckily, this is exactly what we see emerging all over the world. How do we begin living, producing, and organizing in a way that reflects the societies we wish to create? How do we describe the commons that are important to us? How do we design systems around those commons that enable people to act in harmony with them? We see many efforts emerging to create coherent response networks to the polycrises, and to visions for the future, that characterize our times. When we conceptualize the responses to the anthropocene that we've seen emerging around sustainability, solidarity and sharing, around peer-to-peer interaction, we see the creation of common ground and coherance that could transition us towards commons-oriented economies and societies. This can be achieved by the convergence of people from digital cultures and local commons, those who are aligned around the natural commons and new kinds of parties[2] socialized by political commons struggles to create coalitions around the commons.

[2] For example, the population of Barcelona has a newly-elected mayor, Ada Colau, co-founder of the anti-foreclosure group called the PAH (Plataforma de Afectados por la Hipoteca/Platform of People Affected by Mortgages), which has moved families that need housing into empty, bank-owned buildings. Colau was elected on 24 May 2015, with the backing of Barcelona En Comú, a citizen platform that includes groups that came directly out of the 15M movement as well as Podemos.

We see the legions of sustainability, solidarity, open-source and peer-to-peer initiatives that have spontaneously arisen in response to widespread crises felt at local levels. The Commons (and the caring thereof) is a binding force that can build further structures, can create scaffolding between efforts:

> As a system of provisioning and governance, the commons lets people make their own rules for managing the resources on which they depend. It gives them a significant degree of sovereignty and control in the spheres of everyday life that matter to them. It can help them reconnect to nature and to each other, set limits on resource exploitation, and internalize the "negative externalities" so often associated with market behavior." (Bollier, 2014).

In addition, many more far reaching strategies are being designed from such emergences:

> Under conditions of strong, mature peer production through civic dominance, we see that civic voluntary contributors and autonomous cooperative labor would create value through common pools. Labor and civic re-skilling could occur through Commons-oriented distributed manufacturing, which places value creators at the helm of distributed manufacturing and other forms of value creation" (Kostakis and Bauwens. 2014).

We perceive the emergence of commons initiatives as a profound rejection of the widely-discussed "tragedy of the commons" – a rejection that does not deny the tragedies in 21st-century life that we face, but that takes a stand instead by "caring for the commons," celebrating it, inhabiting it in ingeniously creative, revolutionary, life-affirming ways. In the face of tragedy, personal and group agency can diminish. How can anything I could do, or we do, possibly be enough? This sentiment is common among people who allow themselves open-eyed consideration of the anthropocene. However, many people experience surprise at moments of recognition that, "we are so much more than we have been told we are – that we long for more and in that longing have more company than we ever imagined;" such moments, Klein says, "seem to melt cynicism on contact" (2014, p. 465). Cynicism tends to dull curiosity, curtail possibility. And so, caring for the commons is another form of scaffolding we consider vital for the path ahead, a scaffold more sustainable and just than any other we have seen. Together, people have resources that alone we do not. Together, impetus to act – in local or global arenas – gains impetus, lends moral and economic authority, seeds new learning, creates virtuous cycles, becomes transformative. We are aware that the prospect of the anthropocene has inspired many to call for people to fight back – declare war on the many crises that threaten life today. Our approach is different; rather than fighting what is, we are interested in collaborating with those who are constructing what could be. What would it be like if the international community of systems scientists joined in that co-construction?

The proposition that anthropos, humankind, is the decisive force that will shape this geological epoch is serious business. It would be easy to assume that the work ahead for systems scientists is grave. But here we suggest that a key indicator of success in

anthropocene work is this: it needs to be fun. In 1954, psychologist Erich Neumann wrote that "integration of the personality, its wholeness, becomes the supreme ethical goal upon which the fate of humanity depends" (p. 392). Here in 2015, we understand this to mean that for the work before us, both intellect and the human heart must be attracted and engaged. Meeting today's polycrises requires irresistible options for change that entice and enthrall, fascinate and thrill. As much as our work is to design and educate the world of systemic best practices, making it attractive is what needs to happen. Systems scientists must play a role in creating this irresistibility. Surely some people in this world are swayed to engagement by compelling, theoretically-grounded scholarship. We know how to speak to them. However, for a critical mass of our 7-billion-person planet to mobilize, other stories must be uttered. Since humans emerged, we gathered around campfires and spoke to one another – today it happens in coffee shops and pubs. Speaking stories that could sound like this:

> *Pull up a chair. Listen to this. Co-creative system scientists are already amongst us. They are really practicing an art to be danced: she is the weaver of networks, the tiller of soil preparing fertile beds for ecologies of seeds to grow; he is the combiner, the great big magnet, the flow-director. She is the talent spotter and place finder, the phase-thermometer, the esteem-lifter and the process-designer; he is the vision-combiner, the worldview-translator, the space-holder and the boundary-patroller. This is the effervescent host and the masterful enabler.*
>
> *We have been living in a world where the Lead Writer, Head of Department, CEO, the IP Holder, the Owner, the Founder, the Individual Brand is what gets chased and rewarded. Enough. This branding mentality and the need to be 'the hero', where everyone wants to put their own brand on something, is holding us back. In addition, it increases noise and competition for resources and attention. Without intending it so, people pushing for change land up speaking against one another. This culture of individual fame and glory that we grew up in teaches us habits that are hard to break. All the systems, our ways of recognizing or respecting others, are set up towards the individual, not the collective. All our focus on the achievements and prestige of the individual leads even those who want to contribute positively to the world to land up competing against one another. There is much talk of collaboration; actual dropping of private agendas are few and far between. This points to the depth of the cultural shift we have to undergo. There must be a death to this kind of heroism. We must drop the old ideas and adopt new strategies for getting done what needs doing. And there are people who are doing this, now. People working at the edges, building alternatives and bridges for others.*
>
> *Co-creative individuals and organisations find ways that enable people and projects to not merely collaborate, but to turn towards one another, creating side-by-side – the victory of the commons. We need to develop the systemic infrastructure to foster this kind of co-creation. Currently our institutions and legal entities require all kinds of formalities and then, once something's created, it gets locked in. The way we have legally organized ourselves means things are*

> *not permeable or agile. Our ability to act gets inhibited by institutions and these perceived 'ways of doing things properly' become barriers. This makes it hard for people to get together, do stuff co-creatively, and then disband. We need more agile structures that give projects boundaries/membranes for as long as they are useful. "Societal membranes of relevance." That sounds like a mouthful, but really it just means (for instance) that the people in a suburb have structures for finding each other around a shared purpose or activity. One can come in, do the work, and leave. Participate at several places simultaneously. Move around with great agility. Co-creative leaders are those who hold the membranes and structures in place. We need to get better at signaling one another about what we need, what we've got to contribute, find new ways to name various functions and exchange this information. In science we've learnt from the ants and call this "stigmergy".*[3] *We need to create ways where this work can take place – a physical infrastructure to support this – and we need to scale it out, fast. We need processes in place to help people get into a co-creative state.*
>
> *Can you see what astounding levels of productivity and creativity we could find? Can you see how much fun this could be?*

We must paint possibilities with words and images that expand motivation for action beyond the understandable fears people have for the future. The co-constructed world we ask the systems community to help to generate needs to be beautiful (Akomolefe, 2014). It needs to feel good. It needs to engender hope. Only by engendering such effects as these, we believe, will we attract the irreversible momentum necessary for the work ahead. As members of the international systems science community, and as individuals, we must access ways to enliven and invigorate ourselves so we can spread those energies to others. And so, members of the international systems science community, locating the impetus for your own personal and collective creative systems work is more than a matter of self interest or good self care; it is a moral imperative (Buckle Henning, 2013).

CONCLUSION

We find ourselves in the midst of living the ultimate Chinese curse: "May you live in interesting times". These times are remarkable for their unevenness. We have today incredibly uneven distribution of just about everything, from money to consciousness, from population distribution to access to water and food. To sociobiologist Edward Wilson, "the real problem of humanity is the following: we have paleolithic emotions; medieval institutions; and god-like technology. And it is terrifically dangerous, and it is now approaching a point of crisis overall" (2009). So here we are, standing at this juncture in big time, inside the geological age where one species on a planet is drastically altering the make-up of the biosystem, in such a way that it is threatening its own continuation. This human species is not wired for foresight, it is wired to live in the present. We also stand at a pivotal juncture in small time, this one life-time, one year, one week, one moment, with all the complexities held therein. We, along with more than

[3] (Doyle and Marsh, 2013).

7.3 billion other human lives.

For each of us, our view on the world is deeply affected by the lenses we wear, where we've grown up, what education we've had, how many cognitive and emotional connections we are able to make and hold, how deeply into the anthropocenic rabbit hole we are prepared to look. The socio-political-and-economic sphere in which we've been embedded is in a great flux. And inside this fast-shifting context we're still able to laugh and love, give birth and connect, trust and dream. Because all that makes us human is alive, still.

We are just a small sample of humans who happened to be born at this time, inside the families, education systems, belief-systems, countries, and institutional frame-works that we were. The system sciences as we know them emerged from where we were at in the first half of the 20th century, as people started connecting dots, within the context of the dominant systems of that time (socially, in the modern and post-modern era; economically, at the dawn of the neo-liberal capitalist system; etc.). Today, the context of our times places one of history's greatest callings before the systems community: to apply systems knowledge in the steering and governing of the Earth System through an ever-narrowing aperture of surviving.

The question is, at this threshold of the anthropocene, at this moment in our lifetime, on this day: What are we going to do? What is the role that system scientists will play in assisting with what many have coined "the great transition" (Tellus Institute, 2015)? A question of such terrifying profundity, understandably, could trigger every psychological avoidance strategy at our disposal.

> Fear makes us run, it makes us leap, it can make us act superhuman. But we need somewhere to run to. Without that, the fear is only paralyzing. So the real trick, the only hope, really, is to allow the terror of an unlivable future to be balanced and soothed by the prospect of building something much better than any of us have previously dared hope. (Klein, 2014, p. 28)

Fortunately for us, there are places for us to run to, others to run towards. Myriad emergent efforts are already underway. They represent "blessed unrest" (Hawken, 2008). Up to this point, they represent a movement from which the systems science community has been, surprisingly, largely absent. And it is not clear if they will succeed.

Whether or not they do, we believe, has much to do with the systems community. How can we of that community creatively combine our knowledge and invite informed participation to inspire stewardship of life on this planet for generations to come? How can we construct scaffolding to assist our transition into the anthropocene at both exterior, macro-system levels, and interior, micro-system levels? How will we build generative self-regulatory systems of governance and decision-making? How will we replace passive indifference and unsubstantiated optimism with active hope? Among our sources of hope are existing, already-mobilized initiatives that are ripe for the systems community's help. Some are actively asking for it (for example, Deepwater, 2014; Finidori, 2015; etc.).

Action, as we've discussed, can be difficult to mobilize. Daily we witness the inability of politicians and the economy to act with any form of cohesion. Fear and frustration are mounting, evidenced in the first-ever move for citizens (of The Netherlands) to take their government to court (and winning!) for failing to act:

> "You have been negotiating all my life!", cried out 21-year-old Anjali Appadurai from the lectern of a UN climate change conference four years ago. The activist, speaking on behalf of her nation's youth, could have speaking for anyone who has taken a mild interest in more than two decades of international negotiations on climate change and stood aghast as world leaders have failed to protect the most basic of human rights – to exist. (Howard, 2015)

If humankind is to continue to exist, the actions to be taken are unlikely to be led by the institutions created in the old ways of thinking.

That belief leads us to our recommendation – rather, to the great *invitation* we deliver today. We ask that every member of this community of systems scientists lend weight to existing initiatives in sustainability, solidarity, and the commons by informing yourselves about them and making them visible to others. Amplify the many remarkable responses to our global polycrises that are working. Make these viable alternatives visible to others and help build the systems of enablement between them, under them, and global networks to span and strengthen contact among them. Assist those responses by helping to increase their numbers and their reach. There must be many more pathways toward the future than the few, ineffective, and eroding pathways of the past. We ask you, systems scientists, to contextualize others' work that is underway, framing it as generative manifestations of how the human system can react to the anthropocene. Help others' emerging work to operate *as a system*: help them to see their relevance to one another; build channels that share their insight; help them discover the principles by which their work can fruitfully operate.

Essentially, we invite the systems community *to join* in co-creating the single largest movement in human history. We ask you not to lead it, initiate different directions for it, govern it on others' behalf, or impose your knowledge on others – valuable though that knowledge and well-meaning though its offering could be. Although considerable teaching skill exists in the systems community, we ask that you not see your role in meeting the polycrises of the anthropocene as being teachers at the forefront of a humanity-sized classroom waiting to be taught. We are convinced that the most radical and crucial impact systems scientists can have is to offer your systemic mindset to the others whose work is already underway.

It is our ardent hope that at some future time when the history of the international community of systems scientists is written, people will read of how dire were these times we live in now. And that they read, "if not for the active engagement of systems scientists across the world, as a species we probably would not have survived."

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