

Patterns for Navigating the Transition to a World in Energy Descent

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Abstract:

This paper will consider current concerns about resource depletion ("energy descent") and the unsustainability of current economic structures, which may indicate we are entering a new era signaled by the end of growth. Using the systems thinking tool of PatternDynamics™, developed by Tim Winton, this paper seeks to integrate multiple natural patterns in order to effectively impact these pressing challenges. Some of the Patterns considered include Energy, Transformity, Power, Pulse, Growth, and the polarities of Expansion/Contraction and Order/Chaos.

We tend to have horrible visions associated with downturns and "collapse." Can we even entertain the possibility that we might be entering a period of decline in energy and standard of living? Can we re-examine our assumptions about "growth" and "development"? Jean Gebser's emphasis that every mutation of structure is preceded by a crisis will be considered, and Howard T. Odum's ideas about energy as the basis of man and nature will inform the discussion. Edgar Morin's *dialogic Method* of active inquiry in regards to the interplay of polarities assists in our understanding and response to the complex challenges we face.

Key words: Energy descent, peak oil, resource depletion, PatternDynamics, integral, pulse, polarity.

Unless we take a square look at what could otherwise drive us into despair, authentic and full-bodied hope will elude us... Let us recall that the primary driver of evolutionary creativity and transformation is chaos. Paradoxically, from an evolutionary perspective, bad news is often a good thing – a blessing in disguise (Dowd, 2009, p. 280).

Introduction

My contention is that we may be at or near the end of the industrial growth era; if that is so, I believe it is imperative to be thinking about our models of evolution, progress, and growth. We tend to have horrible visions associated with downturns and “collapse.”¹ Possibly we are entering a period of decline in available energy. But let’s reorient and consider some of the natural Patterns at work in all systems (such as the *Pulse* of growth and decline, and the polarities of *Expansion/Contraction*, and *Order/Chaos*). Recognizing these as natural patterns, we can acknowledge that the *Cycle* of life includes loss, but that “creative breakdown” (Winton, 2012a) is also the pathway to new beginnings. I also believe it will be wise to be prepared for future scenarios (Holmgren, 2009) that may not be as rosy as the integral evolution or revolution many of us have been hoping for. Are we equipped to navigate such a scenario with grace and equanimity? Will we have the ability to stay engaged if the future that arrives is “not the future we ordered” (Greer, 2013)?

The Peak, the View, and the Descent

If it is energetically impossible for high energy society to be anything more than a pulse in the long run of human history, then it cannot, by this definition, be sustainable, no matter how much we shuffle the technological deckchairs... I am suggesting that we need to get over our naïve and simplistic notions of sustainability as a likely reality for ourselves or even our grandchildren and instead accept that our task is to use our familiarity with continuous change to adapt to energy descent (Holmgren, 2002, p. xxx).

Picture in your mind a spectacular mountain peak. Now see yourself and the rest of humanity standing at the top of this peak, feeling a sense of great accomplishment and

exhilaration. Take in the view and notice the world laid out before you. Take in “the wonder and majesty of the world, and how it all fits together.” (Holmgren, 2002) Appreciate the perspective of the whole you now have available to you, and give thanks for the resources that made your climb possible. Note the clouds forming. Will we linger too long at the peak, or will we take advantage of the view, the weather, and the daylight to safely make our way down the mountain?

This is the story David Holmgren (2002) uses to introduce the concept of “energy descent.”² “Descent,” he says, is “the least loaded word that honestly conveys the inevitable, radical reduction of material consumption and/or human numbers that will characterise the declining decades and centuries of fossil fuel abundance and availability” (2003, p. 3).

The descent will be more hazardous than the climb, and we may have to camp on a series of plateaus to rest and sit out storms. Having been on the mountain so long, we can barely remember the home in a far-off valley that we fled as it was progressively destroyed by forces we did not understand. But we know that each step brings us closer to a sheltered valley where we can make a new home (Holmgren, 2002, p. xxx).

This paper is looking primarily at this issue of “energy descent”³, with the recognition that related issues of peak oil, climate change, economic instability, and over-population together lead some to believe that there are limits to growth (Meadows, Randers, and Meadows, 2004).

This paper’s primary method is to use several of the Patterns found in the systems thinking tool of PatternDynamics™ (PD) to determine if ideas around “energy descent” and “limits to growth” are consistent with the natural patterns that PD claims exist in all systems. We will also investigate whether these Patterns have something to teach us about how to creatively navigate the changing landscape that may lie before us. PD was developed by Tim Winton (2010a), with a goal of combining patterns found in all natural systems into a language reflecting high level principles useful for addressing the complex challenges that human systems are now

facing (MacLeod, 2013a; Winton, 2014; Aurami, et al., 2014). References to PD ***Patterns*** will be in bold and italicized. For a short introduction to PatternDynamics, please see **Appendix A**.

The work of systems ecologist Howard T. Odum will inform our discussion and Jean Gebser's emphasis that every mutation of structure is preceded by a crisis will be considered. We will conclude with suggested response options for optimal impacts. With a realistic assessment of available energy to support our techno-economic structures; tools such as PatternDynamics to help us understand, communicate, and plan in the cultural realm; spiritual and psychological practices of reflection to support our inner resilience, we can then engage in actions that will be sustainable and impactful.

The World as a Complex, Living, Energy System



Symbols can have a powerful role in shaping what we see. PD uses “wholistic symbols designed to help us develop...systems thinking capacity” (Winton, 2012b). The Pattern diagrams used throughout this paper can be found at <http://patterndynamics.net>.

One of the techniques used in PatternDynamics is to scan the PD Matrix Chart (see **Appendix B**) and while doing so reflect on which Patterns stand out as needing either to be brought into fuller awareness and emphasis in relation to an issue of concern, or perhaps needing to be brought into a healthier balance in relation to other Patterns. In relation to the topic of energy descent, the ***Energy*** Pattern, of course stands out as an obvious place to begin. Most often described as ‘the ability to do work’, Tim Winton has described energy as “any vibratory force that makes change happen” (2013a) and as “the fundamental animating force of reality” (Winton, 2012a). And from his ITC 2013 paper:

Energy has a curious ontological status. It potentiates change; we can measure and quantify its effects, but we cannot measure and quantify it. No one has ever encountered energy as a substance. Its ontological status (quantity) is dependent on its quality of

inducing change – quality being something we normally associate with epistemological status (Winton, 2013b).



H.T. Odum developed an energy systems language to assist in communicating how energy flows in all systems. In this paper we are using instead the PatternDynamics Pattern symbols found at <http://patterndynamics.net>. Reproduced above are the Pattern diagrams that illustrate the Patterns of **Flow**, **Resource**, **Transformity**, **Power**, **Feedback**, and **Void**, which are all correlates to Odum's ideas about how energy flows, stores, transforms, feedbacks, and sinks.

Pioneering systems ecologist Howard T. Odum spent a career specializing in energy systems⁴ and taught that all systems use energy resources to produce, consume, sustain, transform, and recycle materials for the benefit of their respective systems. From the small areas of nature to the entire biosphere of earth; from the big picture of civilization to the miniature ecological microcosm – in all of these systems energy has at least six expressions. It flows, stores, transforms, provides feedback, and sinks (Odum & Odum, 1976, Holmgren, 1994).

As energy **Flows** into a system, and interacts with components, “things” emerge. The “things” that emerge have an embedded energy within them – holding some of the energy that went into their production, and carrying forward the potential energy that make it possible to create something new. These “things” can be called a resource. In essence, the **Resource** Pattern indicates storage of energy, and carrying potential.

As a new flow of energy enters the system and interacts with a resource, transformation of energy can happen, where some *quantity* of energy is liberated from the resource and transformed into a higher *quality* energy. The **Transformity** Pattern, Winton states, “is a major structural aspect of how the universe works, and its structure is complexification.” (Winton, 2012a). H. T. Odum argued that all processes entail a reduction of energy quantity as it is transformed into a higher quality energy, a new quality of energy available for use by the

system to function in a new and more powerful way. The reduction in energy quantity is the 2nd law of thermodynamics at work – the energy that is dissipated out in all processes to increase entropy. This is where some amount of energy “sinks” (into the **Void**) in every process. The 1st law of thermodynamics is not violated, however – the total quantity of energy in the larger system is conserved, but a portion of it has now become unavailable for additional work.

The loss in total quantity of energy for any system or organization to entropy is the price paid for higher quality energy components that represent greater complexification and a resultant ability for increased power. Odum identified this as the Maximum Power Principle⁵ of increased order and complexity that allows a system to be competitive in its niche and to accomplish its goals – “maximizing the work rate to the extent that the energy flow will support,” in Winton’s words (2012a). Winton defines the **Power** Pattern as “Work rate – productivity per unit of time” (ibid).

Odum pointed out (2007) that in the large expanse of human history, we have for the vast majority of time used a small amount of energy with the support of a large amount of stabilizers from the environment. Yet in the very brief time of the last 200 years, we have used an increasingly large amount of energy via fossil fuels, with a quickly diminishing supply of environmental sinks. He characterized this as an interference of life support with insufficient knowledge of the consequences. The **Feedback** Pattern is any process that acts on itself, either as a *positive* feedback loop that amplifies or reinforces the current operations of a system, or a *negative* feedback loop which helps stabilize or even reverse operations or direction (Meadows, 2008). Sometimes positive feedback can put a system into overshoot, while negative feedback lags and does not hit hard enough soon enough to avoid a system collapse.

Odum saw energy literacy as a planetary imperative, emphasizing the need to become aware of the energy laws and to know what can and cannot be done within an energy budget. In terms of the four quadrants of AQAL theory, the lower right quadrant is most often equated with the “techno-economic” base of any system. With the above discussion in mind, we should consider the need to give more attention (Mattessich, 2014) to literacy of the energy base that underlies and makes possible any technology and economy (Holmgren, 2010), and that can form the basis of appropriate normative behaviors culturally in the lower left quadrant.

The Pattern of the Pulse



Scanning the Matrix Chart again, **Pulse** stands out as the next relevant Pattern to examine.

“All natural systems have regular repetitions and cycles that order events over time,” (Winton, 2012b), and all systems on all scales Pulse. **Pulse** refers to “repeated rhythmic surges of activity related to resource flows and exchanges” (Winton, 2012a).

Some examples of these bursts of stored up energy include exploding volcanoes, the surge of vegetative growth that occurs every spring, seasonal floods, forest fires, your heartbeat, and the Big Bang that initiated our cosmos.

Pulse is a pattern that exists in the dimension of time and contains four distinct stages (Holling, 2001; Odum & Odum, 2001; Odum 2007). First is the up slope – a distinct period where the burst of energy and resources allows for growth; second is the plateau at the halfway point, where energy and/or other resources that fueled the burst of growth level off – this is the climax and transition stage; and third is the down slope, the inevitable and inexorable descent.

The fourth stage is a stage of low energy restoration in preparation of the next pulse, if the system in question is pulsing in a consistent cycle.

H.T. Odum (2007) has made an important observation about the concept of sustainability and the so-called “steady state” in relation to the pulsing paradigm. He pointed out that the concept of “sustainability” is based on a somewhat outdated ecological model of succession and climax, where a steady state is achieved. The reality is that studies in ecology show that systems don’t level off for long – they pulse. Therefore, he says, “seeking a constant level of civilization is a false ideal contrary to energy laws” (ibid, p. 54).

Some pulses are difficult for us to see because of the time scale involved. The life of a human is a pulse, as is that of a star or a galaxy. Jean Gebser referred to the pulse as “the rhythmic temporicity which sustains and encloses the stars as well as our hearts,” and spoke of it as “the inescapable destiny of ascent and decline” (Gebser, 1985, p. 173).

All of this is by way of background to allow us to see that the problems we’re facing with energy (peak oil), ecology (climate change and other effects), and economy (financial collapse) can all be related to this very natural dynamic pattern of the Pulse (MacLeod, 2013b).⁶

The Pulse of Peak Oil

Draw a line five miles long to represent the millions of years during which solar energy has been captured and laid down in the earth’s crust in the form of coal, gas and oil. Then put a blip in it. That blip represents the time we have taken to extract and use this embodied energy. We are halfway through that blip (Bruges, 2004).

Geologists Colin Campbell and Jean Laherrère (1998) introduced the term “peak oil,” after Hubbert’s (1956) work that showed the point of concern is not when we “run out” of oil, but rather when the resource peaks, and then begins a decline. The peak is important because our whole society is built around the idea of continual growth. Continual growth is dependent upon reasonably cheap energy resources, which we tend to assume will always be there. Growth, we think (with a few inconvenient ups and downs here and there), will always continue. After all, it’s all we’ve known...that is, until we get a bigger perspective than just the industrial/informational ages of the past 200 years.

The down slope after the peak will require a very different set of behaviors for successful management than did the up slope (Hopkins, 2008; MacLeod, 2013c).⁷

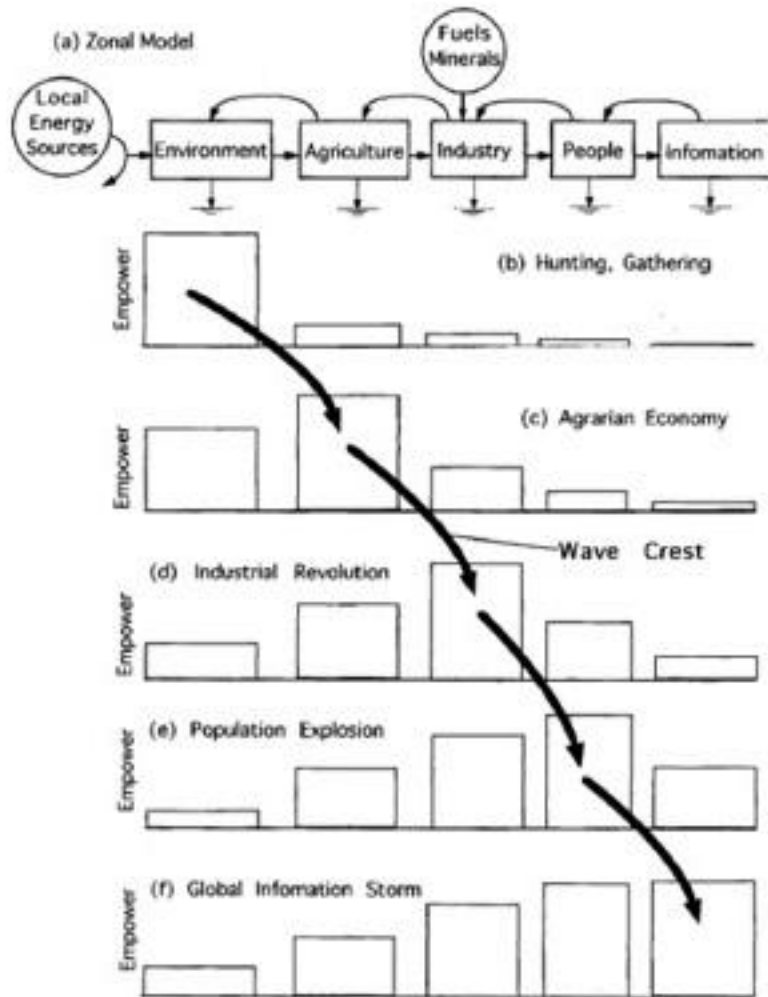
The International Energy Agency acknowledged that conventional oil peaked in 2006 (MacLeod, 2014). Campbell and Laherrère forecasted a peak of all liquid fuels (taking into account conventional and unconventional sources) to occur around 2015.⁸ The fact that this paper is being written in 2015 should remind us that we are very late in the game in considering these issues. As of May, 2015, there are a growing number of analysts who believe 2015 may be the year of the all-liquids fuels peak (Whipple, 2015).

Will these peak predictions prove to be accurate? We won't know for sure until a few years after the fact. See **Appendix C** for more discussion of peak oil, and note the reference to the award winning IEC 2014 paper by Kristian Stålne and Svein Horn.

Pulses of Energy Powering the Waves of History

As mentioned previously, when the integral community discusses the “Techno-Economic base” in the lower right quadrant of Wilber’s AQAL system, the role of energy to support that base is often neglected or minimized. Including consideration of available and embedded energy (Pogany, 2006) would likely be of great benefit in terms of more effective integral impacts. Not only in reference to quadrants, but also stages of development (MacLeod, 2013b).

H. T. Odum, with his wife and writing partner Elizabeth looked at energy as the basis for man and nature (Odum & Odum, 1976). They were in agreement with biophysicist Alfred Lotka (1922a; 1922b), and anthropologist Leslie White (1959) on the fundamental role of available and embedded energy in the course of human evolution, and created a graphic that reveals the big pulse of energy that has undergirded human history (Odum & Odum, 2001).



Howard and Elizabeth Odum (2001) demonstrated that human history can be seen as a rolling wave, or series of pulses moving up the energy hierarchy. In the chart to the left, the vertical axis represents “empower,” which is the power available due to the buildup of resources, or “emergy” (embodied energy/energy memory). The horizontal axis shows five zones of power. In the Hunter-Gatherer period, the great bulk of embodied energy existed in the environment itself. In Agrarian times, it was embodied largely in agriculture, then fossil fuels and minerals during the Industrial Revolution. In more recent times we’ve seen emergy concentration occur with the population explosion in cities, and finally in the “information storm” - the worldwide sharing of information.

Figure 1: Zonal Empower chart of the history of human development (ibid, p. 120)

The wave may be expected to generate more population and information than it can support. As the emergy⁹ flows of the fuels and their matching resources falter, we expect the climax to turn down, either crashing or descending prosperously depending on how well the world shares common purpose. How do we go from the pattern in graph (f) to a new kind of future consistent with the limitations of graph (c) (ibid, p. 120)?

The Principle of the Pulse is the Principle of Peaks

The principle of peaks: the enduring health of any system depends on the appropriate balance and integration of the rate of increase in resource flows and exchanges pre-peak and the rate of decline in those flows and exchanges after the peak, for a given context (Winton, 2012a).

Peak oil is not an isolated problem, it is a predicament that is a manifestation of the natural pattern of the Pulse, and is subject to this principle of Peaks. As long as problems with the world's resources are seen as isolated problems to be dealt with individually, the more likely we are to turn to "solutions" that may not address the root cause. Peak oil may just be a prelude to "Peak Everything" (Heinberg, 2007).

There are now strong signals (Catton, 2009) that we are likely in ecological overshoot and have reached the limits to growth (Meadows, et al, 2004). Overshoot can occur when a system grows beyond what its resource base can support, thus "overshooting" the peak, resulting in a subsequent steeper decline (or collapse) than was necessary (Catton, 1980; 2009).

We often tend to think of our human systems as being somehow outside of nature and its processes, but when we understand that we are part of nature, we understand that our human systems are in a very real sense natural as well. We get into trouble when we don't acknowledge this and let our hubris gain the upper hand. When we think that things like the 2nd law of thermodynamics don't necessarily apply to us, and that infinite economic growth is a real possibility. As Stein's Law tells us, "Things that can't go on forever, don't"¹⁰ (Byron, 2006).

Not only is peak oil a pulse, but so is our economy. This has been painfully obvious in recent years as we see one "bubble economy" after another pulse in and out of existence. We've seen the tech bubble, the housing/mortgage/credit bubble, and the currently bursting fracking bubble (Hughes, 2014, 2015; Berman, 2015). We might see one more bubble, the alternative energy bubble, but it too might burst in the not too distant future. These are all smaller bubbles existing within a larger economic bubble that began with the industrial revolution.

The world has experienced 200 years of growth, thanks to the support of fossil fuels. How long can it continue? Integral philosopher Edgar Morin states that after accelerated growth, if there is no deceleration it will lead to “explosion, disintegration, or maybe mutation” (1999).

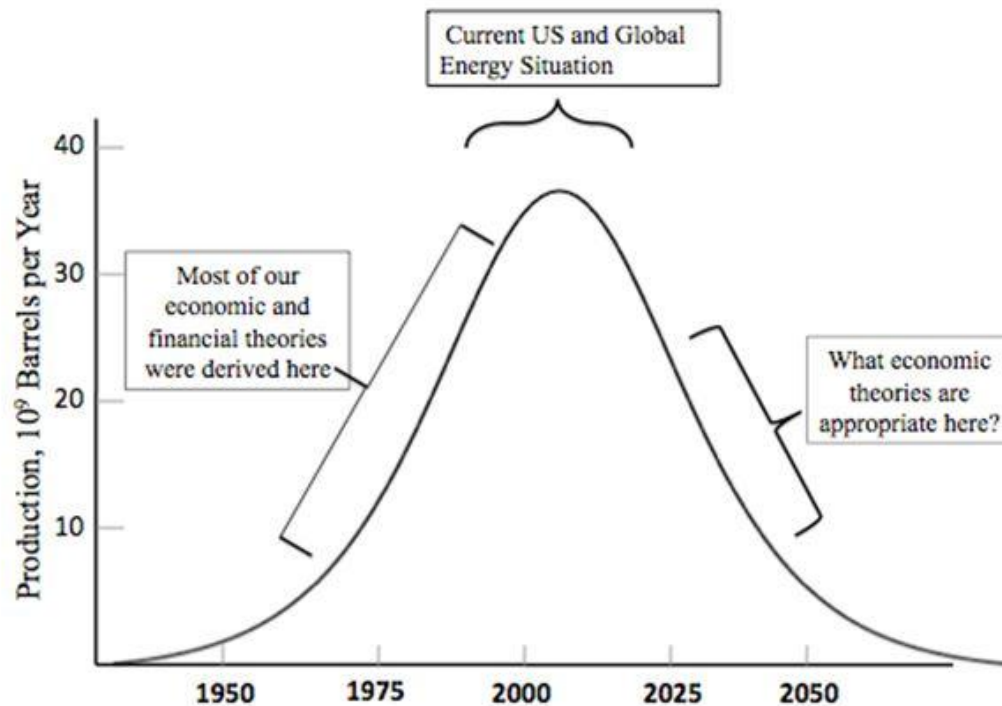


Figure 2 (Hall and Klitgaard, 2012)

In regards to Ecology, we can see that the wastes of the fossil-fueled growth economy have been mounting in equal measure, creating a pulse of deleterious effects that the earth is struggling to absorb. Greenhouse gases are creating a bubble in our atmosphere, which results in a changing climate. Unfortunately, this pulse is still in the first phase of a dramatic swing upwards.

Once we recognize the natural pattern of pulse existing in natural systems, we can see more clearly that it is eminently reasonable that there are limits to growth, and that there are finite resources such as oil that we must at some point transition away from.

Winton (2012a) points out that “The role of Pulse is to maximize exchange flows sustainably.” We want to balance our ability to grow with the foresight of “minimizing the adaptation required after the peak when decline sets in.”

Growth and Development



This brings us to the **Growth** Pattern, defined as “developmental increase” (Winton, 2012a). It is important to understand the nature of compound growth and its dependence upon available resources. Physics professor Albert Bartlett (2004) has famously said, “The greatest shortcoming of the human race is our inability to understand the exponential function.” This was the opening line to his lecture on *Arithmetic, Population, and Energy*, which he gave 1742 times, which averaged once every 8.5 days for 36 years (Cobb, 2013). One of the subjects in the lecture was a simple formula for how long it takes for something growing at a constant rate to double in size. 70 divided by the percentage rate of growth per year provides the doubling time. Current world population of 7 billion, continuing to grow at today’s rate of 1.2 percent per year would double the population to 14 billion in 58 years. A 2 percent growth rate would double in 35 years (ibid).

Bartlett also gave a dramatic example of how the curve of exponential growth can sneak up on us – growth can appear to be very slow for a long time, and then it can overwhelm. The example he used was of bacteria in a bottle:

Bacteria grow by doubling. One bacterium divides to become two, the two divide to become 4, the 4 become 8, 16 and so on. Suppose we had bacteria that doubled in number this way every minute. Suppose we put one of these bacteria into an empty bottle at 11:00 in the morning, and then observe that the bottle is full at 12:00 noon. There's

our case of just ordinary steady growth: it has a doubling time of one minute, it's in the finite environment of one bottle.

I want to ask you three questions. Number one: at what time was the bottle half full? Well, would you believe 11:59, one minute before 12:00? Because they double in number every minute.

And the second question: if you were an average bacterium in that bottle, at what time would you first realize you were running out of space? Well, let's just look at the last minutes in the bottle. At 12:00 noon, it's full; one minute before, it's half full; 2 minutes before, it's a quarter full; then a 1/8th; then a 1/16th. Let me ask you, at 5 minutes before 12:00, when the bottle is only 3% full and is 97% open space just yearning for development, how many of you would realize there's a problem (Bartlett, 2004)?

Richard Heinberg, senior fellow at the Post Carbon Institute believes we have reached *The End of Growth* (2011), as does energy economist Jeff Rubin (2012), who understands that “the real engine of economic growth has always been cheap, abundant fuel and resources.” However, this wasn't the training he received as an economist:

Nearly every economics exam I wrote dealt with the idea of maximizing economic growth. It wasn't until I had years of real-world experience under my belt as chief economist of an investment bank that I began to understand what the textbooks were missing....After watching GDP growth shrink in the face of steadily rising oil prices, I couldn't escape the notion that growth might someday become finite. During my formal training, steeped in conventional economic theory, the idea of static growth was never even considered. It doesn't matter which school of economic thought you subscribe to or where you belong on the ideological spectrum, the notion of growth is an unquestioned tenet of the discipline (ibid, pp. 26-27).

Thomas Piketty (2014) caused a sensation when his rigorous academic economics book was translated into English, and became a bestseller. Piketty provides good evidence that we will not likely see again the levels of growth experienced in the 20th century. One reference he cites is even less optimistic. Robert J. Gordon, economics professor at Northwestern University forecasts a 0.2 percent growth of real disposable income for the majority of the U.S. population over the next 25 to 40 years. He names four “headwinds” contributing to this self-described

“gloomy forecast”: demographic shifts, educational attainment, increasing inequality, and the ratio of debt to GDP at all levels (Gordon, 2012; 2014). This projection does not include resource constraints.

“Rogue” or “heterodox” economists who recognize the validity of biophysical constraints (limits to growth) include E.F. Schumacher (1973), Nicholas Georgescu-Roegen (Gowdy and Mesner, 1998), Herman Daly (Daly & Cobb, 1994), and Peter Pogany (2006). Taking a thermodynamics perspective on economic growth, Pogany argues that entropy applies to matter, not just to energy. Therefore eternal substitution and recycling among materials is an illusion in a closed system (with regards to matter) such as our terrestrial sphere of earth and atmosphere. Technology cannot, in the end, overcome entropy, which means that the Pulse of Growth ultimately hits a peak, based on the availability of quality resources not yet dissipated.

In principle, they could replace copper wires with carbon polymers and make gold from scraps of copper, but in practice they could not do it if they had to pick through the ofals of low-entropy substance in search of other material inputs...between “can be done economically” and “cannot be done physically” there is a tipping point: “Can be done physically but not economically” (Pogany, 2006, p. 123).

Of course there are many economists who strongly dispute the voices above; but more and more are questioning the status quo, with some arguing that we need to embrace a “degrowth” alternative (Caradonna, et al., 2015). Certainly there is reason to pause and to question the idea of infinite economic growth on a finite planet. This is one more “myth of the given” that should not be taken for granted. Edgar Morin referred to “development” as:

The master word...upon which all the popular ideologies of the second half of this century converged...development is a reductionistic conception which holds that economic growth is the necessary and sufficient condition for all social, psychological, and moral developments. This techno-economic conception ignores the human problems

of identity, community, solidarity, and culture... In any case, we must reject the underdeveloped concept of development that made techno-industrial growth the panacea of all anthroposocial development and renounce the mythological idea of an irresistible progress extending to infinity (Morin, 1999, pp. 59-63).

Addressing this “myth of the given,” Pogany pokes fun at his own profession:

Historically, geocapital [matter ready to be used to feed cultural evolution] has registered a net increase; additions and expansions more than offset exhaustions and reductions. This long-lasting successful experience led to the culturally ingrained confidence in the possibility of its eternal continuation. Economic growth theory keeps “deriving” the same conclusion over and over again: Optimally maintained economic expansion can continue forever. Translated from evolutionary scales to our own, this is analogous to “Since I wake up every morning I must be immortal” (2006, p. 118).

Fixation on Evolution and Growth

Considering the cultural environment in which we are embedded, it is not surprising to find these long held beliefs about eternal growth and progress bleeding over into the integral community. Within this community there has been a discussion in recent years about the tendency to fixate on evolution and its association with the idea of linear progress and development (i.e. growth). The integral movement often puts a great degree of attention on the importance of pushing ourselves and others to move up the ladder of developmental levels.

Although this kind of development is not equivalent to physical or economic growth, there may be a connection between the two that are embedded in our deep cultural conditioning. This discussion is also relevant to this paper in that the integral message tends to belie a confidence and possibly unwarranted optimism that the world is on an inevitable linear growth trajectory toward an integral age that is able to escape collapse and cataclysm (Malkinson, 2015).

Susanne Cook-Greuter has expressed concern about “the current integral evolutionary assertion which equates the evolution of the universe with the evolution of consciousness as a

linear, predictable and certain process,” especially in light of the many uncertain processes at work in our universe (Cook-Greuter, 2013, p. 1). She notes the cultural influence inherent in this “linear, upward and onward message.”

It is not an entirely uncommon critique; Jeremy Johnson posted a video commentary asking, “Does Development or Progress Exist in Evolution” (2012)? Johnson’s post then inspired an article by Chris Dierkes (2012) which, in turn, generated an array of comments that on the whole shared the concern about an over-emphasis on evolution, growth, and development.¹¹

In addition, Zack Stein has pointed out the problems associated with viewing the concept of *Integral* as being “deeply entwined with the *growth-to-goodness* assumptions... The term is about certain possible and preferable developmental outcomes, not about developmental outcomes that are necessarily probable, likely, or inevitable” (Stein, 2010, p. 6).

It is not the intention here to deny the important contributions made by those who have given attention to growth, development, and evolution. Rather it is an attempt to bring these ideas into balance by emphasizing some of the pitfalls of such approaches, and by emphasizing some of the statements made by integral theorists where recognition is given to possibilities such as contraction, regression, and collapse. We also want to bring emphasis to a wider variety of meta-types that are enacted by the PatternDynamics™ model (Winton, 2010a).

Can we consider decreasing our emphasis on the more masculine *growth-to-goodness* idea with its emphasis on height and depth, and instead fully embrace the more feminine concept of span (Winton, 2010a)? Can we begin to see Integral not as a level to grow into, but rather as an expanse to fall into (V. Fisher comment in Dierkes, 2012)¹² – a letting go, a sinking into being, a spreading out, a coming down to a safe and fertile valley (Holmgren, 2002)?

Jean Gebser did not frame his structures of consciousness (Archaic, Magic, Mythic, Mental, Integral) as “progress” (Gebser, 1985, p. 130) or “evolution” (p. 142). Rather, each structure comes to a point of exhaustion, which then makes possible a mutation from which the next structure emerges:

This will perhaps emphasize again why we have disavowed the concept of evolution and prefer instead to speak of mutations...No new structure preceeds from an exhausted one, but a mutation can readily spring forth from the originary presence of the whole (Gebser, 1985, p. 142).

The future Integral epoch is seen not as an inevitable outcome nor as a product of our linear growth, but as an optimal possible scenario that might emerge *after* some serious series of contractions (Pogany, 2006, 2013b). Perhaps an *Empathic Civilization* (Rifkin, 2009) will only become viable as an expression of the ***Enantiadromia*** Pattern (Winton, 2012a) - an extreme response to extreme difficulties. Rather than an achievement that humanity slowly evolves into, it might instead be a bifurcated mutational emergence that blesses us as we humbly fall into a simplicity that “embraces and befriends” (Varey, 2013) the lost parts of ourselves - our mythic, magic, and archaic selves rediscovered as our ever present origin (Gebser, 1985).



Returning once again to the PD Matrix Chart in **Appendix B**, we scan for additional Patterns that might help further our discussion. What comes to my attention is the foundational importance of all of the ***Polarity*** Patterns. Polarity is about the interplay of seeming opposites (Winton, 2012b). It is about any *seeming* pair of opposites that are really poles of a single continuum (ibid), not a dualism of actual opposites. It is all too easy to become engaged in

either/or thinking on issues that cry out for both/and understanding. Rather than simply choosing sides, we can instead find the appropriate balance for the context and situation. That balance is not fixed and static, but constantly shifts in an ongoing process of inquiry.¹³

The use of polarities in PD is consistent with Edgar Morin's "*Method*, a kind of 'active inquiry', which takes as its central and foundational rationale the refusal to be pinned down in dualistic thought" (Winton, 2013b, p. 16). Drawing from Taoism, Morin refers to the process as a *dialogical* relationship between polarities. It is not *dialectical* because there is no guarantee of synthesis or resolution (Montuori, 2004). "Morin has set us on this path by focusing ... on the *dynamics* and *patterns* that manifest as the organization of complexity itself" (Winton, 2013b).

The **Expand/Contract** polarity is especially relevant. Winton comments that "Expand/Contract demonstrates the relationship and interplay between the growth phase and the decline phase of any repeated activity or process" (2012a). According to Vipassana teacher Shinzen Young, expansion and contraction are two fundamental forces of the universe (1997). This is a big claim, which will be explored in more depth in a future paper.

Here we note the similarity with the Pulse Pattern, but recognize the Pulse primarily emphasizes movement in time, whereas Expand/Contract tends to emphasize a polarity in space.

Examples of this Pattern are the exercising of muscles, our breathing process, and life and death itself. When we see this Pattern at work in all processes, in all systems, it becomes easier to recognize the coming energy decline, or even the decline of civilization itself as an entirely natural process that at some point will become inevitable. Whether that's in 1, 5, or 100 years, it will at some point occur.

Whether we will personally experience that crisis or not, there is one expansion and contraction we will all experience. We are all born, and we all will die.¹⁴ We are born, we grow, we decline, and we pass away – some sooner than others, but all of us without exception. As George Harrison sang, “All Things Must Pass” (Harrison, 1970; Gellert, 2008).

Shinzen Young, following the lead of his teacher Joshu Sasaki Roshi, asks the question, “What are you gonna do when the earthquake comes” (Young, 1997)? In light of the recent devastating series of earthquakes in Nepal, this is an especially poignant question. We may or may not personally experience a literal earthquake. We may or may not personally experience the dire consequences of ecological overshoot. Nevertheless, at some point some kind of tragedy strikes us all. How are we preparing ourselves for that inevitable time, physically, mentally, psychologically, spiritually? One place to start, as Young teaches, is to understand the nature of impermanence, which he understands to be the underlying vibratory (pulsing) nature of all things – expansion and contraction on many scales.¹⁵

The Order/Chaos Polarity

It appears ever more likely that Jean Gebser was correct in his assessment that,

The crisis of our times...appears headed toward an event which, in our view, can only be described as a ‘global catastrophe.’ ...if we do not overcome the crisis it will overcome us; and only someone who has overcome himself is truly able to overcome. Either we will be disintegrated and dispersed, or we must resolve and effect integrality (Gebser, 1985, p. xxvii).

As we saw earlier, Gebser did not expect the crisis to be averted by a seamless transition, but rather that the crisis itself could possibly enact a mutation (roughly equivalent to what PD refers to as the **Bifurcation** Pattern) - that out of the crisis an integral epoch might emerge – “Mutation as a process must be macromutation through chaotic transition” (ibid, p. 530).

The ***Order/Chaos*** Pattern informs us here. Winton describes the principle behind this Pattern as “creative breakdown.” Breakdown and irregularity “allow the rearrangement of previously fixed elements into new, more appropriate forms. The role of Order/Chaos is to facilitate adaptation and evolution” (Winton, 2012a).

We tend to see Order as a very positive thing, but neglect to notice that the more order created, the more restricted the form becomes. We also tend to think of Chaos as very negative, and neglect to notice the positive role it can play in creating opportunities for new, more creative ways of ordering things. H.T. Odum put the term “chaos” in perspective:

Chaos in the mathematical sense is the property of large pulsing flows passing through small storages so that one pulse shoves the storage very high—which causes the outflow to be very large so that in the next interval of time the storage jumps to very low. Chaos in this sense really has nothing to do with disorder. Mathematical chaos produces exactly the same result each time you run it; it just looks random (personal communication from Mary Odum, April 30, 2015, quoting her father from a 1995 personal communication).¹⁶

Or, as the writer José Saramago (2003) put it, “Chaos is order yet undeciphered.”

In the era of fossil fuel Resource abundance, western industrial society has built an incredible amount of Order. However, in the age of energy descent, this ordered society will be very poorly adapted to the new realities of greatly limited resources and to dealing with the wastes of the old regime. We will likely face a much higher degree of Chaos than we are used to as the old system comes apart. The good news is that this Chaos could represent opportunities for transformation that were previously out of reach - if we have enough awareness to respond in appropriate and life affirming ways (Gebser, 1985; Odum & Odum, 2001; Holmgren, 2002; Heinberg, 2004; Pogany, 2006; Homer-Dixon, 2006; Dowd, 2007; Hopkins, 2008).

Ken Wilber, in conversation with environmentalist Hunter Lovins (2003), stated,

I kind of see a series of not total doomsday, but a really unpleasant decade of turning up the heat – possibly literally - ...

Things never change out of foresight and wisdom, it's just too rare. It's usually after the fact, then there's a catastrophe, and you put something in place, and you hope to hell that you correct it the best you can. So I sometimes think that an almost sane approach to environmental concerns is to try to manage catastrophe in bite size chunks, because you're not going to stop it, it doesn't appear (Wilber & Lovins, 2003).

Peter Pogany felt that a “historical crisis of epic proportions” is on its way, and it might be considered as an opportunity for Gebser’s integral a-rational consciousness structure to finally overcome the current deficient phase of the mental-rational consciousness structure from its place of dominance (Pogany, 2013a). Pogany then outlines the parameters of Gebser’s integral a-rational consciousness. We may see a shift in the expression of the ***Competition/Cooperation*** polarity Pattern, moving from the current emphasis heavily weighted toward competition, to a greater emphasis on cooperation, integrative open-mindedness, and altruism.¹⁷

It may be unlikely that we are able to avert the crises, but the possibility always exists for transforming our own lives, working to prepare ourselves *and* to take steps to have a positive impact on the world.

The answer will be an integral answer only if we have approached the integral in ourselves (Gebser, 1985, p. 141).

This is no time to drop out, give in, or give up. It is a time to engage in Reflection (Winton, 2012c): to work on ourselves; to develop the inner spiritual resources that will assist us in handling whatever comes our way. It is also a time for Action (ibid): to develop the practical skills needed for energy descent. To develop the inter-personal skills necessary for working in difficult situations with other people. Finally, to participate in the development of the best

techno-economic infrastructure for self, culture, and nature, locally and globally, based on a realistic estimate of available energy. For a brief review of ways to engage in the

Masculine/Feminine polarity of Action and Reflection, please see **Appendix D**.

Is the task at hand achievable? Can the worst of climate change be averted before mankind is annihilated? Can a complete meltdown of mutual self-destruction be averted if we experience a long term world-wide economic collapse accompanied by wide-spread environmental devastation? Those may be the wrong questions to ask. As David Holmgren (2009, p. 115) reminds us, “It is not the project but the living process that will be the measure of our actions.”

Edgar Morin’s wisdom is appropriate here, applying his polarity oriented “dialogical” approach (see page 19 above):

All the great transformations or creations have been unthinkable until they come to pass...All the happy events of history have always been a priori impossible...[but this gives] no assurance. Life may accidentally meet death. The unthinkable will not necessarily come to pass. The improbable is not necessarily felicitous. The mole may destroy what ought to have been preserved. Rescue may be unequal to the peril. The adventure remains unknown. The Planetary Era may possibly come to naught before it has even begun to bloom. Perhaps humankind’s struggles may lead only to death and ruin. However, the worst is not yet certain, and the game is not yet over. In the absence of any certainty or even probability, there is the possibility of a better world. The task is huge and unassured. We cannot eschew either hope or despair. Both holding of and resignation from office seem equally impossible. We must have a ‘passionate patience.’ We stand on the threshold, not of the last, but of the early stages of the battle (Morin, 1999, pp. 148-149).

Conclusion

In this paper we have used some of the Patterns that PatternDynamics has identified as existing in all natural systems as principles for discussing the issues related to energy descent,

and I believe they have proved themselves to be very useful. We have only scratched the surface, and there are many more Patterns that might be examined in future papers to further clarify the principles of energy descent and how we might discuss them to collaboratively design more effective pathways in our journey of transition to a life of greater resilience (see **Appendix D**).

We discussed the important role of *Energy* and how it flows through all systems. We saw the *Pulse* Pattern as a natural phenomena that helps explain the concept of peak oil, with the wave/pulse of human history as a second example of an energy pulse. Concerns about *Growth* and development were shared, and we then examined a number of *Polarity* Patterns, which emphasize both/and thinking rather than either/or. We faced the issue that we might be coming to a time of more crisis and chaos before the next structure of consciousness emerges.

Future papers might further examine the deeper implications of the *Expand/Contract* and *Order/Chaos* polarities¹⁸, how *Competition/Cooperation* might play out in a world with less energy, and how various Patterns of *Structure, Exchange, Creativity, Adaptation* and *Dynamics* could greatly assist us as we adapt to new realities. For hints, see Montuori (1999; 2015).

What can we do now? Whatever the future holds (Holmgren, 2009), it behooves us to consider carefully the energy available to us, and how we can use it most ethically (Griffin, 2015). We can drastically reduce our use of fossil fuel energy, slow down, simplify (Elgin, 1993; Andrews, 1998), and drop into our bodies and this present moment. With very refined awareness, we can learn to better utilize each bit of energy we carry and have available to us (including our subtle energies), and to be very judicious with how we allocate this very precious resource (Wieman, 1929; Eden, 2008; Wilber, 2012). We can also put the time in now to cultivate the inner spiritual resources that will assist us in dealing with whatever comes our way (Young, 1997; Chodrin, 1997; Harvey, 2009). What are you gonna do when the earthquake comes?

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Endnotes:

¹ Holmgren (2009) points out that the common understanding of the word “collapse” is as a very rapid and complete unraveling. When ecological historians use the term, the scenarios are more varied and nuanced, and can take place rapidly (Catton, 1980), or gradually over a long span of time (Tainter, 1988; Diamond, 2005). Therefore “collapse” is often not the most useful term.

² Howard and Elizabeth Odum use a similar illustration: “Like a giant train, the world economy is slowly cresting its trip up the mountain of growth. It may be ready soon for its long trip down... The reason for descent is that the available resources on Earth are decreasing... It is a recognition that general systems principles of energy, matter, and information are operating to force society into a different stage in a long-range cycle” (Odum & Odum, 2001, pp. 3-4).

³ Rob Hopkins, co-initiator of the Transition Towns movement, has also adopted the Energy Descent model (2006; 2008), but he turns the story upside down. Rather than a mountain, the fossil fuel age is seen as “a fetid lagoon into which we have dived.” When we find ourselves hitting the bottom of this thick, black, and sticky liquid, we become desperate to fill our lungs with fresh, clean, air, and we propel ourselves upward in an “instinctive rush to mass self-preservation, a collective abandonment of a way of living that no longer makes us happy...” (Hopkins, 2008, p. 93). Other writers share similar “energy descent” perspectives, but have used different terms, such as *The Long Descent* (Greer, 2008), *The Long Emergency* (Kunstler, 2005), *Power Down* (Heinberg, 2004), and *Plan C* (Murphy, 2008).

⁴ With some similarities to PD’s use of symbols, Odum’s energy systems language could also be considered a pattern language (Alexander, 1977). S. Maud and D. Cevolatti (2003) offer a fascinating comparison of Odum’s system language to Leibniz’s *Characteristica Universalis*, and contend that “H.T. Odum’s work is worthy of far greater historical profundity and philosophical respect than many may have previously imagined.”

⁵ Odum proposed that his Maximum Power Principle (MPP) be considered as the 4th law of thermodynamics (Odum and Odum, 2001). In his ITC 2013 paper on *The Meaning of Planetary Civilization*, Winton argued that this MPP be considered a final cause in the Aristotelian formation. In a future paper I intend to argue that the MPP *and* the Maximum Entropy Production Principle (MEPP), connected with the 2nd law of thermodynamics, be considered together as a final cause, as expressed in the Polarity Patterns of Expansion/Contraction, Concentration/Diffusion, and Order/Chaos. Recognition of such a final cause might help us accept and adapt to a world in energy descent, if we’re able to overcome the challenges associated with final cause arguments (Freeman, 1969).

⁶ Odum connected the dots between *Energy, Ecology, and Economy* in a clearly articulated and integrated formulation for the Royal Swedish Academy in 1973, and reprinted in 1974 by Mother Earth News (Odum, 1973). Clearly a very important integral approach to the related issues in each of these fields.

⁷ Rob Hopkins noticed in 2004, when he first became aware of “peak oil,” that almost all of the attention at that time was being given to the peak – when it might occur, and how it might manifest – and almost no-one seemed to be looking at the downslope and how to prepare for it or respond to it. Hence his interest in “energy descent” over “peak oil,” and the birth of the Transition Towns movement. (Hopkins, 2008).

⁸ Coincidentally, 2015 was also the year chosen by Meadows, et al in the original 1972 *Limits to Growth* report as when to expect a downturn in their “business as usual” scenario. *Limits to Growth* (Meadows, et al., 2004) did not discuss peak oil in particular, but was looking at when depletable resources in general might come up against the limits of the earth’s ability to absorb emissions and put us into overshoot.

⁹ Odum (2007) defined ‘emergy’ (spelled with an *m*) as the available energy previously used in making a product or service, expressed in units of one type of energy. He described it as “energy memory.” S. Maud (2005) described emergy as “a quantitative theory of qualitative value.”

¹⁰ Herbert Stein was Chairman of the Council of Economic Advisers under Richard Nixon and Gerald Ford. According to Wikipedia, his “law” was expressed in various formulations, including “If something cannot go on forever, it will stop,” and “Trends that can't continue, won't” (“Herbert Stein”, n.d.).

¹¹ It was that exchange of comments, which, in part, inspired the writing of this paper.

¹² “Gebser argued that time radically changed at the integral level, and past and present all became transparent and available in the now. This is why the constant emphasis on transcendence and needing to push people to integral never really resonated with me. Energetically, I feel much more of a falling quality~ falling into transparency and beauty with all that is and being able to access multiple-streams of intelligence and knowing all at once.” – Vanessa Fisher, in a comment on Dierkes’ (2012) post at Beams and Struts.

¹³ “I see polarities as processes of change and active inquiry. It is not the goal to find a fixed state of integration or balance between opposites. The goal is to become adept at working with polarities in their processes of change according to the needs of a given context” (Angela MacLeod, personal communication, May 29, 2015).

¹⁴ In *Thank God for Evolution!* Michael Dowd explores “the gifts of death,” giving examples of how “death is natural and generative at every level of reality,” and “no less sacred than life.” He writes, “...our commonsense understanding of ecology has most of us convinced that even God could not have designed a functional world in which birth is allowed but death is banished” (Dowd, 2007, p. 86).

¹⁵ Wilber also emphasizes the nature of expansion/contraction as an aspect of impermanence in *The Spectrum of Consciousness*, where he writes of consciousness as a form of energy rising through the spectrums, and then disintegrating back to the void (Wilber, 1993). See also Wilber (2000, p. 11).

¹⁶ I like this description for its plain language and how it distinguishes ‘chaos’ from ‘disorder.’ Although modern chaos theory includes this idea of bifurcations at energy flow thresholds (T. Winton, private communication, May 27, 2015), a more standard definition from chaos theory would speak of chaotic systems being those with “sensitive dependence on initial conditions” (Garvin H. Boyle, private communication, May 26, 2015).

¹⁷ In ecosystems with limited energy, we see large amounts of symbiotic and cooperative relationships. When there's less to fight over, we may learn that it's not worth fighting. Strategies that people have seen as idealistic or utopian are actually just effective survival strategies for any ecosystem with limited energy (Odum, 2001; Holmgren, 2002). See Judith (2013) and Logan (2013) for hopeful scenarios based on love.

¹⁸ See endnote #1.

Appendix A: PatternDynamics™

PatternDynamics (PD) is an integral sustainability pattern language and systems thinking tool developed by Tim Winton (2010a). In an incredibly complex universe, we are challenged with how to organize our thoughts about it in a way that makes useful sense – enough distinctions that are meaningful, but no more complicated than is necessary. The goal is to find, as Wilber said (echoing Bateson), “the patterns that connect” (Wilber, 1995; Bateson, 1979), and perhaps to find the proverbial “simplicity that lies on the other side of complexity” as Oliver Wendell Holmes put it.

The idea is to combine patterns found in all natural systems into a language reflecting high level principles useful for addressing the complex challenges that human systems are now facing (MacLeod, 2013a, Winton, 2014).

The Patterns in PD can also be viewed as a set of meta-types. A typology is a very general set of patterns, and meta-types are very foundational patterns that are manifested everywhere you go in the cosmos. Winton calls them “enacted patterns of semiotic process” (Winton, 2010a).

In PD, the Pattern *Source* is seen as the primary meta-type, “signifying the original meta-type or dynamic pattern of the Kosmos... Another way of saying this is that the first and deepest organizing principle at work in the Kosmos is that the Kosmos self-organizes and evolves” (Winton, 2010a, p. 24).

The remaining meta-types of PD, first-order and second-order Patterns can all be considered aspects of Source. In practical terms, Source can be considered the origin of any system's identity and purpose (Winton, 2012b). We give attention to the second order Patterns with an intent to balance and integrate them for the purpose of health and endurance. The focus is very much on horizontal health, in contrast to the evolutionary depth that is often the case when employing the AQAL/integral framework (MacLeod, Malkinson, Aurami, & Hamilton, 2013d).

For the ideal "integral impacts," the best way to utilize PD is as a language - a collaborative systems thinking tool to facilitate collective intelligence. The better conversations engendered by this process helps us take systems related concepts from the Lower Right quadrant and shift them into the Lower Left quadrant by making them meaningful in our cultural contexts (ibid; Winton, 2010a; Aurami, Johnson & Suutari, 2014).

In this paper, the intention is to use the Patterns to guide my consideration of issues related to energy descent and as a tool to assist in communicating these issues to readers. Ideally this will inspire future collaborative exploration using PatternDynamics, leading to increasingly impactful outcomes.

A more complete introduction to PatternDynamics can be found at <http://patterndynamics.net/>.

Links to websites and articles about PD can be found at:

<https://integralpermaculture.wordpress.com/patterndynamics/>.

Appendix B: The Patterns

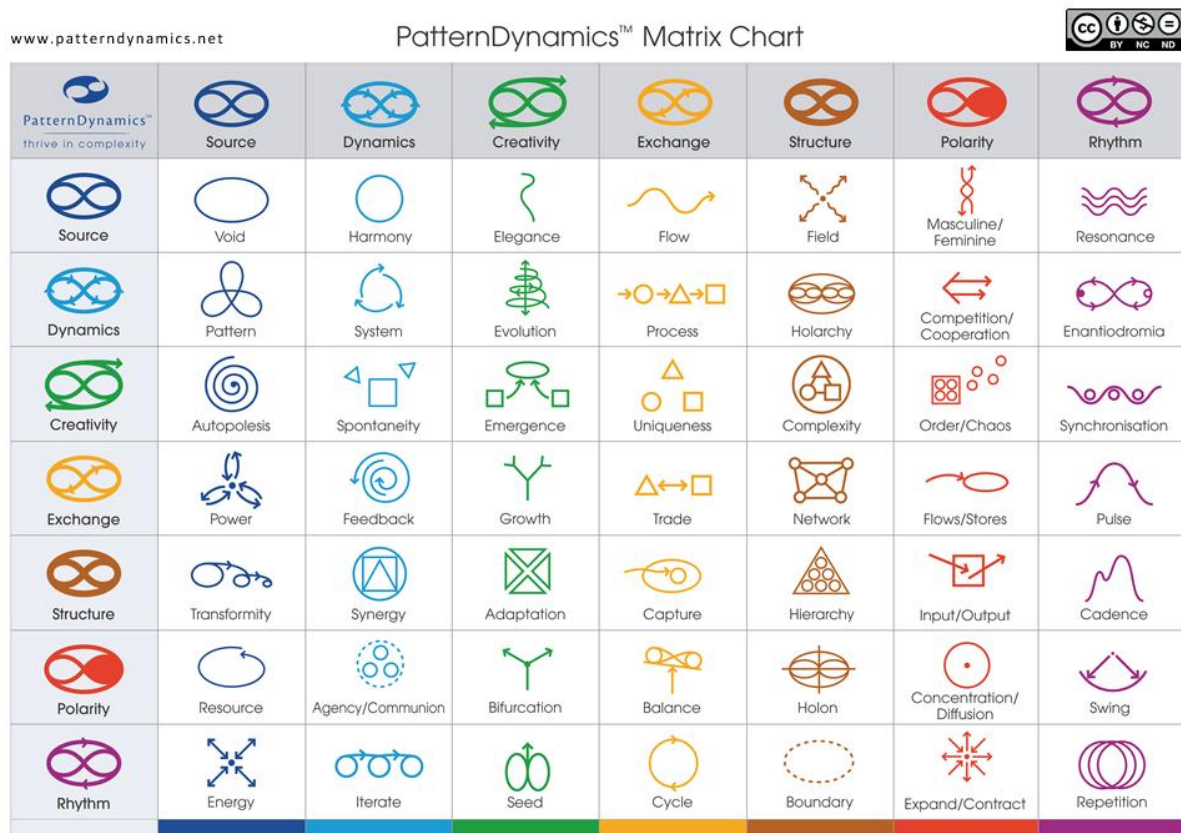


Figure 3: The PatternDynamics Matrix Chart from <http://patterndynamics.net>

Looking holistically at all of the Patterns as we consider which ones stand out as needing more attention, with a goal to more effectively impact the most pressing challenges faced by the world.

Although it would likely be very helpful to go through all of the Patterns in consideration of an issue of concern, it is often more practical to scan the chart and sense into which Patterns really stand out as being unbalanced or needing more attention, and to begin there (Winton, 2010b).

Appendix C: The Pulse of Peak Oil

The “fossil fuel” we know as oil was made possible when, ninety to one hundred-fifty million years ago, algae and other organic material was buried and preserved in a warming environment. When all of the right materials and conditions were present, a very long process ensued to develop eventually into a highly concentrated form of energy (Campbell, 2015). The first commercial oil well was drilled in 1859 by “Colonel” Edwin Drake in Pennsylvania.

As Bruges (2004) pointed out, the fossil fuels that took millions of years to develop are now about half gone, after first tapping this resource merely 150 years ago – just a pulse in time.

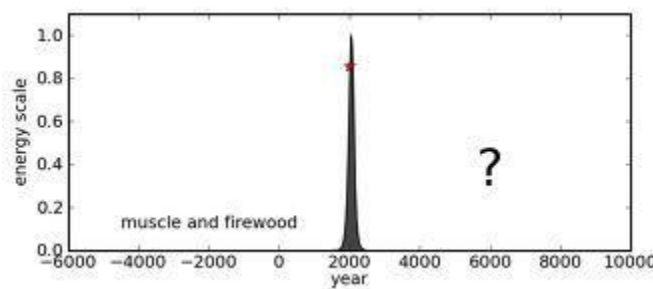


Figure 4, source: <http://physics.ucsd.edu/do-the-math/2011/10/sustainable-means-bunkty-to-me/>

The concept of an oil peak began when geophysicist M. King Hubbert presented a paper to the American Petroleum Institute (1956) sharing his findings that oil production and decline tended to follow a bell shaped curve – our pattern of the Pulse. He argued that this was the case for individual wells, fields, regions, nations, and the world. Hubbert accurately predicted that the U.S. lower 48 would peak in conventional oil production around 1970, and that the world peak would likely occur approximately 50 years from the date of publication, hence circa 2006. In the 2010 World Energy Outlook report, the International Energy Agency stated that *conventional* oil did peak in 2006 (MacLeod, 2014). Hubbert did not have data about *unconventional* oil at the

time (tar sands, oil shale, gas to liquids, deep water drilling, etc.), but he did say in 1976 that activities of OPEC might delay the world peak by about 10 years (Brown and Khebab, 2006).

In a seminal 1998 article for Scientific American, geologists Colin Campbell and Jean Laherrère also expected a peak of conventional oil with the first decade of the 21st century, but noted that a radical increase in prices might lead to a steep recession that would in turn curb demand and flatten production for another ten years. This forecast matches reality pretty well. Oil prices reached a high of \$147/barrel in 2008, and a number of economists have made a strong connection between these high oil prices and the Great Recession that followed (Hamilton, 2009; Rubin, 2009). Oil prices subsequently came down, and production has been essentially flat, or on the plateau, since 2005. More recently, production has ticked up a bit, thanks to the addition of what are considered unconventional liquid fuels, including tar sands, shale oil, ultra-deepwater drilling, etc. (Nikiforuk, 2008). Is peak oil, therefore dead? No. (MacLeod, 2015a; Heinberg, 2013; Hughes, 2014; 2015; Mobbs, 2015).

Taking into account these unconventional oil sources, Campbell and Laherrère forecasted a peak of all liquid fuels to occur around 2015, which is the same year chosen by Meadows, et al in the original 1972 *Limits to Growth* report (Meadows, et al., 2004) for when to expect a downturn in their “business as usual” scenario. *Limits to Growth* did not discuss peak oil in particular, but was looking at when depletable resources in general might come up against the limits of the earth’s ability to absorb emissions and put us into overshoot.

Getting the timing exactly right is not the point (and in fact can often be a distraction). However, the fact that this paper is being written in the middle of 2015 should remind us that we are very late in the game in considering these issues. Good scenario planning and modeling can

be very useful, though exactly accurate date forecasting is more often than not a happy accident if it occurs. There are too many variables to insure that kind of accuracy.

There is much credible evidence indicating that we are now about halfway through that pulse of oil. The first half was the cheap, easy, high quality oil; the second half is increasingly difficult to extract, expensive, and of lower quality (Heinberg, 2004; Hopkins, 2008).

In a well received presentation at the Integral European Conference in 2014 (Best Academic Paper Award), Kristian Stålne and Svein Horn's (2014) paper on *An Integral Perspective on Peak Oil and an Energy Perspective on Integral Theory* laid out an excellent summary in support of the expectation of a near term oil peak, and framed the issue as "the challenge that is probably most central and also most urgent to our societies." In addition they pondered why the role of energy has not been emphasized in integral circles. They write,

As demonstrated in this paper we cannot ignore the fundamental significance of energy to our journey from less to more complex societies and individuals. From this perspective, increasing complexity comes with a cost; it needs an input of energy to be developed and maintained. And this we feel is a blind spot of the AQAL theory. Using an evolutionary impulse as a main explanation and driving force for evolution may prevent us from acknowledging several dangers ahead. With an added energy and resource perspective we may not even need to postulate an evolutionary impulse, and we can start to consider other possible directions for our societies, including acknowledging other perspectives, such as a collapse perspective, even though it may seem unthinkable to some (ibid, p. 9).

Peak oil is a reality "imposed by nature," as Colin Campbell has put it (Prestegard, 2005); the debate is around when it will occur, what will be its cause, and what effects will result. Among other sources, a survey of the last 10 years of World Energy Outlook reports from the International Energy Agency (MacLeod, 2014) leads me to believe that we will be moving off of

the “undulating plateau” of the peak any time between now and 2020, beginning the downward slope of energy descent. Keep in mind that the Hirsch Report for the U.S. Dept. of Energy (2005) warned that a 10 to 20 year period of focused preparation before the peak would be needed to ensure a smooth transition away from the dependency our economy currently has on oil. We no longer have that luxury of time, and will need to adapt quickly to big changes. Alternative sources of energy are not easily substitutable for oil, and there are many additional challenges associated with all current alternatives. One primary concern is the *Energy Return on Investment* (EROI), where we see dramatically lower returns for non-fossil energies (Hall, 2013). Since it takes energy to get energy, EROI evaluates systems for net energy gains (or losses).

Civilization requires a substantial energy return on investment. ...A big problem we have facing the alternatives is they're all so low EROI. We'd all like to go toward renewable fuels, but it's not going to be easy at all. And it may be impossible. We may not be able to sustain our civilization on these alternative fuels. I hope we can, but we've got to deal with it realistically (C.A.S. Hall, quoted by Inman, 2013).

Ted Trainer summed it up: “Renewable energy cannot sustain a consumer society” (2007). For a review of the current and possible alternatives, see Heinberg’s essay *Our Renewable Future* (2015a), and be sure to follow all of the links.

Due to peak oil, we can probably forget about continued economic growth. Our food systems will become relocalized and will have to be less dependent on petrochemicals. We will have less mobility and will need to reduce our trade dependencies (Rubin, 2009). We will need to fundamentally redesign the way we live our lives (Murphy, 2008). Holmgren (1994) urges us to Refuse, Reduce, Reuse, Repair, Recycle (in that order), and to design, build, and purchase for durability and repairability.

Appendix D: Actions and Reflections

We will here explore a brief list of recommended practical Actions and Reflections (Winton, 2012c), in the context of the *Masculine/Feminine* Polarity Pattern.

The Masculine/Feminine Pattern is about the polarity between individual agentic behavior and inclusive communal patterns (Winton, 2012b).

What is decisive for us is to “know” in any given instance where and how to act passively, where and how to make things happen or let things happen to us...Everything hinges on this knowledge of letting-happen and making-happen (Gebser, 1985, p. 138).

Can we rely on it that a ‘turning around’ will be accomplished by enough people quickly enough to save the modern world? This question is often asked, but whatever answer is given to it will mislead. The answer “yes” would lead to complacency; the answer “no” to despair. It is desirable to leave these perplexities behind us and get down to work (Schumacher, 1977).

In a time of less available Resources, it can be expected that many changes and adaptations will need to take place, requiring both good decision making and timely action and implementation. We will need to become more adept at knowing when it’s time to slow down and think things through to achieve consensus, and when it will be important to make quick decisions and take decisive action.

Winton describes this Polarity as both storage and release of potential. Energy is released when the Resources stored in this Polarity come into appropriate balance. We need to find a good rhythm of interplay between agentic action and communal reflection (Winton, 2012c).

Actions

There are numerous options for energy descent action already underway and which I believe are compatible with integral approaches - we don’t necessarily have to reinvent an integral wheel. Listed here are just a few:

The Permaculture Movement: David Holmgren, co-initiator of Permaculture has closely followed H.T. Odum's work throughout his career. Permaculture is built on the foundation laid by Odum, especially in regards to energy descent and the pulsing paradigm.

Widely misconceived as merely a set of organic and holistic gardening techniques, Holmgren explains Permaculture as “the use of systems thinking and design principles” to provide an organizing framework that utilizes the patterns and relationships found in nature to provide food, fiber and energy for local needs. The emphasis is on principles and patterns rather than specific techniques, both because different practices work in different locations and contexts, and because we should not expect conditions to remain static. Noting the “continuous change” aspect of the last two-hundred years of ascent up to the fossil fuel peak, Holmgren comments that we'll need to retain our familiarity with change on the downslope as we continue to adapt to the changing conditions brought about by energy descent and climate change (Holmgren, 2002).

One of the advantages of Permaculture is that it is bottoms-up grassroots oriented, and therefore can be applied at any scale, from the backyard to local community projects, to making contributions to national or international policies. No permission is needed to get started.

Transition Initiatives: Transition (popularly known as *Transition Towns*), was born out of a Permaculture class in Ireland, formed a network in Great Britain, and, after publication of the *Transition Handbook* (Hopkins, 2008), spread across the world. Beginning as an application of “social permaculture,” each Transition Initiative is autonomous and grassroots, but recognizable with common themes, such as “using head, heart, and hands to tackle climate change, peak oil,

and economic instability.” Eschewing the usual approach of environmental activism to focus on protesting against what they don’t like, Transition Initiatives focus on positive actions individuals and community members can take together to make a difference. Projects undertaken vary widely, but some examples include creating community gardens, establishing local currencies, “reskilling” with lower-tech tools and processes, and working on local Energy Descent Action Plans.

Resilience Circles: Formerly known as Common Security Clubs, these are small groups of people who meet together to explore study guides on issues of resilience and mutual aid. In the process they build relationships with one another and often take on community action projects.

P2P, The Commons, The Maker Culture, Shareable, and Local Living Economies: Recognizing the need to “rebuild the Commons,” people such as Michel Bauwens, Jeremy Rifkin, David Bollier, and David Korten are among those spearheading or championing some of these movements, along with a large network of people inspired to become involved in their communities in more direct and productive ways.

Reflections

Permaculture is known for people who like to get their “hands in the dirt” and are action oriented. However, the movement wisely includes space for inner work and reflection (often referred to as “zone zero” or “people care”) (Macnamara, 2012). Transition Initiatives also makes explicit the need for “Inner Transition” or “Heart & Soul” groups. Resilience Circles can also meet some of the needs for inner work, when these small groups are able to create trust and become able to open up to one another and connect on deeper levels.

However, the reality often experienced in these organizations in the arena of exploring inner reflection is the discovery that many of us are extremely unskilled in inner work and in processes of working cooperatively and effectively in small groups.

There is a small, but growing network of people who are working to bring a higher level of “people care” and “zone zero” work into Permaculture and Transition Initiatives by incorporating an *Integral Permaculture* approach (MacLeod, 2015b; 2015c; Strega, n.d.). Join the community here: <https://groups.google.com/forum/#!forum/integral-permaculture>.

Svein Horn recommends a similar integral approach – “A Tetra-Transition Away from Fossil Fuels” (2013); Gary Stamper offers an integrally informed approach to “collapsing into consciousness” (2015); T. Collins Logan, of Integral Lifework, offers “multi-dialectical processing” (2014) as a tool for managing complexity; and M. Hamilton offers Integral City.

To conclude this brief and incomplete survey, we must, of course, include PatternDynamics, which is designed for maximum integral impact on self, culture, and nature, and built on a process of reflection and action. Visit <http://patterndynamics.net/> for more info and to download the free workbook (Winton, 2012b), and visit the PD Community of Practice portal at <http://patterndynamics.com.au/>. For a convenient one stop shop with all the links to the various PD sites and articles, go to <https://integralpermaculture.wordpress.com/patterndynamics/>.

The most important thing somebody can do is actually take in at a deep emotional, physical, and body level, the better and better and worse and worse, and allow the better and better and worse and worse to speak to them in such a way that they feel inspired to take a step towards whatever their solutions are.... If you can actually live with the conditions of our time, it activates an inspired commitment to be where the tide is turning. ... You know we're not spectators in this world. The tide is turning for better or worse through us in every moment ... the only strategy is to be in the middle of it. Sensitized; open mind, open heart. ... Being open emotionally, intellectually, physically, and engaged with the sense that we are in a process of turning the tide (Robin, 2006).