Mapping Archetype Scenarios across the Three Horizons [preprint]

Abstract: The purpose of this paper is to suggest that mapping of archetype scenarios onto the three horizons could provide a useful starting point for understanding change in a domain. It was observed in practice that the combination of a scenario archetype technique and the Three Horizons framework seemed to generate a useful pattern in the relative importance of the archetype scenarios according to the time horizon. In short, a baseline archetype seemed to be most prevalent in Horizon 1, either a Collapse or New Equilibrium archetype in Horizon 2, and a Transformation in H3. To test this idea, 78 historical scenario sets conducive to the archetype technique were identified, and the proposed pattern was tested against the how the domains actually unfolded over time. The results indeed suggested some evidence for the pattern. They also raised a series of interesting research questions for the futures community going forward.

1. Introduction

The purpose of this paper is to propose that the mapping of archetype scenarios onto the Three Horizons framework could provide a useful starting point to explore the nature or evolution of change in a domain. It proposes more attention to the unfolding process and timing of change in the project work of futurists, in particular when using scenarios. Sometimes scenarios are summarized as images or snapshots at the end of the agreed-upon timeframe. This is a legitimate and useful approach. There is indeed a plethora of scenario approaches and techniques that take different perspectives and together comprise a robust toolkit for exploring the future. Bishop et al. (2007) identified 25 different scenario techniques organized in to eight categories; Crawford (2019) developed a scenario typology around the four categories of project goals, process design, scenario content, and scenario impact; and most recently, Cordova-Pozo and Rouwette (2023) presented an updated scenario typology with the useful addition of an evaluation of the various approaches. This paper focuses on the particular aspect of "articulating the different pathways" from the present to the endpoint (Schwartz, 1991). We were in particular curious about the prevalence and relevance of variations of the scenario

pathways over particular timeframes. We found that such variations can in some cases be usefully identified and tracked using scenario archetypes mapped onto the Three Horizons framework.   .

The paper begins with a decade-plus of practitioner observations that acted as the impetus for this research study. It is followed by a relevant review of archetypal scenarios and the Three Horizons as the key research frameworks for the proposed explanation of change in a domain. It contextualizes these frameworks by providing an overview of theories of change and how they relate to the proposed approach.

The paper then turns to the research to test the hypothesis that the development of a domain over time can be usefully understood using archetypal scenarios mapped on the Three Horizons framework based on an analysis of 78 historical scenario sets. The analysis looked for patterns of material change in the domain space that manifest in a repeatable and significant fashion to be of use to futurists in anticipating long-term systemic shifts in any particular domain. Finally, the paper concludes with potentially generative future lines of inquiry.

2. Background

Various project teams at the Hines's university program quite frankly stumbled into the research question about patterns of change in a domain through observation. The typical project is a "future of …" with recent topics including the future of work, sustainable waste management, built environment, higher education, and communities. The clients included NASA, a consumer products company, a research consortium, a university, and a credit union. These clients were united in a desire to understand how change might unfold in their domain of interest. The research teams were consistently led by the Hines, who was joined by different adjunct faculty and graduate students on these projects over the years. For this research, the Hines put together a research team of three faculty and three graduates, each who participated in previous projects with the university program, to test this observation [hereafter referenced as the "research team."]

For several years, the project teams had been using the popular Three Horizons framework to set the timeframe of their projects. They were also using an adaptation of Dator's (2009)

archetype technique that suggests common patterns or shapes of change can usefully explain how a domain typically unfolds. Other futurists have developed variations of Dator's archetype technique. Bezold (2009) developed his visionary futures technique from it. More recently Fergnani and Jackson (2019) developed a variation using quantitative text analysis. Of course, it is recognized that there are many other useful scenario techniques in addition to archetypes (Bishop, Hines, and Collins, 2007; Spaniol and Rowland, 2019).

The authors' academic program explores the future from the vantage point of a domain or topic that is scoped and mapped (Bishop & Hines, 2012). A domain can be extremely broad such as the future of AI or it can be narrow, such as the future of e-bikes. In studying dozens of domains over the years, project teams sensed that there seemed to be a relationship between the scenario archetypes and the Three Horizons framework. It was most obvious in an activity done with the client near the end of a project that maps various "hypothetical" journeys across the scenario landscape. The team found it was consistently organizing certain archetype scenarios along with certain horizons, and that this placement made intuitive sense to clients, and they reported it really helped them grasp how their domain might unfold.

The program began experimenting with mapping its scenario archetype technique along the Three Horizons framework. It made intuitive sense. It proved useful in practice – clients liked it, and students understood it. In teaching the archetype technique to a wide range of audiences, almost invariably a question was asked about whether there was a pattern in the timing of the archetypes. Finally, the decision was made to formally conduct a research study and offer support for the observation that there indeed appears to be a pattern on how the archetype scenarios map across the three horizons.

3. Key Research Frameworks

3.1 The Three Horizons framework

One way to view the Three Horizons framework is as a guide to transformation, a description of how a domain might move from a system (H1) that is growing less fit to the current environment to the next system (H3) that is presumably more fit to the future

environment, with various potential transition pathways in between (H2). The framework says that domains pass through the three horizons over time:
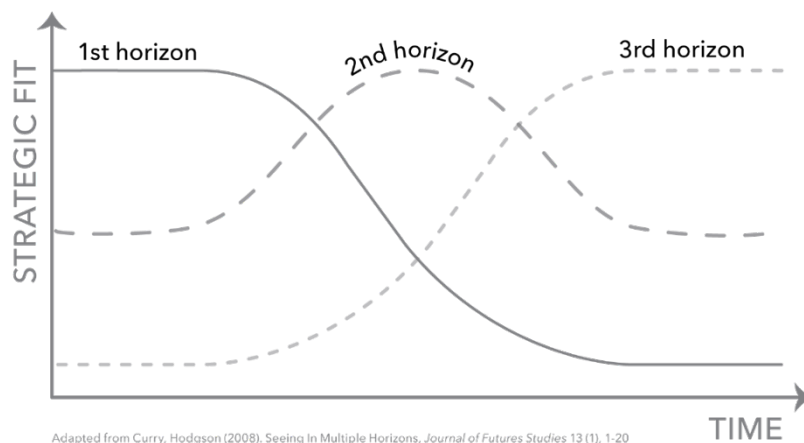

Figure 1. Three horizons

- Horizon One (H1) is typically the baseline future of continuity, which is often set as the next 3-5 years.
- Horizon Two (H2) is the transition zone of disruptions to the Baseline. Most organization's projects are focused on H2. The timeframes are about ten years out, which is about as far as most are willing to go. The arbitrary nature of selecting a specific number of years is recognized. It could be that the H2 transition is shorter or more often longer.
- Horizon Three (H3) is anything beyond H2. It is the realm of the next new system. In our experience, sometime a project timeline is set to focus on describing the new system of H3. For instance, Hines organization did a Future of Work 2050 project for NASA's Langley Research Center (Hines et al., 2017).

It should be noted that the original Three Horizons framework developed by McKinsey has been substantially updated by futurists (Curry and Hodgson, 2008; Sharpe, 2013). Interestingly, the McKinsey version has come under some criticism for failing to account for rapid technological development (Blank, 2019). Blank cites Air BNB as one of several examples of rapid disruption. Air BNB has its roots in the couchsurfing trends of the late 1990s (Moran,

2011). The firm was founded about a decade later in 2008. It indeed grew rapidly, but it was another twelve years until it went public in 2020. One might view this as a thirty-year journey, albeit with a rapid take-off in the middle. It follows a similar trajectory to the examples of 3D printing, self-driving vehicles, and AI avatars that are used in our academic program to contextualize seemingly rapid changes. They typically have a long gestation period: 30+ years in these examples. (Hines 2021b). The rise of AirBNB was certainly huge for the company, but less so for the lodging domain. The major players survived and operate much the same today as they did before Air BNB. The research on the 78 scenarios sets that we are reporting on seems to point to a similar conclusion: the journey through the three horizons, via the archetypes, is rarely rapid. In fairness to the advocates of rapid disruption, our approach to the analysis of a domain includes the early weak signals of change, which will naturally extend the timeframe of the transformation journey.

3.2 Archetype Scenarios

The Hiness' program has been using a version of Dator's (2020) Archetype Technique that is now being referred to as the "HAT" or [Program] Archetype Technique (Hines,2020, 2021b). The introduction noted that Dator's original archetype work has spurred the development of several variations, including the one described here. But where did the originals come from? Dator (2009, 6) recounted his early years in which he collected and analyzed as many images of the future as he could find. He considered "corporate long-range plans; statements about the future by politicians … implications of laws and regulations; books and essays … science fiction … public opinion polls … [seemingly] thousands–millions–billions–of images."

The HAT technique sets the domain as beginning in the Baseline. In some cases, the Baseline could also be described as being in one of the other archetypes. In these cases, it is described as Baseline/Collapse, Baseline/New Equilibrium, or Baseline/Transformation. This is not typical, but some examples were identified.

A key assumption underlying this technique is to view the domain as a system – operationally defined as "the current way of doing things." Four patterns characterize the plausible movements of a system/domain over time, shown in Table 1.

Table 1. The Four Archetypes
BASELINE: *continuation or extrapolation of the present into the future.* Present trends continue within the system without any major disturbances. The current system and its way of doing things prevails.
COLLAPSE: *system stuck in dysfunction.* Collapse does not necessarily suggest the apocalypse, but the system regresses or dips into a level of dysfunction, e.g., economic stagnation or recession.
NEW EQUILIBRIUM: *challenge to the system leads to compromise to save the existing way of doing things.* The system is challenged and responds in a way to save itself. It actively seeks to return to stability and is willing to make some compromises in order to preserve its essence, e.g., bailing out banks and companies in the Great Recession.
TRANSFORMATION: *can't save the system, so a new one with new rules emerges.* Entails fundamental change to the system, which could be driven by any number of factors, values, technology, or economics. It essentially involves creating new operating rules or guidelines.

3.3 Hypothesis: Domains follow an Archetype Patterns across the Three Horizons

The research team hypothesized that the movement of a domain over time could be tracked using archetypes mapped onto the Three Horizons framework as follows:

Figure 2. Pathways to transformation

In short, the hypothesized journey is from the Baseline of H1 to an eventual Transformation in H3, with two principal pathways in between in H2: Collapse or New Equilibrium. In Collapse a new system arises from the ashes of the old. In New Equilibrium, the change is gradual. In Collapse, there is less overlap between H1 and H3; a new system arises from the ashes of the old. In New Equilibrium, the overlap is much larger, and change is more gradual. It may only be with hindsight that Transformation is recognized to have taken place. The historical examples of transformation in Section 4.2 below demonstrate the power of hindsight in explaining what happened. While the changes are actually taking place, there are a multitude of starts and stops, and alternative pathways and possibilities, such that it is difficult to clearly distinguish the shifts in real time. Similarly, our literature review did not find any clear guidance on how or when to declare a horizon shift or when a transformation was complete. In Section 8, a terrific research opportunity on providing guidance for identifying horizon shifts is noted.

A related hypothesis is that the jump from Baseline to Transformation is too much and there needs to be a transition step in between. For instance, a jump from today's food system to an H3 Transformation of "stronger local and circular food systems" (Hans, 2021) is too big of a change. The idea being proposed here is that it will most likely either be achieved gradually via H2 New Equilibrium, which might include shortages and a legislative response, or via H2 Collapse, such as extremely high energy and food prices. There is a vast literature on resistance to change and change management that supports the notion that transformative leaps are rare. Change expert Kotter (1995, 59), in his study of hundreds of companies trying to create transformational change, noted that few succeeded and that the most general lesson is that the

change process goes through a series of phases that, in total, "usually require a considerable length of time."

4. Literature review

The Three Horizons Framework and Archetypal Scenarios together are a synthesized model for understanding patterns of change in a domain. Before proceeding further into the research, a more general overview of theories of change is required to contextualize the research.

The importance of a theory of change is crucial to futures work (Peck 2009). The Hiness' university program dedicates three courses in its master's curriculum to understanding change. The Systems Thinking course explores how systems work and change over time. The Social Change course looks at how big systems (of people) change over time – it covers similar terrain with Inayatullah and Galtung's (1997) popular macrohistory work. A third, Futures Research, explores change in the context of foresight projects.

This work assumes a developmental model of change, that is, change in a consistent direction over time. It does not suggest whether that change is good or bad, or positive or negative, but simply that the movement over time is generally in a linear direction – there can be steps backward, sideways, forward, and iterations. There is cyclicality involved as well. The Three Horizons framework itself has a cyclical aspect in that the three horizons are a cycle that repeats over time – the H3 Transformation becomes the new H1 Baseline. The overall orientation of the developmental approach is toward greater complexity with more options and choices.

It is important to note that different assumptions of change can lead to quite different projections of the future. Some analysts question a developmental progression to transformation as posited here. For instance, a contrasting model would be cyclical. The difference between the linear and cyclical models is nicely illustrated by Inayatullah (2017). Adam and Groves (2007) provide an impressive in-depth treatment of the issue of time, change, and the future by reaching back into the past.

Snowden's (2007) Cyenfin frameworks identifies five different types of domains – simple, complicated, complex, chaotic, and confused – that question the developmental logic. It may be

that the explanation of change in different types of these domains is not best described by a developmental logic, or some types might fit with it better than others.

Sardar's (2010) notion of post-normal times questions any model hinting at linearity – as developmental models do to some extent. He demands that we get away from linearity and focus our attention on the interconnections amongst complexity, chaos, and contradictions.

In other cases, the move to transformation itself is questioned. Pogany's (2015) wariness of technological development leads him to see a "Dark" period ahead. The Stockholm Resilience Center sees a Hothouse Earth future (Steffen et al, 2018). Dystopic and end of days images are proliferating. These images fit with our Collapse archetype. The salient point is that perhaps Transformation does not necessarily follow Collapse. Indeed, our analysis of the 78 scenarios sets found few examples of Transformation following Collapse – more often it followed New Equilibrium – suggesting that post-Collapse futures need further research.

Cynefin, post-normal times, Dark futures, and Hothouse Earth offer alternative explanations for explaining change in a domain. We welcome these and other ideas. Our findings do provide some preliminary support for our hypothesis about change in a domain in general, but there are many cases where our model seems to come up short and we may find the answers with these and other alternative explanations.

The literature review focuses on two critical areas of change discourse. The first briefly explores a half-dozen models of change that are relevant to understanding how domains might change over time, again, assuming a developmental trajectory. The six models included are: (1) Molitor Model of change (2) Fine's Clockspeed (3) Wack and Shell version of archetypes (4) Geel's Multi-Level Perspectives (5) Perez's Technological Revolutions and (6) Transformation Variations from Sharpe and Hodgson's H3Uni.

The second focuses on transformational change, with three examples provided. The first looks at the long macro-change in lighting from candles to incandescent light bulbs; the second is the shift from the horse to the car, and the third looks at political transformation.

4.1 Models of Change

In describing the Three Horizons framework of system transformation, Curry and Hodgson (2008, 11) observed that "one of the curiosities of futures work is that for a body of practice which is, above all, interested in change, there are relatively few models of change in the literature." They added that "the scenarios literature has been particularly thin on this." This paper takes up Curry and Hodgson's challenge in suggesting a model of change based on archetypes or typical pattens of systems change as they align with the Three Horizons framework.

Below are six models that explain change over time that support the developmental trajectory assumed by the Hiness of this paper.

4.1.1 Molitor Model of change

Perhaps the most prominent model of change comes from Molitor (2018, 13) who observed that: "Public policy change rarely comes about abruptly. It typically goes through twenty to thirty distinctive steps over a period of thirty to one hundred years." This timing of 30 to 100 years suggests that change is slower than most people think. Even proponents of rapid change such as Diamandis (2020), who argues that the future changes faster than we think, observes that there is a deceptive phase technology development in which "early progress is slow" and "these technologies spend a long time failing to live up to the hype." For instance, VR entered a two-decade deceptive phase in the 1990s after the initial hype wore off. He noted that 3D printing "took a while to get here….it showed up back in the 1980s" (Diamandis and Kotler, 2020). The rather slow development pattern of this model aligns with the observations from the analysis of the 78 scenario sets.

4.1.2 Clockspeed

The Clockspeed research was reviewed to see if it had any insight into how domains unfold over time. The research used product, process, and organization rates of change to create an

overall "clockspeed" for various industries and sorted them into slow, medium, and fast. Some examples include:

- Slow: tobacco, petrochemicals, electricity

- Medium: automobiles, cosmetics, and pharmaceuticals

- Fast: media, semiconductors, and personal computers

The Hiness acknowledged a great deal of difficulty in putting together the estimates, largely relying on industry interviews, and had hoped others might subsequently pick up the research, however, it appears not to have caught on. It also did not provide any sense of how the domains unfolded over the three horizons (Fine, 1998). It does provide support for the observation that there was variation in the timing of the H1 to H3 Transformation journey in the various domains.

4.1.3 Wack and Shell version of archetypes

An unexpected connection was made to the pioneering work of the Pierre Wack-led team at Shell. They produced a view of the future that aligned with the Three Horizons (Chermack, 2017). Their 1973 scenarios were basically a third iteration of the 1971 and 1972 versions. The more they learned, the more sophisticated the scenarios got. In Figure 3 below, the Traditional Environment is the H1 Baseline. They had produced a set of A and B scenarios in 1971 that were refined in 1972. By 1973, they eliminated the B scenarios as implausible to continue, but as the current system of the time, they fit the definition of a Baseline. They foresaw that the industry was on a disruptive trajectory, which they called the Rapids, which in Three Horizons parlance, was the industry moving into the H2 Zone of Transition. They were convinced the industry was on the trajectory of the A scenarios with disruption in the form of an "Energy Crisis." Finally,

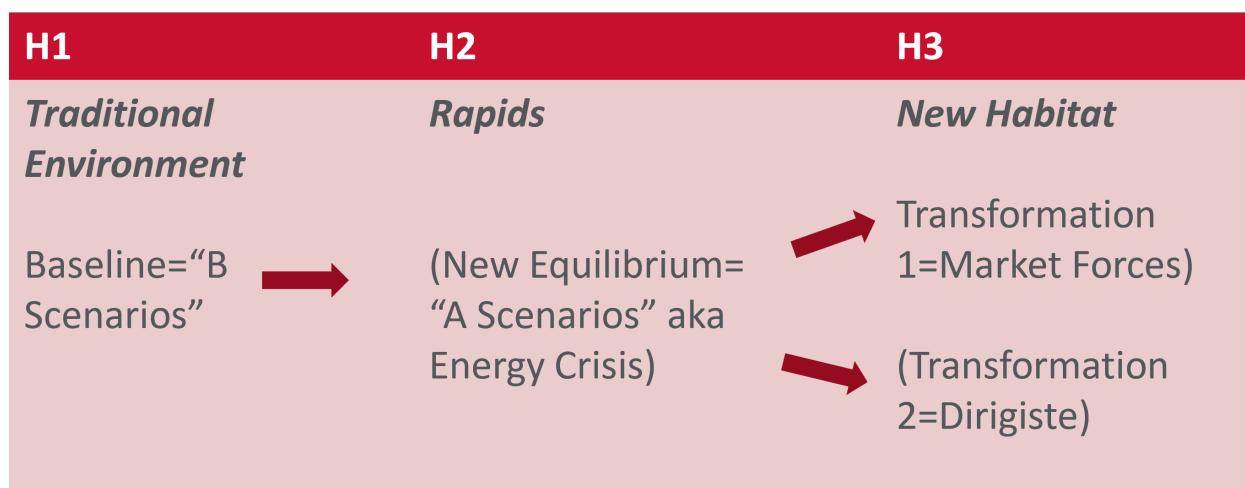| H1	H2	H3
Traditional Environment	**_Rapids_**	**_New Habitat_**
Baseline="B Scenarios"	(New Equilibrium= "A Scenarios" aka Energy Crisis)	Transformation 1=Market Forces) (Transformation 2=Dirigiste)

Figure 3. Wack Shell Scenarios

they suggested two versions of New Habitat, which fits with H3 Transformation: Dirigiste and Market Forces.

Reading the story of the creation of 1971, 1972, and 1973 scenarios, it was clear that what became the rapids metaphor was telling a story of the unfolding future, one in which they were increasingly confident about – they talked about the journey from present to future; not just some magical endpoint, but the unfolding, which aligns with the approach being explored here of baseline, transition, and transformation. The Shell team did not use the archetype technique language or three horizons, but in retrospect their explanation of the unfolding of the petroleum domain and their famous scenarios align very well with our proposed approach.

4.1.4 Multi-level perspective

While technological and societal discontinuity can seem sudden, leading to unexpected Collapse or Transformation, Frank Geels's Multi-Level Perspective (MLP) transition framework suggests that what looks like rapid change is often just the most visible step in a long, complex, society-wide process that takes place at radically different scales in the system.

The multi-level perspective (MLP) framework consists of three levels: niche-innovations, sociotechnical regimes and sociotechnical landscapes. Niche-innovations proliferate at the

bottom of the MLP framework and incorporates emerging and novel technologies and, in general, "the locus of radical innovation" (Geels, 2011, 26). The sociotechnical regime is the middle layer in the framework, representing the established order, the "locus of established practices" (Geels, 2011, 26). Finally, the sociotechnical landscape sits at the top of the framework and forms the macro and slow-moving influencers of sociotechnical change such as cultural beliefs and long-established structural dynamics.

MLP contends that transitions are "changes from one sociotechnical regime to another" and that transitions arise out of the "interactions between processes" at the niche-innovation, regime and landscape levels (Geels, 2007, 399-400). Various transition pathways emerge out of the timing and nature of the interaction between the three levels of the MLP. A suggested typology of these transition pathways by Geels and Schot is transformation, reconfiguration, technological substitution, and de/re-alignment. In practical applications of MLP, the longue durée is a critical conceptual posture in which the evolution of contemporary sociotechnical issue is the consequence of many interactions and transition pathways over a long historical period. Possible relationships and synthesis between MLP in understanding horizon shifts would need to be explored in follow-up work.
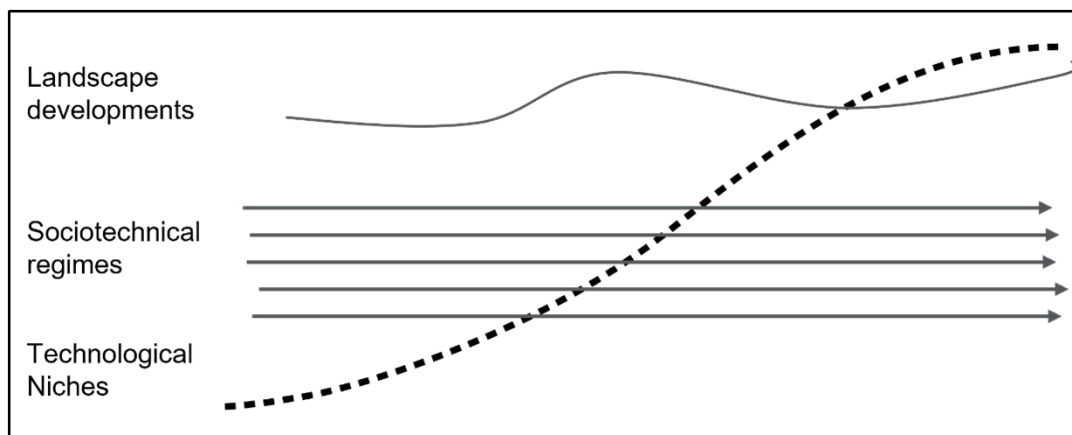

Figure 4. Multi-level perspective

4.1.5 Perez's technological revolutions

Economic historian Carlota Perez (2002) has a popular cyclical model of technological revolutions, in which full cycles run approximately every 50 years:

- Installation is the first half of the cycle that covers the technology's initial invention (Irruption) all the way through a firestorm of financial and intellectual investment, exploration of new possibilities, proliferation, and over-exuberance (Frenzy) that leads to a financial collapse or "Moral Crisis."
- Pruning is the second half in which society, government, or other regulatory mechanisms pick up the pieces, select from the many options generated by the Frenzy phase, impose needed regulation, and enable a Synergy of society and technology that leads to Maturity.

In Three Horizons terms, Perez's model represents the progress of a successful technological entrant and its eventual installation as the new H3 system. While it does not include scenarios per se, one could easily envision how the archetypes would map nicely onto Perez's model, which aligns with the Three Horizons.

4.1.6 H3 Transformation variations

The organization H3Uni, whose operational leaders include Three Horizons creators Bill Sharpe and Anthony Hodgson, has released a Three Horizons tutorial that supports the ideas being developed in this paper. They describe four variations to H3 transformation: (H3Uni, undated)

- The classic version is a shift from one system to the next that is "relatively successful and without difficulties other than the deconstruction and reconstruction that is unavoidable in Horizon 2". This classic version, which is called "Challenge & Transformation," bears close resemblance to our "New Equilibrium" pathway.

- A second variation has H1 as so dominant and resourceful that it co-opts nearly all the energy and attention of the innovative H2 space, artificially extending its life and delaying the rise of the new H3 system. This variation, "Capture and Extension," also resembles our New Equilibrium pathway.

- A third variant sees the dominance of H1 "creating runaway success but at the expense of some critical condition." For whatever reason, H2 energy is weaker or remains uncaptured by H3, and H1 collapses before H3 has had a chance to grow. The example given is small, regional or single-city economies dependent on one industry (like cars or textiles) that collapses and leaves a vacuum. This version, which is called "Collapse & Slow Recovery." It is similar to our Collapse pathway.

- A fourth variant, "Overshoot," tracks quite closely with the first half of Perez's revolution cycle, in which enthusiasm for a new technology leads to over-exuberance and then financial collapse when expectations outrun realities. This too resembles our Collapse pathway.

In sum, two of their versions fit with our New Equilibrium pathway and two fit with our Collapse pathway.

While the belief that crisis is necessary for significant change is commonly held, it should be noted that Collapse is perhaps a risky path to Transformation. It can lead to a protracted period of resource-poor and chaos-rich instability. The foundational 1972 Limits to Growth work modelling the one-hundred-year future of the globe found that the most likely outcome was collapse in the form of an "uncontrolled decline in both population and industrial capacity" (Meadows et al., 1972). Their findings were attacked as gloom and doom, but when they incorporated the suggestions of critics and re-ran the models twenty and thirty years later, their original conclusions stood the test of time (Meadows et al., 2005; Hines 2005).

As economist Kate Raworth has said, "collapse is rarely beneficial" (2018), and it's possible to get stuck in Collapse for an extended period.

4.2 Historical Examples of Transformation

Retrospective narratives of transformation often feel simple, relatively swift, and inevitable. Thomas Edison invented the light bulb and made candles obsolete. Henry Ford mass-produced the automobile, and horses were no longer necessary. But a closer look illustrates the slowness observed by Molitor and Geels, the generally cyclical nature of dominant systems described by Perez, Sharpe, and Hodgson, and particularly the H2 space detailed by the Three Horizons model as well. In particular, the H2 transitional zone tends to be overlooked in explanations of transformation, but it is a pivotal site of proliferation, high complexity, pruning, and contention. The dynamic H2 space of transition, as noted earlier, can have variable durations, take many forms, and lead to change that seems sudden and may take us by surprise if we haven't been paying attention.

These known historical examples below were selected for their familiarity in order to make it easier to see the point about transformation. They are operating at a large social scale and often the domains that futurists study are more bounded in scope, i.e., exploring the future of the electric car rather than mobility as a whole. The transformation examples below took a long time to happen, could have taken many paths with many options, and provided an opportunity to anticipate and get ahead of the change.

4.2.1 Candles to Incandescent Light Bulbs

The transition from candles to electric light is a classic example of Oren Harari's famous quote: "Edison's electric light did not come from the continuous improvement of the candle" (Beck and Charitos, 2021, 1). New contenders emerged and "fought it out" over a period of decades. Before the Industrial Revolution, the artificial lighting landscape was extremely diverse, with wax candles, plant- and animal-based fuels, such as whale oil lamps, rush lights, tallow candles and very expensive beeswax candles as a form of conspicuous consumption among the wealthy (Savage, 2016).

The Industrial Revolution and the accompanying urbanization drove a demand for bright, steady, low-maintenance and low-cost lighting. This fueled an H2 space of contention with

kerosene, gas lighting (bright but high-maintenance), and lower-maintenance but dangerous carbon arc lamps. These developments took place against the backdrop of the rise and fall of the whale oil industry, another strong lighting contender (Lienhard, 1998). New lighting approaches required significant infrastructure, as with gas, which paved the way for the investment in infrastructure required for electric light) over the course of many decades.

The H3 Transformation didn't arrive until the 20ᵗʰ century with incandescent electric light bulbs -- inexpensive, long-lasting, low-maintenance, and very bright -- that were able to fulfill nearly all household, industrial, and municipal lighting functions. Today, of all the types of artificial lighting that existed before the incandescent bulb, only wax candles (now often scented and colored) remain a significant economic presence, a $3.14 billion industry in 2013 (National Candle Association, N.D.).

This example illustrates our proposed pattern. Candles as the H1 Baseline. The many alternatives competing in H2 follows a New Equilibrium archetype, in which there is change as some of the competitors surge ahead, only to drop back as the current system structure maintains until finely, decades later the light bulb prevails, and the H3 Transformation is complete.

4.2.2 From the horse to the car

The automobile's replacement of the horse is another much-used example of quick and complete technological transformation. It, too, has a more complex and slower story of change. Horses had been used to transport humans and cargo, and to supercharge agricultural labor, for millennia. The centrality of the horse to society was underlined by language: new steam-powered trains were called Iron Horses, and machine potency is still measured in horsepower. But horses had downsides; they were fragile animals, required whole industries around their maintenance (breeding, grooming, veterinary), they needed rest periods, they made messes, and they got sick.

The horse-dominated H1 of the Industrial Age was not replaced all at once, but gradually and over the course of many decades – fitting a New Equilibrium transition pathway. Horses

were not replaced only by cars, but by trains, steam-powered fire engines (Smith and Browne, 2017), and electric streetcars on rails (Keim, 2013). The car's eventual ascendancy required a decades-long total shift in the public's understanding of who streets are for and how they operate, the creation of universal car-friendly asphalt infrastructure, large coordinated efforts by car manufacturers, and massive government investment (Keim, 2013). Although horses began to be replaced across the West in the late 19th century, the car-dominated American landscape did not fully come into being until the 1950s.

4.2.3 Political transformation

Transformation is not always driven by technological invention. Historical examples of socially driven transformation demonstrate both that the seeds of change are present long before a seemingly swift transformation. There is often a significant and protracted H2 zone of transition. The French Revolution is often spoken of as a single event that created democracy in Europe. In reality, the decade of violent revolution was followed by various forms of non-democratic government: decades of Napoleonic war, Bourbon and Orléans monarchy, and then the Second French Empire of Napoleon III. It wasn't until 1870, eighty years after the French Revolution, that a stable democracy was established. The collapse of the Soviet Union in 1991 is another seemingly swift and supposedly complete transformation -- historian Francis Fukuyama famously asked whether this and other events of that period marked the "end of history" and the permanent transition to Western liberal democracy (Fukuyama, 1992) -- with an H1 tail that is turning out to be more persistent and more complex than anyone in the West might have anticipated.

These well-known examples of transformation suggest that the process can be shown to follow the three horizons trajectory as well as relating to the scenario archetypes. The literature review of models of changes also suggests a basic compatibility with the idea that archetypes along the three horizons is at the least a useful idea to explore. At the same time, the research team recognizes the validity of alternative explanations, several of which were outlined in the beginning of the Section 4 Literature Review.

5. Method

The literature review left us confident enough to proceed with testing the idea laid out in the background section that the scenario archetypes can be usefully mapped along the three horizons. This section describes the research method, which involved identifying historical sets of scenarios, seeing if they fit to the archetypes, and then judging if the domain unfolded over time following the hypothesized archetype patterns along the three horizons. The three steps are:

1. Identifying scenario sets: Find domain(s) with historical set of scenarios
2. Assessing fit: Analyze to see if the scenarios fit with archetypes – to the extent feasible
3. Map the pathway: Map the archetype scenarios to the three horizons of the domain over time – to the extent feasible.

Each step is explained in more detail below.

5.1 Identifying the scenario sets

Ideally, the scenario sets would have reached their projected timeframes, but this was not always the case. It was easier to find sets that were more recent, and the more recent ones often had not reached their projected timeframe. These sets were included as well. The scenario sets were identified using five approaches:

1. Open search: a general web search was conducted for publicly available historical scenarios
2. Searching foresight journals: five foresight journals were searched: *Futures*, *Foresight*, *TF&SC*, *World Futures Review*, and the *Journal of Futures Studies*.

3. <u>Archive or platform sites</u>: The Millennium Project, for example, created a bibliography of scenarios

4. <u>Personal projects</u>: Co-Hines Hines' drew upon professional futurist work involving dozens of projects he led over the last thirty years and including the Hines organization's project work. He reviewed the copies of projects he still had access to and identified 21 scenario sets that would be useful for the analysis. The furthest back was 2004. Several recent projects were included as well, although they were less useful since not enough time has yet elapsed to discern the pattern of change over time.

5. <u>Foresight teaching</u>: The Hines organization has been gathering scenarios sets for teaching purposes.

This search identified over 100 scenario sets for further analysis. Ideally, the sets would have four scenarios. In some cases, more than four were still useful in that it was found some archetypes were represented by more than one scenario.

5.2 Assessing fit of scenario sets to archetypes

The historical scenario sets were reviewed and assessed for matches to the archetype techniques, ultimately yielding 78 for further analysis. Each scenario in a set was matched with an archetype pattern and the strength of the fit was assessed. For example, a particular scenario could be identified as the Baseline with a high fit, meaning the team felt it was indeed a Baseline, whereas another scenario might have a medium fit with, say New Equilibrium, meaning it was close to the archetype but not as strong of a fit. If any scenario in the set was judged to be a low fit, the set was not used.

Given the large number of scenario sets the main goal was to be consistent in the review. Individual research team members were assigned scenario sets to review. One Hines then reviewed all the entries to ensure consistency.

The assessment of the scenario sets fit to archetype was captured in an analysis template, shown in Table 2 below. The scenarios are dated and briefly described. They are then "fitted" to

an archetype. Some of the scenario sets were created using an archetype technique, which made for an easy decision to include. But they were just a small number of these sets, and they tended to be relatively recent and many had not yet reached their projected timeframe.

The team decided to include scenarios sets that might be missing an archetype, i.e., no Baseline. This was decided because in practice the research team occasionally combined archetypes – in several domains today, for example, it could be argued that the Baseline is on a Collapse trajectory, so they can be combined, and thus one might be "missing."

Table 2. Archetype Analysis Template		
Scenario Name (Client) Scenario Timeframe	Archetype	Scenario fit to Archetype (Hi, Med, Lo)
Scenario one name • Brief description of scenario		
Scenario two name • Brief description of scenario		
Scenario three name • Brief description of scenario		
Scenario one name • Brief description of scenario		

5.3 Map the pathway of how the domain developed or is developing

The final step was to analyze how well the scenario sets, organized into archetypes, mapped the actual development of the domain over time. The Three Horizons framework was used as a backdrop: the Baseline is H1; Collapse or New Equilibrium is H2, and Transformation is H3.

In Table 3 below, the name of the scenario set is the first column, followed but the timeframe, which was the period of time covered by the scenario projection. The third column mapped the pathway using a shorthand:

- B = Baseline
- C = Collapse
- NE = New Equilibrium
- T = Transformation

The task for the analysts in the third column was to judge how the domain had evolved over time – if or how it had moved across the three horizons. Some domains might still be in the baseline archetype. If they had moved out of the H1 Baseline, the analyst had to judge which archetype it moved to – Collapse or New Equilibrium -- and finally whether it had reached H3 Transformation.

Table 3: Scenario Pathways Template		
Scenario Set	**Timeframe**	**Pathway (abbreviations below)**
Name of Scenario Set	Dates of projection	B > NE > T In this example, the domain went from Baseline to New Equilibrium to Transformation
Name of Scenario Set (Hines)	Dates of projection	B > C In this example, the domain went from Baseline to Collapse

Figure 5 below visually illustrates a domain pathway that was filled out as follows:

Knowledge Work (Social Technologies)	2007-2020	B > NE > T

Archetypes Across Three Horizons: Knowledge Work Example

Baseline
> VIRTUAL TEAMS COLLABORATING
Work is increasingly virtual, but progress is evolutionary rather than revolutionary. Work in 2020 is far more decentralized and different in many respects, but the transition is managable.

New Equilibrium
> SOCIALLY-CENTRIC WORK
Digitization and social networks create new collaboration opportunities, new roles and relationships, as insiders, freelancers, and even customers routinely work together.

Collapse
> BACK TO BASICS
Innovative approaches to knowledge work are put on the back burner as tough economic times and high-profile security breaches call new modes of work into question.

Transformation
> PERSONALIZED PROFESSIONS
Successful new organizational and business models emerge around knowledge work that frees workers to personalize their contributions. Work is largely driven by personal interest. All workers are knowledge workers.
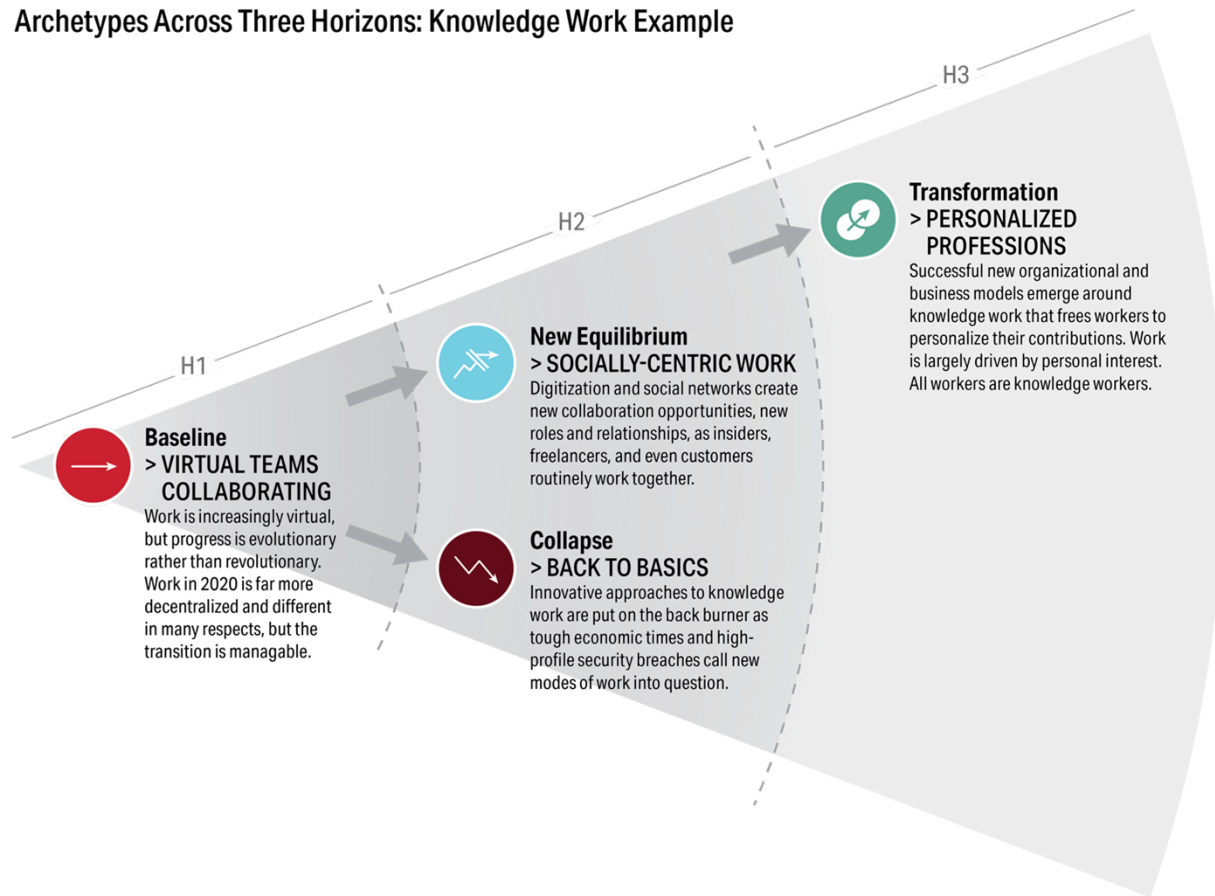
Figure 5. Knowledge work across Three Horizons

A set of scenarios about the future of knowledge work done by the firm Social Technologies covered a timeframe from 2007 to 2020. The knowledge work domain in 2007 was characterized by a baseline scenario called "Virtual Teams Collaborating." The domain eventually shifted to the context described in the New Equilibrium scenario called "Socially-Centric Work." The final shift was to an H3 Transformation called "Personalized Professions."

The archetype technique used by [Hines] organization considers all domains as beginning in a Baseline – the current way that the domain operates. Admittedly, a domain might have just shifted, and in a few cases the Baseline is referred to in a combined fashion, i.e., B/C or B/T. In this case, the team might craft two versions of New Equilibrium or two versions of Transformation. Although in one project with a Baseline in Collapse, a "worse" Collapse was

created. It was observed that it would be more difficult to identify whether a domain was in New Equilibrium at the start of a project, since that archetype most closely resembles the Baseline. There is no set number of archetype scenarios.

As the Baseline decays, that is, it no longer fits well with external conditions, it could move into Collapse. That decay could be long and gradual, in which the actors in the domain are in denial about what's happening, or resisting, or just plain not noticing. Sometimes there may be a catalytic event that the current system cannot deal with and the domain collapses, such as a political coup, market crash, or environmental disaster.

The Baseline move to New Equilibrium typically involves a disruption or discontinuity that challenges the current rules of the domain. Foucault (2002, 50) spoke of discontinuity as when an external event that challenges concepts of power, coercion, and knowledge that causes "a culture that ceases to think as it had been thinking up till then and begins to think other things in a new way." The powerful actors in the Baseline will often seek to minimize the change and keep things the way they are, since they are powerful in the existing system. Accommodations or comprises to meet the disruption or discontinuity are made, but the goal is to keep as much as the existing system structure intact as practical. So, there is change, but it is still similar to the current system.

Whether via Collapse or New Equilibrium, eventually Transformation is reached in which a new system with new rules emerges. This of course is an ideal case for the model, and as we will see in the next section, ideal cases are not necessarily the norm.

6. Key Findings

More than 100 scenario sets were reviewed for inclusion. They sorting criteria was whether the individual scenarios could be fitted to the archetypes using the Archetype Fit table. Seventy-eight met this simple test, but only 25 sets had fully reached their timeframe. This issue will be discussed further in 7.1.

6.1. Scenarios sets developed with other techniques can be fitted to the Archetype technique

Table 3 below is a representative example of a filled-in template that shows the typical level of detail. Most templates were about a half-page or so. Given that there were 78 sets, the full compilation runs over 50 pages, thus is it not included here. This example illustrates the phenomenon explained above of a combined baseline-collapse archetype. In this case two new equilibrium scenarios were identified along with a Transformation.

In the first cell of Table 4 below, the domain is named along with who the set was done for. The timeframe of the set is below that. The cells below that name each scenario along with a brief description, typically a set of bullets. The column to the right identified which archetype the scenario fits. For consistency, the Baseline was first, followed by Collapse and New Equilibrium, and finally Transformation. The final column characterized the scenario fit to the archetype as low, medium, or high. Scenario sets that had a low fit were excluded from the analysis. The 78 scenarios sets are those that made it through an initial triage of the analyst making an include/exclude decision.

Table 4. Archetype Analysis Sample Entry		
Chemical Industry (Dow Chemical) **2004– 2020**	**Archetype**	**Scenario fit to Archetype** **(Hi, Med, Lo)**
Conventional Wisdom • **Described in 24 statements based on research and interviews with leadership**	Baseline/Collapse	Hi
Hydrocarbons Rule • **Caspian oil comes online, creating vast new sources of supply** • **Russia and Central Asian firms develop industry, focus on exports to Europe first** • **Major US and European players can no longer compete in Europe, losing market share in N. America**	New Equilibrium	Hi

• *By 2020, the main production centers for chemicals are in the Middle East, Russia, and Central Asia*		
Emerging Markets Rewrite the Rules • **Asian players become skilled at reverse-engineering specialty chemicals and exporting cheaper versions** • **Asian players gradually achieve scale required to compete on price in commodity products** • **In serving local markets, Asian players create new cost-effective, innovative solutions that become successful exports to the West** • *By 2020, Asian players threaten to dominate global growth*	New Equilibrium	Hi
The Next Envelope • **Emerging technologies begin to converge; exciting new findings at intersections of nanotech, biotech, infotech, and chemistry** • **Rising environmental movement and regulations force attention on green solutions** • **Major breakthroughs in energy and alternative feedstocks reduces dependency on hydrocarbons** • *By 2020, the chemicals industry is transformed into one of the most innovative areas of science and business, attracting talent and capital*	Transformation	Hi

6.2 Pathway mapping suggests the archetypes align along the horizons … and is a useful way to track movements of domains over time.

Table 5 below shows the results of the pathway mapping of the scenario sets over time. The name of the set is followed by who it was done for in parenthesis. If the client was not clear or held confidential the Hines(s) were used. The project timeframe of scenario set follows. Finally, the pathway is indicated using the abbreviations B, C, NE and T.

In the first example below, the famous Mont Fleur scenarios, the pathway B > NE > T means that the domain, the political situation in South Africa, started in the Baseline (as all domains do in this technique), moved into a New Equilibrium transition, and eventually reached a Transformation. As readers might imagine there is a degree of subjectivity in mapping the pathways and surely judgements will differ. There is likely enough material to warrant another paper on mapping the pathways. For now, it is hoped the reader can assume the team did a fair enough job in the mapping.

Table 5: Scenario Pathways			
	Scenario Set	**Timeframe**	**Pathway**
1	Mont Fleur (S. Africa and Shell) (Kahane, 1992)	1992-2002	B > NE > T
2	Higher Education: The California Case (Ogilvy, 1993)	1993-2008	B > NE
3	Four Scenarios of State Government Services and Regulation in the Year 2010 (Bonnett and Olson, 1994)	1994–2010	B > NE
4	Your Health in 2010 (Institute for Alternative Futures, 1996)	1996-2010	B > C
5	Airforce 2025 (Kelly, 1996)	1996-2025	B > C/NE >T
6	Virtual University Scenarios (Hurst, 1998)	1998-2010	B > NE
7	Four Futures for Hawaii (Dator, 1999)	1999-2030	B > C
8	Environmental Futures (SPRU) (Berkhout et al., 1998)	1998-2040	B > C
9	Genomics and Society (Institute for Alternative Futures & Centre for Research on Innovation and Competition, 2000)	2000-2015	B > NE
10	Biotechnology (World Business Council for Sustainable Development, 2000)	2000-2050	B >
11	Great Transition (Global Scenario Group) (Banuri et al., 2002)	2002-2050	B >
12	Chemical Industry (Dow Chemical) (Hines, 2004).	2004-2020	B/C > NE > T
13	Mapping the Global Future (National Intelligence Council, 2004)	2004–2020	B > C/NE

14	Sustainable Urban Water Management (Makropoulous et al., 2008)	2005-2020	B > C
15	US Families 2025 (Montgomery, 2008)	2005-2025	B >
16	Global Energy Scenarios (Millennium Project) (Glenn & Gordon, 2006).	2006-2020	B > C
17	Marine Ecosystems (DEFRA) (Pinnegar et al., 2006)	2006-2036	B > C
18	Agriculture (Dow Agrosciences) (Hines, 2007)	2007-2017	B > NE > T
19	Knowledge Work (Social Technologies) (Hines & Carbone, 2013)	2007-2020	B > NE > T
20	Our Biopolitical Future (WorldWatch) (Hayes, 2007)	2007-2021	B >
21	Mobility (Nissan) (Hines, 2008)	2008-2018	B > NE
22	Texas DOT Scenarios (Bishop, 2008)	2008-2040	B > NE
23	Lodging (InterContinental Hotel Group) (Hines & Abraham, 2009)	2009-2020	B > C
24	Road to 2020: Scenarios for World in Crisis (World Bank) (Djankow et al., 2009)	2009-2020	B > NE
25	The Century Ahead (Tellus Institute) (Electris et al., 2009)	2009-2025	B > C
26	A Post-Carbon Aviation Future (Airport Metroplis Australia) (Kivits et al., 2009)	2009-2059	B > C
27	Oxford Future of City Scenarios (Raford, 2010)	2010-2050	B >
28	Carbon Economy (Institute for the Future, 2010)	2010-2020	B > C
29	Molecular Identity (Institute for the Future, 2010)	2010-2020	B >
30	Water Ecology (Institute for the Future, 2010)	2010-2020	B > C
31	Adaptive Power (Institute for the Future, 2010)	2010-2020	B > C
32	Cities in Transition (Institute for the Future, 2010)	2010-2020	B >
33	Africa 2010-2020 (Ballantyne et al., 2011)	2010-2020	B > NE
34	CEP Agriculture Energy 2030 Synthesis (Centre for Studies and Strategic Foresight, 2010)	2010-2030	B > NE
35	Technology and International Development (Global Business Network & Rockefeller Foundation, 2010)	2010-2030	B > NE
36	Sustainability Discourses (Belgium) (Crivits et al., 2010)	2010-2050	B > NE
37	Changes to the Land (Harvard University) (Blumstein et al., 2014)	2010-2060	B > C
38	Mythic images of future cities (Frewen-Wuellner, 2011)	2011-2025	B >
39	Chemical Industry Context (Hines, 2011a)	2011-2021	B > NE
40	Credit Unions (Filene Research Institute) (Hines, 2011b)	2011-2021	B > NE

41	The Evolving Internet (Cisco) (Rueda-Sabater et al., 2011)	2011-2025	B > NE > T
42	Mediterranean Region (World Economic Forum, 2011)	2011-2030	B > C
43	Families to 2030 (OECD, 2011)	2011-2030	B > C/NE
44	Future of Vulnerability 2030 (Institute for Alternative Futures, 2011)	2011-2030	B > C
45	Global Megacrisis (Halal & Marien, 2011)	2011-2033	B > C
46	Library Futures (Inayatullah, 2014)	2011-2060	B/C > NE
47	Renewable Energy (Sadorsky, 2011)	2011-2100	B >
48	Broadband Demand (Cable Labs) (Hines & Reuss, 2012)	2012-2022	B > T
49	Primary Care 2025 (Institute for Alternative Futures, 2012b)	2012-2025	B > C
50	Transition to a Digital Economy (Policy Horizons Canada, 2012)	2012-2025	B > C
51	American Classroom: Beyond the Four Walls (Sanborn et al., 2009)	2012-2025	B > NE
52	South Korea Scenarios (Son, 2013)	2012-2030	B >
53	Health and Health Care in 2032 (Institute for Alternative Futures, 2012a)	2012-2032	B > C
54	Futurevision (Freeman & Watson, 2012)	2012-2040	B > NE
55	Energy Futures for Canada (Conference Board of Canada, 2012)	2012-2050	B/C >
56	Delivering Tomorrow: Logistics 2050 (ZPunkt, 2012)	2012-2050	B > NE
57	Low-Carbon Futures and Sustainable Lifestyles (Neuvonen et al., 2014)	2012-2050	B >
58	Future of the Courts (Tonn et al., 2012)	2012-2050	B >
59	K-12 Teaching: Decade of Disruption (Prince, 2014)	2014-2024	B > NE
60	Change in Asia (Policy Horizons Canada, 2013)	2014-2024	B > NE
61	Imaging BRICs (Shapenko et al., 2014)	2014-2029	B > NE
62	Public Health 2030 (Institute for Alternative Futures, 2014)	2014-2030	B > C
63	Arab Futures: Three Scenarios for 2025 (Institute for Security Studies (Gaub & Laban, 2015)	2015-2025	B >
64	Technolife of Romeo and Juliet (Hiltunen & Hiltunen, 2014)	2015-2035	B >
65	Autonomous Vehicles (Tenn DoT) (Hines, 2016b)	2016-2030	B > NE
66	Residency & Foreigners Affairs (GDRFA Dubai) (Hines, 2016s)	2016-2030	B/T > C
67	Canada in Changing Energy Landscape (Policy Horizons Canada, 2016)	2016-2030	B >
68	Forest Futures (US Forest Service) (Hines et al., 2019)	2017-2035	B >

69	Work (NASA Langley) (Hines, 2017)	2017-2050	B >
70	Sustainable Waste Management (Hines, 2018)	2018-2028	B > C
71	Built Environment (Hines, 2019c)	2018-2028	B >
72	Human progress and Human Services (Institute for Alternative Futures, 2018)	2018-2035	B >
73	Circular Economy (Hines, 2019a)	2019-2029	B >
74	Changing Demand for Higher Ed (Hines, 2019b)	2019-2030	B >
75	Veterinary Assessment (ICVA) (Hines, 2020a)	2020-2030	B >
76	Public Health Evidence (Hines, 2020b)	2020-2030	B/C >
77	Public Health Emergency Lab Preparedness (Hines, 2020c)	2020-2030	B/C >
78	NC Communities (Hines, 2020d)	2020-2040	B/C >

Table 6 below compiles where the pathway patterns from the previous table "ended up." The patterns are grouped according to which horizon they reached. There were a few exceptions to the hypothesized flow of B > C > T or B > NE > T. The exceptions are noted in the bullets. For example, there were 26 domains that were still in the Baseline. Of these 26, three fit the combined Baseline/Collapse archetype.

Table 6: Where the 78 domains ended up	
Which archetype did the pathway reach?	Percentage (raw #)
Horizon 1 (33%)	
Baseline (B>) • 3 B's were B/C	33% (26)
Horizon 2 (58%)	
Baseline to Collapse (B > C) • 1 B was B/T	28% (22)
Baseline > New Equilibrium • 1 B was B/C	27% (21)
Baseline to Collapse/New Equilibrium (B> C/NE) • domain was roughly halfway between each	3% (2)
Horizon 3 (9%)	
Baseline > New Equilibrium > Transformation (B > NE > T)	6% (5)

• 1 B was B/C		
B> C/NE > T	1% (1)	
• Domain was roughly in between C and NE		
Baseline > Transformation (B > T)	1% (1)	

The numbers are virtually the same for Baseline, Collapse, and New Equilibrium, which seems reasonable. The team was initially concerned that only just under 10% made it to Transformation. Upon reflection, the simple explanation for that low percentage was that Transformation would be the archetype most effected by the fact that many of the scenario sets had not yet reached their time horizon. Since Transformation is the furthest in time from the present, it makes sense that it needs more time to materialize.

Table 7 includes just the 25 sets that fully reached their projected timeframe.

Table 7: Scenario Pathways for those reaching their timeframe			
	Scenario Set	Timeframe	Pathway
1	Mont Fleur (Shell for S. Africa)	1992-2002	B > NE > T
2	Higher Education: The California Case (Ogilvy/GBN)	1993-2008	B > NE
3	Four Scenarios of State Government Services and Regulation in the Year 2010 (Bonnett and Olson)	1994–2010	B > NE
4	Your Health in 2010 (IAF)	1996-2010	B > C
5	Virtual University Scenarios (Fred Hurst)	1998-????	B > NE
6	IAF Genomics	2000-2015	B > NE
7	Chemical Industry (Dow Chemical)	2004-2020	B/C > NE > T
8	Mapping the Global Future (NIC)	2004–2020	B > C/NE
9	Sustainable Urban Water Management (Makropoulous et al)	2005-2020	B > C
10	Global Energy Scenarios (Millennium Project)	2006-2020	B > C
11	Agriculture (Dow Agrosciences)	2007-2017	B > NE > T
12	Knowledge Work (Social Technologies)	2007-2020	B > NE > T
13	Our Biopolitical Future (WorldWatch)	2007-2021	B >
14	Mobility (Nissan)	2008-2018	B > NE
15	Lodging (InterContinental Hotel Group)	2009-2020	B > C

16	Road to 2020: Scenarios for World in Crisis (World Bank)	2009-2020	B > NE
17	The Carbon Economy (IFTF)	2010-2020	B > C
18	Molecular Identity (IFTF)	2010-2020	B >
19	Water Ecology (IFTF)	2010-2020	B > C
20	Adaptive Power (IFTF)	2010-2020	B > C
21	Cities in Transition (IFTF)	2010-2020	B >
22	Africa 2010-2020 (Curry et al)	2010-2020	B > NE
23	Chemical Industry Context (Arizona Chemical)	2011-2021	B > NE
24	Credit Unions (Filene)	2011-2021	B > NE
25	Broadband Demand (Cable Labs)	2012-2022	B > T

Table 8 compiles these results. Indeed, within these sets, 20% reached Transformation compared to 9% for the larger set of 78 as a whole.

Table 8: Where the 25 domains ended up	
Which archetype did the pathway reach?	Percentage (raw #)
Horizon 1 (12%)	
Baseline (B>)	12% (3)
Horizon 2 (68%)	
Baseline to Collapse (B > C)	28% (7)
Baseline > New Equilibrium	36% (9)
Baseline to Collapse/New Equilibrium (B> C/NE) • domain was roughly halfway between each	4% (1)
Horizon 3 (20%)	
Baseline > New Equilibrium > Transformation (B > NE > T)	16% (4)
Baseline > Transformation (B > T)	4% (1)

Table 9 below shows an expected difference in which those scenario sets that reached their timeframe were less likely to be in the H1 Baseline and more like to be in H3 Transformation.

Table 9. Comparing where the 25 and 78 sets ended up

	The full 78	The 25 reaching their timeframe
H1	33%	12%
H2	58%	68%
H3	9%	20%

7. Discussion

Some high-level observations from reviewing the 78 sets.

7.1 Future researchers need more historical scenario sets: Only a third of scenario sets found made it to their projected timeframe.

Each member of the research team was assigned at least one search strategy described in Section 5.1 above. The preference was to find older sets that had reached their timeframe, but this proved challenging. For example, scenarios produced in say 1990 that went out to the year 2015 were said to have reached their timeframe. Of the 78 scenario sets that were used, just over one-third -- 25 -- had reached it. This speaks to a limited public availability of historical scenario sets. It may be that many pre-web or early web sets were not or have not been posted. It is also likely that many scenario sets that were once proprietary were never released into the public domain. Another factor would be that the search was only conducted in English.

7.2 Scenarios over time: They begin in the present

Most often scenario sets are described at their end states in time – a ten-year scenario is described by what that world looks like in ten years. Good quality scenarios will include a pathway that describes how the scenario unfolds from the present to the future end state. This

creates a sense among some clients that the scenarios are "out there" in the future. But what happens between now and then?

The assumption made in this research was that all scenarios in a set can be said to already exist in the present to at least some degree, and that over time, depending on how the future unfolds, their presence may go up or down. So, in the present, the Baseline is present to a very high degree. There may be some degree of Collapse present, perhaps even less New Equilibrium, and very little (but not zero) Transformation present. As the domain unfolds these "ratios" change, that is, the Baseline typically declines, and either Collapse or New Equilibrium become more prominent, and Transformation will start to become more apparent. Eventually, the Baseline recedes significantly, Collapse and New Equilibrium also decline, and Transformation becomes the dominant archetype scenario. It's not a complete replacement of one archetype for another, but a relative degree of emphasis. For the sake of clarity, the team has to make judgments about when relative dominance/prominence of a domain has passed from one archetype to another. This provoked a very rich discussion and set of research activities, such that it was ultimately decided that this topic merited its own paper.

7.3 Positive or negative is a matter of perspective

The four archetypes are structural patterns of change. They involve shifts in the way a domain operates, or the rules of the domain's operating system, that may be perceived differently. The interpretation of the development or shifts brings into focus one's perspective, that is, some may see the Transformation scenario as positive and others as negative. A transformation scenario could be great news for the client organization but viewed unfavorably by other stakeholders such as competitors or the public. Or an organization might view a collapse as catastrophic, but it could be great news for their customers. In the analysis, the perspective takes on whether a scenario was Collapse or Transformation, for example, was from the point-of-view of the domain rather than the actors in the domain. Take Knowledge
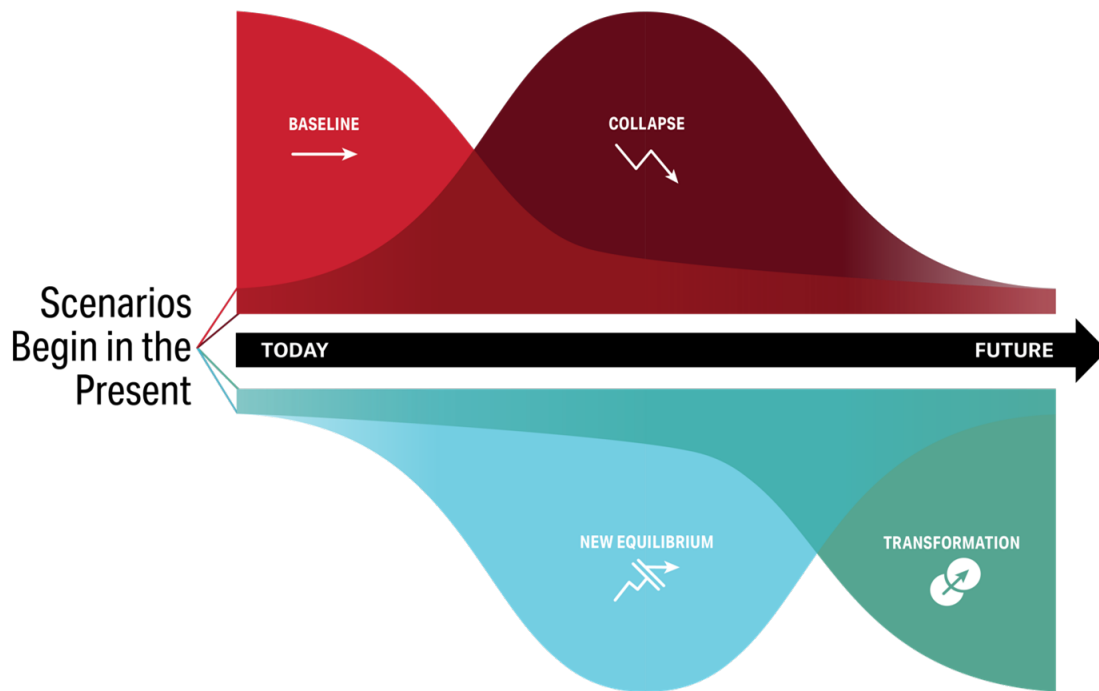
Figure 6. Scenarios begin in the present

Work as a domain. It is framed a particular way at the beginning of a study, and that frame is used to distinguish Collapse or Transformation – not what various actors might wish it to be or not to be.

7.4 New Equilibrium appears to be the more common route to Transformation

It is worth noting that New Equilibrium was the more common pathway to Transformation than via Collapse. The sample size is too small to make a more definitive statement. Five domains went through the New Equilibrium to Transformation. One was judged to move in between Collapse and New Equilibrium. None followed a "pure" Collapse to Transformation pathway. That goes against the popular perception that crisis is necessary for significant change.

It could be that the definition of the archetypes accounts for this difference. Perhaps the crisis in Collapse is too much to overcome? Perhaps the "challenge and response" of New Equilibrium is more amenable to paving the way for Transformation? The gradual pace gives people in the domain time to prepare and learn. It raises an interesting possible research

question of whether Collapse and New Equilibrium are being properly differentiated, that is, transitions labelled as New Equilibrium could possibly have been more accurately described as Collapse.

It is also possible that a New Equilibrium could get "stuck" and fail to re-set in something akin to a state of limbo. A significant change takes place, but the existing system has trouble absorbing the change. It is not enough trouble to be considered a collapse, but nor is it a successful re-set to equilibrium. This is a fascinating question for further research.

Reflecting on three big historical disruptions, 9/11, the Great Recession, and now Covid, they ended up following a NE path. They jolted the system but didn't collapse it. Perhaps Collapse itself has historically been pretty rare?

Morgan (2021) suggests that the key difference between New Equilibrium and Collapse is one of adaptive constraints. New Equilibrium leads to Transformation via a Ship-of-Thesus-like gradual adaption of systems elements. New Equilibrium adapts by adding in new complex systems. This opens up new adaptation opportunities through both additional complexity. Collapse fails to adapt adequately, often by trying to add ever more complexity to its existing system until it is overwhelmed. Both lead to Transformation, one via full replacement, the other via progressive adaptations.

7.5 How much Transformation should be expected?

It might be assumed that domains reaching Transformation more frequently are performing better, since they are embracing change. But one could imagine a counterargument that if a domain is operating well, it should not need to change frequently. As noted above, the research team expected more Transformation. So why are we not seeing more of it? One explanation is that powerful stakeholders invested in the Baseline use that power to prevent change. A less conspiratorial explanation is a large amount of sunk costs. Both explanations apply in the fossil fuel industry. Some players are resisting change and there are huge sunk costs involved.

Another explanation is that the rate of transformation depends on the size and complexity of the domain. Hines's (2021a) explanation of the long-term future after capitalism notes that

capitalism has been the dominant economic system for hundreds of years. It fit well with external conditions. Today, however, the fit is no longer so tight, and many observers believe it is heading toward collapse. Horizons scanning reveals, however, that supporters of capitalism are busy proliferating a wide array of reform approaches and suggesting new variations. Neoliberal Capitalism emerged in the 1970s as the dominant variation. In the last few years, however, one Hines identified 68 proposed varieties of capitalism (Hines, 2023). A complex entrenched system does not give up easily!

The perceived lack of Transformation could also be explained by several other factors:

- The analysts understanding of the domain may be inaccurate.

- The scenario sets themselves may not have accurately mapped the domain.

- Other models of change may more accurately describe a domain

- Some of the scenario sets that were judged as still being in the Baseline may actually have moved to a Collapse or New Equilibrium or even to Transformation. A more accurate scenario mapping would have enabled the analyst to detect the movement of the domain.

- Along these lines, perhaps the Transformation scenario was inaccurate, and there was indeed a Transformation, just different than the scenario set projected, and thus it was missed.

It is worth noting that Dator (2009) originally proposed two types of transformation: discipline (values-driven), and technological. The Hiness' program deliberately chose to genericize its concept of transformation to include a wide range of types: social, political, economic, environmental as well as technological. In the change models introduced in Section 4, Molitor's model was primarily focused on public policy, Pierre Wack and Shell focused on energy transformation. Perez focused on technological transformation but was careful to note that the process involved more than just technology.

The Hines's work on capitalism noted above focused on economic transformation, but found that social, political, environmental, and technological aspects had to be accounted. In short, there can be many different types of transformation, beyond technology. Digging into

the nature and types of transformations would seem to be an excellent follow-up research question.

7.6 Revising the archetype technique: the HAT

One tangible output coming from this research was the creation of a variation on the scenario archetype technique dubbed the current Hines organization Archetype Technique, shown in Figure 7. If the research proves out the expected pattern, the number of scenarios could be expanded as follows:

- Horizon one is covered by the Baseline
- Horizon two is covered by Collapse and New Equilibrium
- Horizon three, the most novel of the scenario set, is more deeply described by two or even three scenarios.

[insert Fig. 7 Hines organization Archetype Technique]
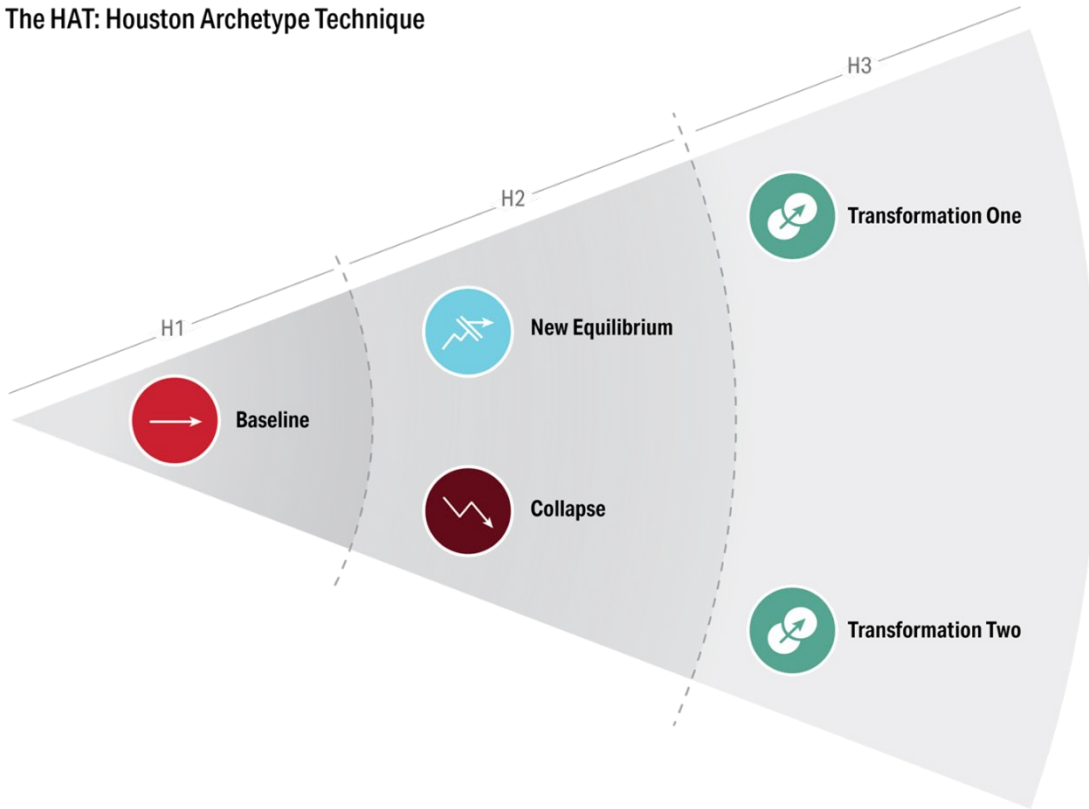
The HAT: Houston Archetype Technique

Figure 7. Houston Archetype Technique

Figure 8 shows all archetypes beginning in Horizon 1, with the Baseline most prominent. As the Baseline declines, either Collapse or New Equilibrium become more prominent in H2. And as they eventually decline, Transformation arrives in H3. After applying the technique in a few projects, an interesting question has already emerged about how prescriptive the pathway might be: should it be: B>NE>T1 and B>C>T2, as suggested by Figure 8 below.

A key question that emerged during the analysis was how well or accurately the team was doing the mapping. This led to a discussion of how to indicate or claim when a horizon shift had occurred. What are the ideal criteria to use for saying, for instance, that a domain had shifted from the Baseline to New Equilibrium, or from New Equilibrium to Transformation? The research team believes this could be a very fruitful topic for further research. Finally, before we
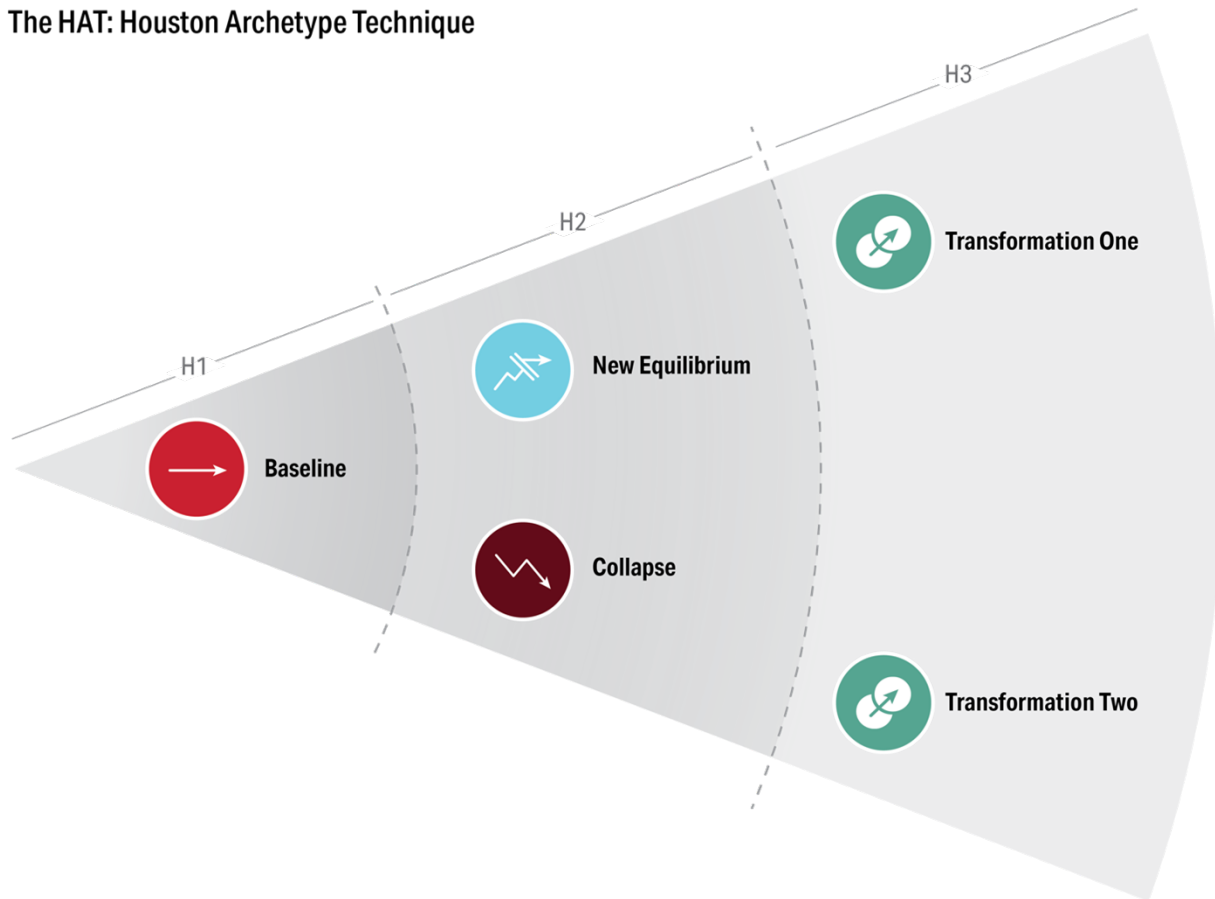
The HAT: Houston Archetype Technique

Figure 8. Pathway variations

conclude, we will discuss the future research opportunities that have been revealed through this project.

8. Future Research Opportunities

Through the course of this research program, several opportunities for further research were revealed. An immediate follow-on research question would be to explore this pathway to transformation consistently observed by the research team with a larger scenario set to confirm whether the New Equilibrium route is indeed the more common one. As discussed above, a required preliminary step would be to first find more historical scenario sets. A promising development in this regard is the recent launch of the Open Foresight Hub (see

www.openforesighhub.or), a wiki for collecting and organizing publicly available reports on the future, which began with over 700 reports including many scenario sets.

Several other areas emerged as exciting for potential future research:

- The research team was a bit disappointed at what was felt to be a lack of transformation. Perhaps this is the most common development timing. But it raises a key research question: How might we get better at Transformation? There are promising recent attempts to address this question. An integrative literature review by Ketonen-Oksi and Vigren (2024) focused on methods for imagining transformative futures, motivated by the need to address the planetary crisis. The Hiness built upon work from Vogel and O'Brien (2022) coming from the sustainability domain, which noted an increase in the scholarly literature on transformation. In particular, they note the need to make this work more tangible in terms of how to empower individuals, groups, and organizations to transform. Along these lines of "how to" enable transformation, Hawxwell, Abe Hendriks and Philipp Späth (2024), recently proposed a typology of future-making for transformative change.

- What happens after Collapse? The research team expected Collapse to be the more likely predecessor to Transformation, but the research did not bear this out. Perhaps non-developmental models of change highlighted in the literature review could provide insight here. A helpful place to start is Brozovic's (2023) multidisciplinary review that consolidates and synthesizes the existing literature (361 articles and 73 books) on collapse. It provides a solid foundation for investigating collapse. Interestingly, there were very few sources from the Foresight field. Reinforcing this observation, a search of the journal Technological Forecasting & Social Change returned only two articles with "collapse" in their title, both from 2010. Decolonizing futures research may also provide insight into this question, as many discourses in these spaces position the present and future of colonized people as inhabiting a post-collapse world. This includes work such as Eshun (2003) and Brown (2021) on afrofuturism, and Paradies (2020) among others, regarding indigenous futures.

- The New Equilibrium Loop: does it take multiple discontinuities to finally break out of New Equilibrium? Perhaps a single shift simply loops back, nudging the system forward, but not enough to reach H3 Transformation. It may take several of these loops to finally transform the system. Sardar and Sweeney's (2016) postnormal times suggest a future where complexity, chaos, and contradictions are the norm and linearity is increasingly rare. Iterative loops may fit well here. Another promising area to explore is Snowden's (2022) latest entry in his Cynefin (1998) series that refers to estuarine mapping, which creates a visual metaphor of water flowing in and out in describing nonlinear systems behavior in which change advances in a series of micro-nudges rather than one big shift.

- The research team wondered if there were any domain-specific patterns, that is, did I/T domains move faster than say security domains? Also, the team suspected the framing of the domain itself may influence its development timing. If a domain is framed very broadly, e.g., the future of work, does that suggest it would take longer to reach transformation than a domain framed more narrowly, e.g., the future of virtual work? An interesting potential research question would be to look for patterns in various domains. For instance, are some domains doing more futures/scenario work? If so, are they benefitting from it? And how would that be measured? The Clockspeed (Fine 1998) research noted in Section 4.1.2 provided a qualitive estimate of some domains, but there does not appear to have been an update along similar lines. Perhaps a few places to start are transformations involving sustainability and digitization. The literature review cited above by Ketonen-Oksi and Vigren (2024) that identified cases of transformation was heavily weighted towards sustainability, roughly two-thirds of them. A second search of Technological Forecasting and Social Change's top 100 most relevant hits on transformation found that 67 were about digital transformation.

- More broadly, does this research have something to tell us about the pace of change? If we surveyed futurists and clients, for example, on their expectations on how domains develop over time, would they be surprised one way or another – is change faster or slower than they expected. Harman (1979) contended that social systems change continuously and smoothly and rarely change in a discontinuous fashion. Brand's (2018)

seminal work on the pace layering of change proposed that different components or systems of civilization change at different rates. The media is replete with headlines about the unprecedented pace of change (Shapiro, 2021) or that the future is faster than we think (Diamandis and Kotler, 2020). The Hiness of this paper are perhaps in the minority in proposing that change is generally slower than perceived. There is still much to be sorted here.

9. Conclusion

The Hiness' program observed in its practice that its version of Dator's original scenario archetype technique seemed to map usefully to the Three Horizons framework. It provided a helpful way to understand how domains develop over time. It was not expected that it would explain the pattern of every domain, but it seemed to provide a useful starting point for clients to "get their heads around" how their domain might change. Oftentimes, clients report that the future looks like a bewildering array of conflicting possibilities that lacks a rhyme or reason. Thus, this technique is offered to help with that. It is not intended to suggest that this is the only way that change happens, but "a" way. In that spirit, we welcome alternative ways of seeing or knowing that might enhance our approach or open up new and potentially more useful paths of inquiry.

To test this idea, historical scenario sets of various domains were collected and selected for inclusion if the scenarios could be usefully mapped to our four scenario archetypes. Unfortunately, it was more challenging to find older scenarios sets that reached their projected time – 25 were included – so we also included more recent sets who hadn't reached their timeframe – a combined total of 78. After fitting the scenarios to the archetypes, the pathway the domain followed over time was mapped. As anticipated, the pathway from Baseline to either Collapse or New Equilibrium was consistent. A surprising finding, however, was that the ultimate path to transformation (as suggested by the Three Horizons framework) consistently went through New Equilibrium. It challenges the aphorism that crisis – in our case Collapse – is necessary to provide the motivation to significant change – in our case Transformation.

Our work assumes that the Horizon 1 Baseline scenario describes the way the current systems operates, or the way things are. But it is a fair question whether that can accurately be done. Snowden's Cynefin Framework and Sardar's post-normal ideas, both noted in the literature review, and Timothy Morton's elusive Hypeorbjects (2014) would suggest otherwise. There are many other possible contributors to the understanding of change in a domain from the Anticipation work of Miller (2019), the critical futures work of Inayatullah (1998) embodied in CLA, and the Integral Futures work of Slaughter (2020). We might also anticipate potentially new explanations and frameworks from the Global South as its futurists assert their presence on the global foresight scene. This brings us back to the point made earlier by Curry that the futures space has a relative lack of change models – thus the space is wide open for new contributions.

While we are pleased the research supported our hypothesis to some extent, there is much left unexplained. We propose some areas for further research above, but it is worth calling out here that we also believe that other explanations of change could play a useful role in explaining how domains unfold into the future. We are excited to provide this initial foray into what we hope will be a topic of research interest to the broader futures community.

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