BUILDING BRAVE NEW WORLDS

Science Fiction and Transition Design

By: Leah Zaidi

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Submitted to OCAD University in partial fulfillment
of the requirements for the degree of Master of Design in
Strategic Foresight and Innovation

Toronto, Ontario, Canada, December, 2017

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ABSTRACT

The worldbuilding practices of science fiction authors have the potential to play a key role in society, given that they involve the design and depiction of complex, alternative realities set in the future. This potential is acknowledged by Transition Design--an emerging area of practice that melds futures-based narratives, foresight, and systems-thinking, amongst other disciplines. Transition Design goes beyond social innovation to envision radically new images of the future, and pathways towards more sustainable systemic states. To facilitate the design of and transition towards sustainable futures, this Major Research Paper introduces the Seven Foundations of Worldbuilding: a model that integrates a new superstructure of complex systems with backcasting methodology.

ACKNOWLEDGMENTS

This Major Research Project is dedicated to my loved ones who have tolerated both my presence and my absence over the past two years, including David, Irene, Jarita, June, Lin, Michele C., Nargis, Richard, Sarah, and Wendy. To my talented writer's circle — John, Joyce, Rob, Sandra, and Terry — who have taught me much, and continue to teach me still.

The there are a few individuals within the Strategic Foresight and Innovation community without whom this paper would not have been possible.

To my classmates who inspired and challenged me: it is said that if you are the smartest person in the room, you are in the wrong room. For the duration of the program, it was my privilege to sit in the right room. I would like to thank Annie Constantinescu, Nicole Knibb, and Ziyan Hossain for their friendship. In particular, thank you to Michael Keoshkerian who has not only provided me with countless hours of free therapy, but has become like a brother to me.

Thank you to my professors for their knowledge, wisdom, and time. Throughout the program, Stephen Davies and Peter Jones were a constant source of support and insight, above and beyond what was required of them. To my secondary advisor, Stuart Candy, who set me down this path and changed how I see the future. Last but not least, to my primary advisor, Michele Mastroeni, who has altered the trajectory of my life and inspired the path I take forward.

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INTRODUCTION

"Today we live in a society in which spurious realities are manufactured by the media, by governments, by big corporations, by religious groups, political groups... So I ask, in my writing, 'What is real?' Because unceasingly we are bombarded with pseudo-realities manufactured by very sophisticated people using very sophisticated electronic mechanisms. I do not distrust their motives; I distrust their power. They have a lot of it. And it is an astonishing power: that of creating whole universes, universes of the mind.

I ought to know. I do the same thing."

-Philip K. Dick

Have you dreamt of other worlds? Another time, another place perhaps...universes of the mind so unlike our own. Is it because you grew tired of this one? Many of us have, at some point in our lives, asked if there is a time or place better than the one we find ourselves in — that this cannot be all that there is or the best that we can do. And when we grow dissatisfied, we may look for an escape — someway out of our reality, sometimes seeking a world brighter than our own, other times a world in darkness so that we may better appreciate ours.

The desire for escape is one reason why we love fiction. It is through stories that we immerse ourselves in a different world — become a different person, live a different life — all the while never moving an inch. Stories are, at once, both safe and dangerous; we never need to leave our own mind to fully appreciate a story, but a good story may forever change our mind. When those stories are of worlds yet to come — set in a future we may never see, in a world foreign to us, or full of objects of ingenuity we have never encountered — we call that story science fiction. It is in the worlds of science fiction that we see the potential for what we could become.

But what if we stop seeking escape and start seeking change? What if we could learn from those who build the worlds we escape to, in order to create a better one for ourselves? It may be possible for us to build a world we prefer more than this one — a world in which our systems are sustainable, and in which we are collectively better off. However, it is difficult to envision such worlds, much less realize them.

The following paper is an exploration of how changemakers can leverage the artistic practices of science fiction authors to inform the strategic design of, and transition towards, collective preferred futures.[1]

WHO IS A CHANGEMAKER?

For our purposes, a changemaker is an individual who:

1. Is addressing a complex societal problem with a long-term sustainability mindset. This individual has an inclination towards social innovation (designing for the current paradigm), but may want to change the paradigm altogether;
2. May have some knowledge of foresight and systems-thinking;
3. May be working with various stakeholders who have some or no foresight and systems-related knowledge.

1. Because literature serves as source material for other science fiction mediums such as film, this paper will focus mostly on science fiction literature. Some notable exceptions of original work, (not adaptations of literary work), include *2001: A Space Odyssey, Star Wars*, and *Star Trek*.

Changemakers may require simple and intuitive, yet robust frameworks and methods that allow them to engage in complex, uncertain futures. They may encounter common problems that prevent individuals and organizations from engaging in deep, long-term change such as the lack of futures literacy or our propensity for short-term thinking (Slaughter, 2004). For instance, they might need to envision and design for a sustainable society using language that is familiar to all of us, and lends itself to constructing a shared reality.

Changemakers may also need multiple societal leverage points, from the everyday life to deep-seated civilizational mythologies. A changemaker is someone who wants significant societal change, and is willing to do the hard work required to get there.

THE PATH AHEAD

This Major Research Paper will take you through the following journey:

In **Chapter One**, we explore the broader implications of narratives and science fiction; the power they hold over us and how they shape our lives.

In **Chapter Two**, we consider how science fiction relates to the strategic practice of foresight, their uneasy past and their increasingly entangled future.

In **Chapter Three**, we learn about the concept of worldbuilding — the lifeblood of storytelling in science fiction — and how authors engage in it. By understanding how authors build worlds, we extrapolate design implications for building collective preferred futures, and the transitions it will take to shift our world to a more sustainable one.

In **Chapter Four**, we take a brief look at backcasting in foresight and the panarchy framework in systemic design — practices foreign to worldbuilding that could benefit collective preferred futures.

In **Chapter Five**, we tie our learnings together in a new worldbuilding model for changemakers — one that facilitates the creation of collective preferred futures, with consideration for the foundational elements of a world, and the transitions required to get there. The model was derived from the worldbuilding processes of authors, and the tenets of Transition Design (a proposed field of study). It consists of easy-to-use, intuitive categories that allow changemakers with limited foresight and systems knowledge to envision radically new images of the future, while distilling complex concepts such as backcasting into a simple visual form. It challenges changemakers to build robust preferred futures, capturing all elements of a societal superstructure in every future system or state.

In **Chapter Six**, we learn the results of a preliminary research study, in which practitioners explore whether or not our new worldbuilding model is usable and viable.

In **Chapter Seven**, we look to the future and conclude our journey.

On that note, let us begin.[2]

2. The complete research methodology for this paper is provided in Appendix A.

CHAPTER ONE: THE POWER OF NARRATIVES

There are few things we love more than a good story. Imagine, for a moment, what it must have been like when the first story was told. Was it a little lie told to a child to keep her out of trouble? Or a fantasy shared between lovers in a stolen moment? Or, perhaps, it was a great tale of survival against all odds, of gods and other worlds, of life and death and everything in between? We will never know. Neither storyteller or listener could have understood the weight that the first story carried for all of humanity. The only thing that we can be certain of is that, once upon a time, we began to tell stories and it changed everything.

Stories matter to us. Great stories transcend space and time, becoming a part of the very fabric of our lives. They help us make sense of our world and of ourselves in a way reality cannot, and show us that we must accept the limitations of our humanity, while striving to transcend ourselves, nonetheless. Stories "can be a way for humans to feel that we have control over the world. They allow people to see patterns where there is chaos, meaning where there is randomness. Humans are inclined to see narratives where there are none because it can afford meaning to our lives — a form of existential problem-solving" (Delistraty, 2014).

Often, stories have the power to change us on a fundamental level. In a study on race perception and narratives, researchers found that "reading offers the potentially rare opportunity to understand individuals different from ourselves" and can instill a sense of empathy (Johnson, Huffman, Jasper, 2014). It is not just that narratives are compelling; our brain processes moral lessons coded in narratives differently. Researchers have also found that "narratives that appeal to 'protected values', including core personal, national, or religious values, may be particularly effective at influencing receivers. Protected values resist compromise and are tied with identity, affective value, moral decision-making, and other aspects of social cognition" (Kaplan, et al, 2016). When we encounter moral lessons in the form of a narrative, our brain shows increased activity and engages more deeply than we would otherwise (Kaplan, et al, 2016).

Creating fiction — our ability to envision possibilities outside of our immediate reality — is a defining characteristic of being human, and has served as an evolutionary advantage for our species. In many ways, it has shaped our reality. Historian Yuval Noah Harari argues that our world can be divided into objective reality and fictional reality (Harari, 2015). According to Harari,

> "We humans control the world because we live in a dual reality. All other animals live in an objective reality. Their reality consists of objective entities, like rivers and trees and lions and elephants. We humans, we also live in an objective reality. In our world, too, there are rivers and trees and lions and elephants. But over the centuries, we have constructed on top of this objective reality a second layer of fictional reality, a reality made of fictional entities, like nations, like gods, like money, like corporations. And what is amazing is that as history unfolded, this fictional reality became more and more powerful so that today, the most powerful forces in the world are these fictional entities" (2015).

This social constructivist view of the world places fiction at the heart of human civilization. We create narratives to better understand and operate within our world, and legitimize those narratives through our artifacts and actions. For instance, corporations have offices, nations have flags, and money comes to us in tangible forms such as coins, notes, and credit cards, even in the digital age.

If we approach our reality as if it is a story, then this perspective yields three significant insights:

1. All stories are co-created;
2. Stories can be rewritten;
3. Language and narratives can help transition a system from one state to another.

The fictions we have entrenched ourselves in require perpetuation from all of us to preserve themselves. Even on the most intimate of levels — the private, unspoken exchange between author and reader — **stories are co-created**. In his memoir, *On Writing*, Stephen King describes this act of co-creation — a sort of "telepathy in action", if you will:

> "Look — here's a table covered with a red cloth. On it is a cage the size of a small fish aquarium. In the cage is a white rabbit with a pink nose and pink-rimmed eyes. In its front paws is a carrot-stub upon which it is contentedly munching. On its back, clearly marked in blue ink, is the numeral [eight].
>
> Do we see the same thing? We'd have to get together and compare notes to make absolutely sure, but I think we do. There will be necessary variations, of course: some receivers will see a cloth which is turkey red, some will see one that's scarlet, while others may see still other shades. (To colorblind receivers, the red tablecloth is the dark gray of cigar ashes.) Some may see scalloped edges, some may see straight ones. Decorative souls may add a little lace, and welcome — my tablecloth is your tablecloth, knock yourself out" (King, 2010).

Narratives leave room for interpretation, for each reader to make the experience of reading a story personal. Similarly, through participation, non-participation, or outright dissent, we forge our fictional reality and feed or starve the myths at play in society. Everything from gender norms to human rights to our consumption-driven culture are acts of co-creation that we reinforce on a daily basis. Dismantling destructive or detrimental narratives requires us to collectively choose another story.

If we can create stories together, we can destroy them together too. Our **stories can be evolved or rewritten**. This is common practice whether we consider how oral traditions evolve, the retelling, reinventing, or remaking of works, or the adaption of a story from one medium to another. For example, Ray Bradbury, Arthur C. Clarke, and Robert A. Heinlein all consider Edgar Rice Borough's *A Princess of Mars* a source of inspiration (Simon and Schuster, 2017). Onscreen adaptations of books such as *Hitchhiker's Guide to the Galaxy* and *Jurassic Park* take liberties that stray from the original storylines.

If we acknowledge that much of what we consider reality is comprised of narratives, and that these narratives can be rewritten, then the process for creating and telling stories may offer insight into how to improve our society. Creating and imagining collective fictions also gives our species "the unprecedented ability to cooperate flexibly in large numbers" (Harari, 2014). We may be able to facilitate widespread change because,

> "large scale human cooperation is based on myths, [and] the way people cooperate can be altered by changing the myths – by telling different stories. Under the right circumstances myths can

> change rapidly. In 1789 the French population switched almost overnight from believing in the myth of the divine right of kings to believing in the myth of the sovereignty of the people. Consequently, ever since the Cognitive Revolution Homo sapiens has been able to revise its behaviour rapidly in accordance with changing needs" (Harari, 2014).

This implies that the intentional design of narratives can have a profound societal impact, and trigger meaningful change on a mass scale if employed towards that end.

It is not only stories that have a significant impact in shaping our understanding of the world, but also the words those stories are comprised of. In all cultures, language "fulfils a number of functions. It interprets the whole of our experience, reducing the infinitely varied phenomena of the world around us, as well as the worlds inside us, to a manageable number of classes of phenomena, types of processes, events and actions, classes of objects, people and institutions" (Resta, 1998).

Language is a critical leverage point that can shift a system's dynamic. In a documented conversation, cybernetics expert Paul Pangaro and researcher Michael Geoghegan discussed the role of language in organizations (Esmonde, 2002). They articulate that "because organizations struggle with internal and external challenges that threaten its survival, narrowed and shared language creates efficiency shortcuts and helps preserve relationships" (Esmonde, 2002). Geoghegan offers that organizations can evolve and regenerate through the introduction of new language into the system without challenging formal power structures (Esmonde, 2002). Since new language that comes from outside the system has a different history and presents different challenges, it counteracts obsolescent thought (Esmonde, 2002).

Language is not just a leverage point; it is a living system onto itself. The design of language, conversations, and narratives that underlie a system are powerful enough to shift it, and developing a new and/or common language can help establish a shared reality. Language can also be used strategically.

Borrowing from religion's penchant for storytelling, Japanese multinational, Panasonic, staged a dramatic recovery by employing a narrative strategy in the early 2000s (Ogilvy, Nonaka, Konno, 2014).[3] Alternative scenarios, themes of creation and destruction, and a series of messages, such as 'Refound the company every day', were introduced to shift mindsets and behaviours away from a culture of copying competitors, towards becoming a 'super-manufacturer' (Ogilvy, Nonaka, Konno, 2014). By employing these tactics, the organizational mythology evolved, and the company was able to capitalize on the power of storytelling.

They also demonstrated that "organizational reform...can be carried out when its proponent motivates people to get involved in the 'plot', especially if they can tell their own stories as sub-plots" (Ogilvy, Nonaka, Konno, 2014). They positioned employees as protagonists, giving each person a role to play in the transition process. This also suggests that they tapped into an emotional, archetypal approach rather than one driven by facts and figures. Using this strategy, it took Panasonic two and a half years to turn a 2ll.8 billion yen deficit into a 126.6 billion yen surplus (i.e. approximately $2.4 billion in deficit to $1.4 billion in surplus in Canadian dollars) (Ogilvy, Nonaka, Konno, 2014).

3. At the time, Panasonic was known as Matsushita Electric Industrial Co., Ltd. (Ogilvy, Nonaka, Konna, 2014).

The power that narratives wield in our lives should not be understated. Our fictions are as much a part of us as our realities, and have consequences that play out on a mass scale. It is against this vast backdrop that we consider the role of science fiction.

THE POWER OF SCIENCE FICTION

As a prominent and popular literary genre, it should come as no surprise that science fiction has a power of its own. From Mary Shelley to Robert A. Heinlein to William Gibson, science fiction has provided the world with images of the future. Science fiction is, in the broadest sense, fiction that follows science. It depicts "plausible futures — envisioning where contemporary social trends and recent breakthroughs in science and technology might lead us" (Gunn, 2014). Beyond foreign and familiar technologies and worlds, are warnings, wisdom, and messages of hope. They convey powerful insights into human nature — what we are, what we could be, and what we might fail to become. According to famed futurist Alvin Toffler, "science fiction is the sovereign prophylactic against future shock" (1970).

Science fiction holds influence over technological innovation and scientific research. For instance, "Jules Verne is credited with having directly inspired the inventor of the US Navy's first submarines (Simon Lake who was inspired by *Twenty Thousand Leagues Under the Sea*) and the modern helicopter (Igor Sikorsky inspired by *Clipper of the Clouds*)" (Tavakoli-Far, 2013). It was Arthur C. Clarke who first proposed using satellites for global communications in 1945 (Tweney, 2011). And the list goes on. Everything from the desire to visit "Mars to flying cars to digital drugs, robot friends to teleportation, GPS to mobile communicators, smart food to mitochondrial reproduction techniques," has roots in science fiction (Bassett, Steinmueller, Voss, 2013). The multitude of examples demonstrate that "science fiction and science 'fact' — science and technology innovation, policy, public knowledge, investment — are not two separate realities but are two entangled and overlapping fields" (Bassett, Steinmueller, Voss, 2013).

But science fiction is more than that. The genre "unites apparent opposites. It is secular-scientific and mythic-romantic; it is both rational and emotional; it combines the strengths of religious inspiration with rational understanding…[it] can be seen as both 'thought experiments' and artistic visions...it ties the past and the future together" (Lombardo, 2006). In short, science fiction is many things to many people. In fact, science fiction author "Brian Aldiss is not alone in declaring that 'any definition of science fiction lacks something'" (Bassett, Steinmueller, Voss, 2013).

Physicist Helen Klus has stated that science fiction is important for three reasons: it helps us explore philosophical questions around the nature of reality and our place in it, it "inspires people to become scientists", and it provides us with alternative images for how society could function (2012). To support her claims, Klus cites some powerful examples. For instance, "Edwin Hubble...the first person to prove that galaxies exist outside of the Milky Way, was inspired to become a scientist after reading Jules Verne novels. Astronomer and science fiction author Carl Sagan was influenced by Robert A. Heinlein, and theoretical physicist Michio Kaku enjoyed the television show Flash Gordon as a child (Klus, 2012). There are dozens of examples like this. In fact, companies like Google, Microsoft, and Disney now seek out science fiction authors to help their teams imagine and design for the future (Gunn, 2014).

Another example of the interplay between science fiction and research can be examined through the influence and impact of Michael Crichton's *Jurassic Park*. To many scientists, the 1990s became known as the 'the Jurassic Park phase' (Jones, 2015). For instance, when "a team of researchers extracted and sequenced DNA from a 125 [to] 130 [million]-year-old ancient weevil in Lebanese amber", scientific journal, Nature, delayed reporting the results until June 10, 1993 – "one day after the Jurassic Park premiere and one day before its release in cinemas across the United States" (Jones, 2015). Furthermore, the release of the movie impacted decisions surrounding grant funding and "created a new generation of 'geeky but glamorous' scientists" (Jones, 2015).

It is not just in the field of science that science fiction has an impact. The genre has had a significant role in helping our society progress. For example,

> "When Nichelle Nichols, who played Lieutenant Uhura, was considering leaving the series, civil rights leader Martin Luther King Jr. convinced her to stay. King argued that her inclusion on Star Trek was important because, as a black woman, she helped represent a future people could aspire to, one where people were judged solely on the content of their character.
>
> Shortly after, Nichols publicly criticised NASA for only selecting white male astronauts, she was invited to NASA headquarters and asked to assist in convincing former applicants to reapply. This led to the selection of Sally Ride and Guion Bluford, who became NASA's first female and first black American astronauts respectively. NASA's first female black American astronaut, Mae Jemison, directly cited Star Trek as an influence, and later appeared on Star Trek: The Next Generation" (Klus, 2012).

Science fiction can and has instigated positive social change.

Yet, the genre is consistently met with derision. The New York Times once declared that "science fiction will never be Literature with a capital 'L'" (Mancuso, 2016). In *Future Shock*, Toffler stated that,

> "Science fiction is held in low regard as a branch of literature, and perhaps it deserves this critical contempt. But if we view it as a kind of sociology of the future, rather than as literature, science fiction has immense value as a mind-stretching force for the creation of the habit of anticipation. Our children should be studying Arthur C. Clarke, William Tenn, Robert Heinlein, Ray Bradbury and Robert Sheckley, not because these writers can tell them about rocket ships and time machines but, more important, because they can lead young minds through an imaginative exploration of the jungle of political, social, psychological, and ethical issues that will confront these children as adults" (1970).

As a sociology of the future, science fiction has an important role to play. To understand the dynamics of this role better, we must examine the relationship between the genre and the professional/academic field of foresight.

CHAPTER TWO: SCIENCE FICTION AND FORESIGHT

Given that science fiction is described as a sociology of the future, it should come as no surprise that science fiction has close ties with the field of strategic foresight. Science fiction and foresight both consider possible, plausible, and preferable futures, albeit to varying extents and towards differing outcomes (Voros, 2003).

However, a tension exists between futurists and science fiction authors — "between elite/expert and grassroots/amateur producers of knowledge" (Li, 2013). Futurists have questioned "the legitimacy and utility" of popular culture science fiction, and science fiction authors have threatened "disruption and usurpation" to the authority held by professional futurists by creating populist futures that are more readily absorbed by society, and use little to no futures knowledge (Li, 2013). Li explains that the futures field tends to express three uneasy attitudes towards mixing foresight and pop culture:

> "Monkish (where professional futures knowledge must be institutionally protected in amidst popular culture), Gonzo (where popular culture is primarily a target for jamming-and-hacking by grittily enlightened futurists); and Collapse-Folk (where futures knowledge has been thoroughly mangled after being absorbed by grassroots popular culture)" (2013).

Ultimately, science fiction is an artistic endeavor while foresight is a strategic one. For instance, foresight may examine the past for signals and patterns to inform an exploration of the future (Saffo, 2007). In contrast, science fiction is free to move in every direction of time for any purpose, including in parallel or as an alternative to our own time stream.

Unlike foresight practices, science fiction does not typically have a desired outcome that is commissioned or intended to inform strategy, policy, or design. Writers have a number of reasons for engaging in their craft and writing specific types of work. These reasons include, but are not limited to: a desire to explore an internal or external world/reality, personal interests, to tell the stories they want to read, earning an income, establishing a legacy, and so on.[4] Whatever reasons an author may have to write, mobilizing real world change does not necessarily need to be one of them. It is not an obligation or a requirement. Because it is not strategic in nature, science fiction writers do not actively work towards influencing global systems and the creation of collective preferred futures.

Foresight, on the other hand, seeks to engage with the future for strategic purposes. Foresight is "the ability to create and sustain a variety of high quality images and understandings about futures and apply these in a range of socially useful ways; for example, to develop policy, guide strategy, [and] avoid or mitigate disasters" (Slaughter, 2004). In the context of collective preferred futures, we may engage in civilizational foresight.

Civilizational foresight looks "toward the next civilization — the one that lies beyond the current hegemony of techno/industrial/capitalist interests...it routinely thinks long-term, takes future generations seriously, learns its way towards sustainability" (Slaughter, 2004). It is a systemic, long-term approach that "draws on countless fields of culture and enquiry to set up notions of 'design forward'. Such work allows us to speculate openly about such questions as: worldview design, underlying assumptions and values, civilizational myths and so on, as well as more down to earth matters such as infrastructure, governance and economic relations" (Slaughter, 2004). An example of an attempt at civilizational foresight is the Kyoto Protocol: "an international agreement...which commits its Parties by setting internationally binding emission reduction targets" (UNFCCC, 2014).

4. Many would say writing to become wealthy is ill-advised given the difficulties of earning an income through art.

A NEW HOPE

At present, "the divide between science fiction and futures studies is neither necessary nor desirable. There is a long history of crossover between the two, with each positively influencing the other" (Stackelberg, McDowell, 2015). It was author H.G. Wells who first called for professors of foresight in 1932 (Slaughter, 1989). A little over thirty years later, it was Arthur C. Clarke who stated that "a critical. . . reading of science fiction is essential training for anyone wishing to look more than ten years ahead" (Clarke, 1964). Both Wells and Clarke, "frequently and successfully crossed back and forth from science fiction and futures studies" (Stackelberg, McDowell, 2015). There is much to be gained if the two establish closer ties to inform each other.

Foresight has the potential to influence and impact both science fiction, and real world scientific progress and technological innovation. The scientific and technological progress that arises out of a foresight-conscious and sustainability-oriented society will differ from our own, as will the narratives that such a reality generates. For instance, if stem cell research had not been stifled in the U.S. in the early 2000s, the resulting innovation and social sentiment could have inspired alternative narratives about human cloning and biological 3D printing (Reaves, 2001). In turn, these narratives could have triggered further innovation and research while continuing to impact public perception.

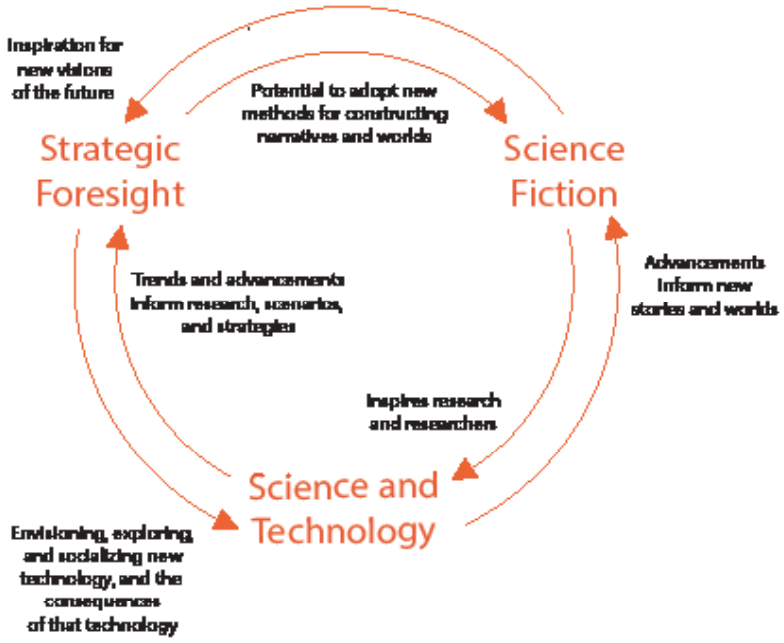


Figure 1: The Mutual Influence of Science Fiction, Science and Technology, and Foresight

A GROWING BOND

Science fiction and foresight already share a number of similarities, and recent developments in foresight further entangle the existing relationship. Amongst the similarities between science fiction and foresight are artifacts, Science Fiction Prototyping, speculative design, and scenario generation.

Science fiction is abound with technology from the future, and artifacts in stories can have enough gravitas to become the central element of a story. Some artifacts can be so powerful, they overshadow social and value-based messages layered into the narrative. For instance, we are more likely to reflect on the dinosaurs from *Jurassic Park* than the social, philosophical, and political implications of unchecked entrepreneurship. Foresight defines artifacts as a "tangible experience of the future" that "make the details of a scenario concrete" (Institute for the Future, 2016). Artifacts from the future play a role in the emerging practice of experiential futures: "the manifestation of one or more fragments of an ostensible future world in any medium or combination of media including image, artifact, and performance" (Candy, 2010).

In both science fiction and foresight, when an artifact is not handled carefully, it can detract or draw attention away from the intended purpose of the narrative or the future it is meant to support. If the intended meaning is lost or overshadowed, the story or the experiential futures' ability to impact real world systems is diminished. For example, modern media and the prevalence of surveillance has given us versions of Orwell's telescreens and Big Brother, but we missed the important lessons about privacy and anonymity from *1984*. As comedian Keith Lowell Jensen notes, "What Orwell failed to predict is that we'd buy the cameras ourselves, and that our biggest fear would be that nobody was watching" (2013).

Another recent development that ties science fiction and foresight together is Science Fiction Prototyping (SFP): the writing of "science fiction based on science fact," or the systematic process of pulling science into narratives in order to generate technological prototypes and understand their human impact (Johnson, 2013). It is a foresight method that directly influences science fiction because the intended outcome is a narrative — one that protoypes a real-world experience in addition to a proposed technology. This method aims to do what science fiction already does in a more direct and strategic manner.

Experiential futures and SFP are closely related to speculative design. Speculative design places "new technological developments within imaginary but believable everyday situations that would allow us to debate the implications of different technological futures before they happen" (Dunne and Raby, n.d.). Speculative designs can be as simple as an unergonomic chair or "as substantial as a public transport infrastructure or how a business should plan its goals. At either end of the scale, the aim of a design process is always to improve the future, which is why the future is often a dominant factor in different design activities" (Kolehmainen, 2016). This interplay of design and narratives set in the future is similar to the exploratory practices of science fiction authors.

Finally, both foresight practitioners and authors build scenarios. In foresight, scenarios are a set of alternative futures that "describe a world to come, making a systematic set of assumptions about the drivers shaping that world. They may be brief and descriptive or they may include story-like narratives that represent the point of view of personas in the future. They may include a 'history of the future' — how we get from here to there" (Institute for the Future, Scenarios, 2017). There are a number of inductive and deductive methods that foresight practitioners use to create scenarios including Generic Images of the Future, 2x2 Matrix, and Branch Analysis Method, amongst others.

In fiction, scenario generation can be far more expansive and elaborate, as authors create robust imaginary worlds — a context within which a story takes place. Because the goal is artistic rather than strategic, scenario generation in science fiction does not consider alternative sets, but a singular and specific vision of the future.

The overlaps between science fiction and foresight are, essentially, the envisioning, exploring, and analyzing of future worlds. For science fiction authors, these overlaps are distilled into a single concept deemed "the lifeblood of storytelling": worldbuilding (Anders, 2013).

CHAPTER THREE: WORLDBUILDING

Worldbuilding is the process of constructing an imaginary world, and encompasses all the contextual details the characters of a story operate within. It is "the creation of imaginary worlds with coherent geographic, social, cultural, and other features" (Stackelberg, McDowell, 2015). The worlds "within which stories are set – provide detailed contextual rule sets that develop a larger reality that extends beyond a single story, while potentially providing a deeper understanding of the underlying systems that drive these worlds" (Stackelberg, McDowell, 2015). A world is a vast, three dimensional landscape while a story is an experience that occupies a sliver of that world. Fictional worlds should reflect the richness of our own realities and give the impression that, even though we are engaging with a work of fiction, the world presented to us is complete and plausible. Every work of literature requires some worldbuilding, whether the story takes place in Rome in 500 B.C., or modern day Tokyo, or in a galaxy far far away.

Not only does worldbuilding hold promise for informing foresight practices, but it can help forge a stronger relationship between foresight and systemic design. Worldbuilding is social constructivism and systemic design for storytelling. Similar to how our socio-ecological systems are emergent, co-evolved and "interlinked in never-ending adaptive cycles of growth, accumulation, [and] restructuring," science fiction worlds instill a sense of completeness (Hollings, 2001). Worldbuilding does not need to be narrow or artifact-centric; it can and should aspire to be systemic.

Unlike science fiction and foresight — which have a longstanding, mutually entangled relationship — science fiction and systems have a less obvious relationship. The connections between the two become more evident when we step back, and look at the broader category of speculative fiction. Speculative fiction "encompasses works in which the setting is other than the real world, involving supernatural, futuristic, or other imagined elements" (Oxford Living Dictionaries, Speculative Fiction, 2017). It includes science fiction, fantasy, horror, alternate history, supernatural fiction, and superhero fiction, amongst other categories (Goodreads, 2017). In the 1980's, literary critic, Tom LeClair coined the term 'systems fiction': speculative fiction that "picks apart how the systems that keep society chugging along work: politics, economics, sex and gender dynamics, science, ideologies...The dramatic kick in a systems novel is usually found in the points where the different systems overlap" (Walter, 2016).

Systems fiction and science fiction can become indistinguishable:

> "At their best, when systems novels veer right into science fiction, they can hold infinity itself in their purview – and none come closer to that than Kim Stanley Robinson. Robinson's seminal Mars trilogy opens with humanity's efforts to colonise our cosmic neighbour in Red Mars, and closes two centuries later in Blue Mars: by then, water is flowing on the planet's surface, an achievement reached after hundreds of pages of Robinson's musings on science, politics, economics and religion" (Walter, 2016).

Heinlein's *The Moon Is a Harsh Mistress*, Ursula Le Guin's *Hainish* series, and Samuel Delany's *Nova* are other examples of both science fiction and systems fiction because they attempt to portray how a complete society works rather than a piece of it (Walter, 2016). Evidence of overlap can also be found in lesser known but emerging subgenres of science fiction such as climate fiction, which "explores the potential, drastic consequences of climate change" or alternative climates (Ullrich, 2015).

Despite its systemic leanings — and its connection to foresight within the context of science fiction — worldbuilding is an understudied act of intentional design that holds potential for real world application. Raven and Elahi have identified that "little or no literature exists which applies the strategies and logics of narrative as understood by writers, cineastes and cultural scholars to the methods deployed by futures scholars and practitioners in the creation of their final outputs" (2014). Given that worldbuilding in science fiction relates to both foresight and systems, an area of design that combines the three domains for the purpose of change may offer tremendous value.

Enter Transition Design.

WORLDBUILDING AND TRANSITION DESIGN

An emerging area of design that marries science fiction, foresight, and systems is Transition Design. Transition Design is a proposed area of practice and study that asserts "that we are living in 'transitional times'" (Irwin et al, 2015).

Consider the following: In early 2017, the "Mauna Loa Observatory recorded its first-ever carbon dioxide reading in excess of 410 parts per million", and we are "on track to create a climate unseen in 50 million years by mid-century" (Kahn, 2017). Nazism has resurfaced in the United States of America — a country that went to war against such a detrimental ideology — thanks to a President that has fueled and legitimized racism, while encouraging violence (Sinclair, 2017). The Doomsday Clock — a design metaphor "that warns the public about how close we are to destroying our world with dangerous technologies of our own making" — sits two and a half minutes to midnight (Benedict, 2017). A statement from the Science and Security Board warns that "the probability of global catastrophe is very high, and the actions needed to reduce the risks of disaster must be taken very soon" (Mecklin, 2017). It has been almost fifty years since the Club of Rome identified a list of forty-nine Continuous Critical Problems, (otherwise known as wicked problems), and we have not resolved a single identified concern but have managed to create new ones (Churchman, 1967; The Club of Rome, 1970).

Change is more imperative than ever. Social innovation — which "challenges existing socio-economic and political paradigms" — is no longer enough (Irwin et al, 2015).[5] Decades of addressing these issues to varying degrees have not yielded results partly because, without intention and foresight, social innovations fall short of their potential. If we restrict ourselves to the domain of social innovation — which often lacks a long-view and sometimes a systemic one — we are more likely to create band-aid solutions than solve our complex problems. Some within the social innovation space share this sentiment. Prominent social entrepreneur, Matthew Manos, asserts that social entrepreneurship is reactionary and "built upon the failure of a natural or societal system", creating an atmosphere of "post-traumatic innovation" (Manos, 2016).

5. Social innovation is a "novel solution to a social problem that is more effective, efficient, sustainable, or just than current solutions. The value created accrues primarily to society rather than to private individuals" (Stanford Graduate School of Business, 2016). A more rigorous definition of social innovation is that it aims to change "the system dynamics that created the problem in the first place...it is any initiative (product, process, program, project, or platform) that challenges and, over time, contributes to changing the defining routines, resource and authority flows or beliefs of the broader social system in which it is introduced. Successful social innovations have durability, scale, and transformative impact" (Westley, 2013). However, not all social innovations are systems changing; some are simply "an idea that works for the public good." (Centre for Social Innovation, n.d.). The concept of social innovation has so many definitions and nuances, that it is has veered into buzzword territory.

What we may need is to reimagine our world and its systems in their entirety. The magnitude and complexity of our social problems may require us to look beyond social innovation to an area of design that demands that, we not only create solutions to existing problems, but envision and design new systems in order shift our society towards preferred futures.

Transition Design suggests that "radically new ideas and compelling visions of sustainable futures are needed", and that we must leverage "future-based narratives that come from the field of science fiction, narrative and storytelling, future-casting/futuring and speculative and critical design to name a few" (Irwin et al, 2015). In addition, it

> "takes as its central premise the need for societal transitions to more sustainable futures and argues that design has a key role to play in these transitions. It applies an understanding of the interconnectedness of social, economic, political and natural systems to address problems at all levels of spatiotemporal scale in ways that improve quality of life... This knowledge, and the new skillsets it will inform, must be integrated from areas such as science, philosophy, psychology, social science, anthropology and the humanities and will therefore challenge existing design paradigms" (Irwin et al, 2015).

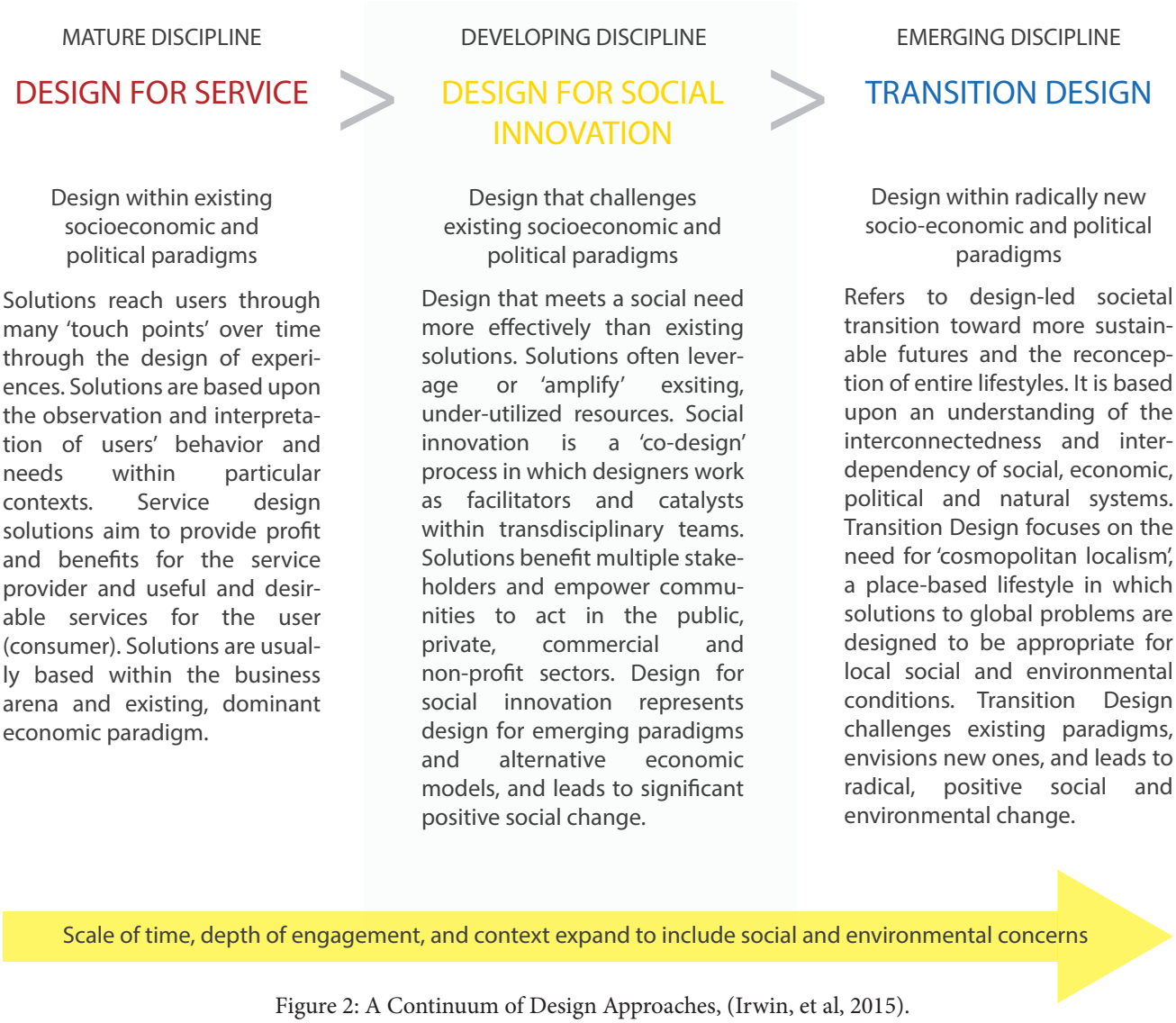


Figure 2: A Continuum of Design Approaches, (Irwin, et al, 2015).

As it stands, design and futures work well together. In The Futures of Everyday Life, futurist Stuart Candy states that,

> "futures can lend design a richer temporal context and big-picture meaning-making — a framework within which to process the stupendous question of, to use Mau's phrase, the 'design of the world'. Design lends futures solidity, communicative as well as exploratory effectiveness...a direct interface to materiality, a place to begin pursuit of preferred futures in the concrete. Together, they provide the tools of a more complex and yet more intuitive exploration of possibilities, with the 'theory objects' of futures — which scenarios have always been — now assuming irresistibly tangible forms" (2010).

When we add science fiction and systems into the mix, we can deepen and enrich the existing relationship between foresight and design.

Transition Design acknowledges the role of systems thinking and systemic design in preferred futures. This includes the concept of 'phase transitions' — "dynamic, non-linear, self-organizing and interdependent" change "within a complex and natural system" (Irwin, et al, 2015). It also includes the living systems theory which "explores phenomena in terms of dynamic patterns of the relationships between organisms and their environments" (Irwin, et al, 2015). Living systems emphasizes "principles such as self-organization, emergence, resilience, symbiosis, holarchy and interdependence, among others, can serve as leverage points for initiating and catalyzing change within complex systems" (Irwin, et al, 2015).

When science fiction is at its best, (think Huxley's *Brave New World* or Herbert's *Dune*), it provides a systemic view of a world and offers insight into what we do and do not consider a preferred future. It goes beyond plot, characters, and artifacts like new technology, to engage in worldbuilding that is expansive and has implications beyond itself, reaching into our reality and revealing its nuances. However, science fiction is not written to inform collective preferred futures. Instead, it is often caught between two extremes: "our apparent binary choice between unthinkable dystopia and unimaginable utopia" (Candy, 2010).

Despite all of the images we have of dystopian futures that paint the follies of inequality, complacency, and unwillingness to change the status quo, we have done little to prevent these futures from becoming our present-day realities. Images of a ravaged Earth are plentiful in popular works of science fiction, such as Hugh Howey's *Wool*, Kim Stanley Robinson's *Science in the Capital* trilogy, and J.G. Ballard's *The Drowned World*. Furthermore, there are few impending challenges that have achieved as much consensus, inspired as much fear across as many scientific fields, from as many experts as climate change. Still, we have taken little meaningful action to prevent the deterioration of the only habitable planet available to us.

On the other end of the spectrum, images of utopian futures that illustrate the wonders and endless benefits of high functioning worlds have not inspired us to build a society in which we are all better off. H.G. Wells' *Men Like Gods* (1923) and Ursula K. Le Guin's *The Dispossessed* (1974) both offer idyllic worlds that we do not use as templates for our own. Replacing self-interest, and our fixation with a profit-driven world, could allow us to achieve significant social reform, including reducing global poverty and improving living conditions for all. We can see the end goal but we do not reach for it. Change, however necessary, is difficult.

If worldbuilding is approached as an act of design that can allow us to envision sustainable futures, then learning how authors engage in the worldbuilding process might aid in real-world design. Moreover, because narratives are powerful and processed differently than other forms of information, borrowing from the principles and foundations of storytelling (such as worldbuilding) may allow us to create and disseminate emotionally resonant images of sustainable futures throughout society. After all, it is through science fiction that society receives its images of the future, and leveraging worldbuilding practices to envision and bring about change may catalyze our efforts. Worldbuilding is one potential approach to combining science fiction, foresight, and systems in meaningful way that facilitates change.

So how is that authors build worlds?

WORLDBUILDING PRACTICES OF AUTHORS

Though researchers have not previously conducted a substantial study on how authors construct narratives, we can catch glimpses of the process through publicly available resources.[6] This includes the worldbuilding practices of science fiction authors Brandon Sanderson, N.K. Jemisin, and Orson Scott Card. We begin with the worldbuilding practices of these authors because all three are recipients of Hugo Awards (science fiction and fantasy's most prestigious award), but also because they have shared their processes with aspiring writers, thereby disseminating their approach and influencing the works of others.[7] The worldbuilding process of each author will be followed by considerations for Transition Design based on those processes.

In general, authors design worlds by taking a top-down or bottom-up approach. A top-down approach involves creating a high-level overview of the world in its broad strokes. For example, this may include outlining features such as geography and technology before articulating details such as cities and weaponry. This approach allows authors to build an integrated system that they can mine for individual stories. The bottom-up approach begins

6. Though an initial enquiry into the worldbuilding practices of authors was conducted in this paper, more insights into the writing process could be of benefit. In order to develop a deeper understanding of narrative design and the process of creating worlds, a suggested methodology for a comprehensive study is as follows:

    1. Literature Review: An in-depth review of worldbuilding processes in literature and other fields
    2. Ethnographic Study: Recruit a variety of authors at different stages within their writing career to conduct ongoing observation and assessment of their practices, with access to the materials produced. Categories of authors should include (but are not limited to):
        a. Science fiction authors
        b. Fantasy authors
        c. Literary authors
        d. Cross-genre authors
        e. Aspiring authors
        f. Debut authors
        g. Seasoned authors
        h. Critically acclaimed authors
        i. Commercially successful authors
    3. Interviews: Ask authors about their experience writing and worldbuilding
    4. Journal/Self-Reporting: Ask authors to keep a daily journal of their writing experience, with particular emphasis on time and effort spent on worldbuilding, and emergent and unexpected realizations about the world throughout the process
    5. Comparative Analysis: document the dissonance between the perception of writing and the reality of it

7. Worldbuilding lists of lesser known authors have been included in Appendix B.

by identifying specific details, incidences, or characters, and/or their relationships. Authors then extrapolate more complex systems from those details. This approach contains the story to its pertinent details. For example, an author may begin with a specific mode of transportation or a character encountering an unknown species, and add layers of complexity to their environment, interactions, and more from there.

BRANDON SANDERSON

The iceberg metaphor is often invoked by authors when describing the worldbuilding process. This metaphor suggests that, even though authors create vast worlds, that are rich in detail, only a portion of that work is visible in the final product (the published story). Authors do not necessarily disclose every aspect of the worlds they create.

In a lecture on worldbuilding at Brigham Young University, Brandon Sanderson, science fiction and fantasy author of *Legion* and *Mistborn*, states that we seek out immersive experiences that take us to a different time and place, and that the iceberg method is one way to accomplish this feat (Skepton Media, 2016). When authors create a tome for their fictional world, "the reader gets the sense the author is several steps ahead, I believe this is real, and the characters are living in a world that exists beyond the page" (Skepton Media, 2016).

Sanderson also acknowledges that, in contrast to authors who plan and build their worlds in advance to writing a story, there are 'discovery' authors who abhor the stifling restrictions that come with having an outline and a pre-designed world. Discovery authors write their story without building their world first, then generate the hidden depths of their world after, and do a rewrite to incorporate their world's hidden elements and/or revise any logical inconsistencies in a subsequent draft of the story (Skepton Media, 2016). Both approaches are valid. As Sanderson states, "you need to give the illusion that the iceberg is there, you don't actually have to have an iceberg" in order to begin writing (Skepton Media, 2016).

In the aforementioned lecture, Sanderson also delves into his worldbuilding process. He divides worldbuilding into two types: a physical setting and a cultural setting (Skepton Media, 2016). The physical setting encompasses all that would exist if humans were not present, and the cultural setting encompasses everything that humans contribute (Skepton Media, 2016). Sanderson then urged the students attending his lecture to identify some physical and cultural 'settings'. They generated the list presented in Figure 3.

Cultural	Physical
language, economy, religion, laws, politics, government, landmarks/wonders, caste systems, customs, philosophy, food lore, music, fashion, folklore, gender roles, weapons, technology, history, human rights, prejudices, education, war, courtship, architecture, jobs	flora and fauna, geography, weather, cosmology, geology, laws of physics

Figure 3: Worldbuilding 'Settings', Brandon Sanderson and Brigham Young University Students (Skepton Media, 2016)

Sanderson then points out that no story addresses all the facets of any given world, and that they could generate many more facets of physical and cultural settings that are distinct from the list provided in Figure 3 (Skepton Media, 2016). He recommends that authors,

> "pick two or three things that pop off the page and [are] unique, something that is at the foundation of what the conflict is going to be in your story or, at least, one of the character conflicts. And then you be as wildly original with that thing as you can be and you try to extrapolate it as far as you can go. This is kind of like building a mini iceberg in one of these areas... pick a couple of these things… [such as] education, laws, and prejudices. I'm writing a fantasy attorney who is defending...these fairies who have been exploited for whatever reason...she's a law student...Then maybe spend your physical worldbuilding on the flora and fauna, so you know what kind of species these are that are being exploited, and dig deep into that. And then you say, you know what, I may not have to spend a lot of time on the languages. The fairies can magically speak our language. I will just leave that out entirely" (Skepton Media, 2016).

Sanderson goes on to state that having a few distinct and interesting ideas (e.g. government or architecture), a character who is passionate about those things, and developing those details can make a world more realistic than a "hundred thousand word bible" (Skepton Media, 2016).[8]

CONSIDERATIONS FOR TRANSITION DESIGN

Balance people and planet: While dividing physical and cultural aspects of humanity may help authors envision new realities, it is problematic from a systems perspective given that our physical environment shapes us and we shape it, in turn. For instance, flora and fauna give us food, a staple of culture, which we not only consume but engineer and design to serve our purposes. Access to and availability of natural resources are a critical factor that determines a nation's wealth and the livelihood of its people (EAP Task Force, 2011). There are less readily apparent connections to consider as well. In the journal, Science, researchers from Princeton University and the University of California-Berkeley reported that,

> "even slight spikes in temperature and precipitation have greatly increased the risk of personal violence and social upheaval throughout human history…[one] standard-deviation shift — the amount of change from the local norm — in heat or rainfall boosts the risk of a riot, civil war or ethnic conflict by an average of 14 percent. There is a [four] percent chance of a similarly sized upward creep in heat or rain sparking person-on-person violence such as rape, murder and assault" (Kelly, 2013).

Separating a world into its physical and social components is akin to the argument made by Harari in his book, Sapiens, and outlined earlier in this paper: that reality is comprised of objective reality and fictional reality (2014). By separating aspects of a world into its physical and sociological components, authors are making the same distinction that social constructivists make. In the real world, we engage in a complex and nuanced exchange with

8. Sanderson references J.R.R. Tolkien's sixty years worth of worldbuilding work on *The Hobbit*, *The Lord of the Rings*, and *The Silmarillion* throughout the lecture to emphasize that such extensive work is not required to write a good story (Skepton Media, 2016).

our objective reality, and actively shape it. As such, the environment should always be considered when designing a preferred future state and any related transitions, with the understanding that changing our social conditions will impact the physical world.

N.K. JEMISIN

At the Writer's Digest Online Workshop and Annual Conference in 2015, N.K. Jemisin, author of Hugo Award winning novels, *The Fifth Season* and *Obelisk Gate*, shared her process of worldbuilding with aspiring writers. Like Sanderson, Jemisin addressed the iceberg metaphor, but suggests that authors include as many worldbuilding details as they desire in their story (whereas Sanderson cautions authors on the extent to which the whole iceberg is visible).

Her worldbuilding process consists of constructing two main elements: the physical world in which the story takes place, and the people that inhabit that world. Jemisin's process shares many similarities with Sanderson's. She begins with picking a planet, considering factors such as whether or not that planet is habitable, if the planet has continents, an archipelago, and oceans, the climate, and its flora and fauna (2015).

Once she has a sense of the general environment, she shifts her focus to building people. Jemisin states that the "world gives us the basics...sociology gives us the rest," and that "even one sociological difference [from reality] can have profound effects" (2015). In the slides she presented, she suggests writers "pick three sociological characteristics to start" that, "in conjunction with the world's physical characteristics, will dictate the rest" (Jemisin, 2015). When layered with a speculative element such as weird science (e.g. two moons) or another sentient species, the fictional world's foundations are in place (Jemisin, 2015).

The example she provided her audience with was as follows: her world consists of two continents — one cold, one tropical — separated by the 'Sea of Tears', a 'hell corridor' that boasts "violent storms, tsunamis, whirlpools, [and] vicious winds" (Jemisin, 2015). Her sociological elements include art and architecture, sex and sexuality, and an 'element X' (Jemisin, 2015). In her fictional world, the homes are built on stilts, ocean motifs dominate the culture, and there is a distinct appreciation of the ephemeral, etc. (art and architecture) (Jemisin, 2015). Society has three genders, with women captaining both families and navy ships (sex and sexuality) (Jemisin, 2015). Its people construct their invincible ships using 'furywood' — a strong and lightweight wood made from trees that grow off the coast from the Sea of Tears (element X) (2015). Jemisin then layers on additional details such as 'a negative attitude towards medicine" and "conflicts with agrarian societies" (Jemisin, 2015). These details provide more dimension and realism, within which plot and character can flourish.

CONSIDERATIONS FOR TRANSITION DESIGN

Design for coherence: Jemisin's example demonstrates attempts at coherence as she extrapolates houses on stilts and ocean motif art from an environment subject to storms and tsunamis. However, to achieve coherence, she goes one step further:

> "Sometimes I'll write a short story set in that universe to try and solidify my ideas. Not the same plot, not even the same characters; just playing around with the world. I call this a 'proof of concept'

> story, for lack of a better description — basically I'm testing the worldbuilding to see if it's complete enough to support a novel yet. Often the act of writing the story helps me catch glaring holes in my worldbuilding (Jemisin, 2011).

Jemisin tests her world in addition to rewriting chapters and revising drafts. Without a concerted effort to reconcile the physical world with the people living in it, the outcome may contain visible disconnects in the world that prove problematic and undermine the plausibility of a story. When a fictional world is incoherent, the story and characters flail within it. This is one reason why authors revise their work and write multiple drafts of the same book: to achieve coherence. In contrast to Jemisin's use of short stories, Sanderson typically writes seven drafts of a book before it is ready for publication (Skepton Media, 2016).

Like the real world, a fictional world requires the same interplay, but to a greater degree. Author Ursula K. Le Guin states that "the touchstone to plausibility in imaginative fiction is probably coherence. Realistic fiction can be, perhaps must be, incoherent in imitation of our perceptions of reality. Fantasy, which creates a world, must be strictly coherent to its own terms, or it loses all plausibility. The rules that govern how things work in the imagined world cannot be changed during the story" (2005). Coherent worldbuilding is critical to science fiction because the genre demands a suspension of belief to engage with worlds that differ from our own.

Coherence implies that the design of a preferred future state should have an internal logical consistency. The concept of coherence is not given prevalence when changemakers solve problems — at least, not to the same degree as ease-of-use or aesthetics — but does emerge in tangents. For instance, in Making Meaning, designers, Diller, Shedroff, and Rhea present harmony as one of the fifteen core meanings and values that people seek in experiences (2008). They describe harmony as that which "promotes balanced and pleasing relationship of parts to a whole, whether in nature, society, or an individual" (Diller, Shedroff, and Rhea, 2008). However, harmony does not necessitate a logical consistency, like coherence does. For proponents of design thinking such as IDEO, coherence is not an explicitly acknowledged consideration in models such as the one presented in Figure 4.

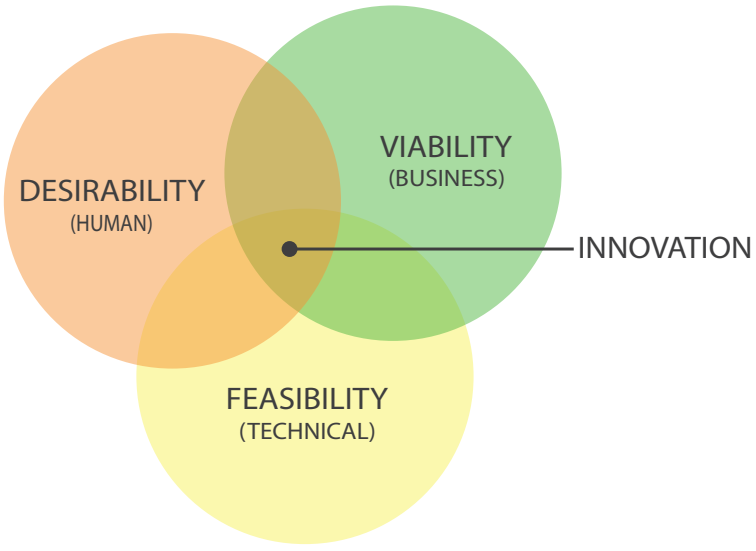


Figure 4: Desirability, Feasibility and Viability Model (IDEO, 2008)

Coherence may not be a key consideration in a living systems approach either, given that nature seeks balance and equilibrium, and not necessarily coherence. Coherence is, however, an aspect of systems ordering — one of ten Shared Systemic Design Principles outlined by systems expert, Peter Jones (see Figure 5) (2014). Jones states that "the design of data structures and information representations enables the ordering of coherent patterns and information flows that afford the recognition of meaningful relationships by an observer" (2014). Furthermore, "ordering defines the relationships of objects, system components, or abstract concepts to each other in a systematic way. The ordering of relations within a system set creates a compositional unity" (Jones, 2014).

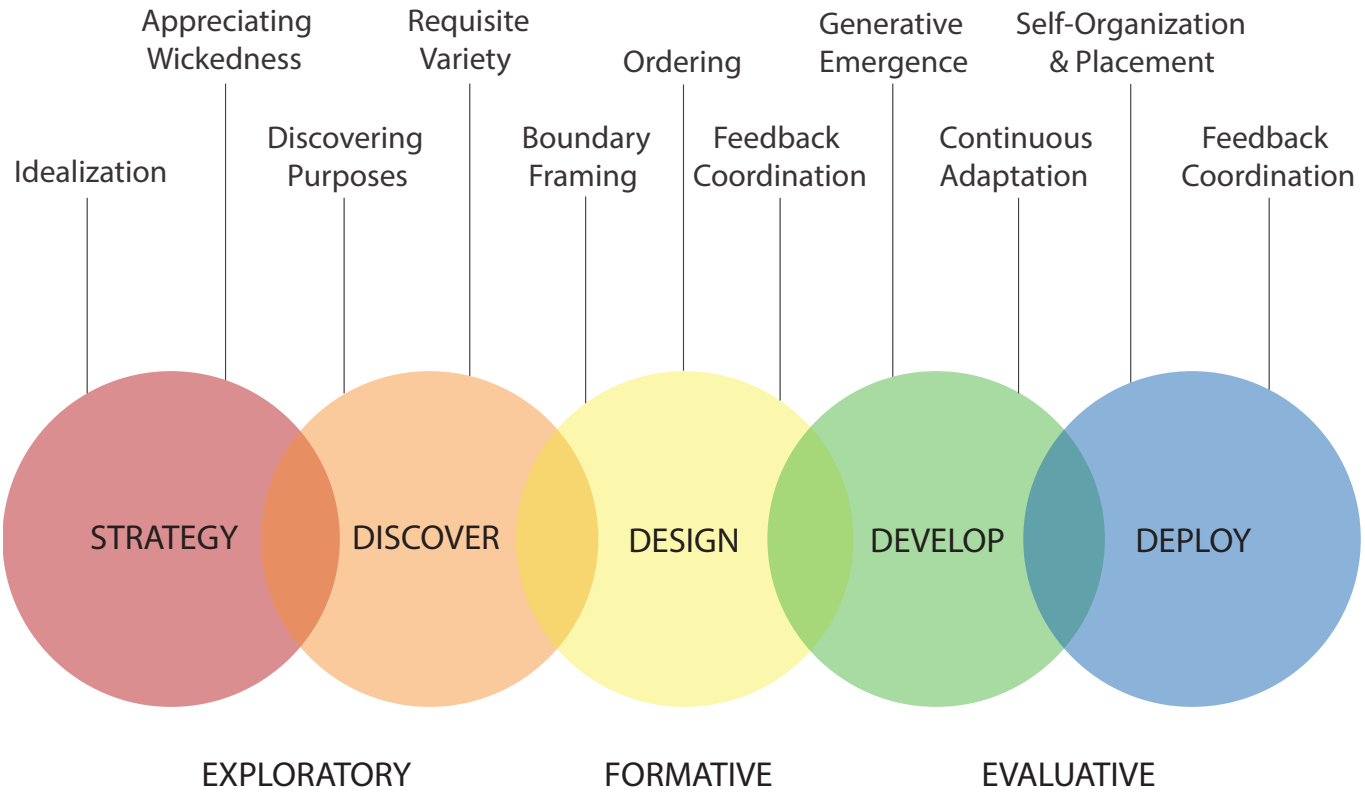


Figure 5: Design Principles Mapped to Design Model (Jones, 2014)

The main difference between ordering and coherence is that the word ordering suggests hierarchy, linearity, perhaps even optimization — terms well suited to organizations — while the word coherence suggests balance and circularism akin to living systems. Either way, systemic coherence is a both a narrative and design consideration that could prove useful in Transition Design practices.

ORSON SCOTT CARD[9]

In contrast to Sanderson and Jemisin — who divide their worldbuilding process into two distinct parts — Orson Scott Card, author of *Ender's Game*, offers aspiring authors a five-step process for worldbuilding. He outlines his process in his book, How to Write Science Fiction and Fantasy. Card begins with an idea, and allows that idea to 'ripen' for months or years at a time before beginning to write, so that the idea has time to evolve (Card, 1990). He also advocates that authors use their 'idea net' to catch the 'why', 'how' and 'what result' stories that occur in

9. On a personal note, I hesitated to include Orson Scott Card. *Ender's Game* is widely considered an important work of science fiction but Card's personal values and politics are deplorable. However, his insights on how to create worlds are valid.

everyday life around them, applying that line of questioning to both individual characters and society at large (Card, 1990). Card states that no event provokes a single, unanimous response from a world at large, "nor has any innovation been introduced into the world without unpredictable side effects. When the car was invented and popularized, no one could have imagined that it would lead to the drive-in movie and the drive-up bank...to pollution and the greenhouse effect and the political ramifications of OPEC" (Card, 1990).

Once he has an idea, Card creates rules for his world. Using a number of science fiction tropes such as time travel and warp speed, he outlines examples of rules. For instance, if a story includes hyperspace, then rules could include requiring "that you have to be near a large star in order to make the jump, or that you can't be near a large gravity source or the jump gets distorted" (Card, 1990). These rules can be explained in a quick and concise manner, while affording authors opportunities to develop, challenge, and constrain characters (Card, 1990).

After creating rules, Card 'invents the past'. This step of the process includes three considerations: evolution (how an alien species developed biologically),[10] history (how the communities within the world came to be), and biography (developing the past of characters to add complexity to the world) (Card, 1990). The fourth step, Language, does not necessarily prescribe inventing a whole new language. Instead, he encourages writers to create a few unique words that have significance to the story, treat the story as if it is a translation of an invented language, or create a 'subset of English' much like slang (Card, 1990). The purpose of language as a worldbuilding component is to convey the "the cultural and intellectual differences between cultures" (Card, 1990).

The final step in Card's process is developing scenery, similar to how Sanderson and Jemisin build physical worlds. Card makes a distinction between 'hard' science fiction, which is often precise and mathematically accurate, and 'soft' science fiction which is more sociological and anthropological in nature (Card, 1990). For example, an author could provide the exact surface temperature, and how the human body would react to it, as opposed to describing it as' too hot for habitation'. However, there is considerable contention amongst science fiction authors on whether or not the distinction between hard and soft science fiction has merit (Wilde, 2017). Card states that science fiction authors should strive to blur the line, incorporating elements of both (1990). When the scenery is completed, Card moves on to building elements of the story.

CONSIDERATIONS FOR TRANSITION DESIGN

Build rules for preferred futures, not just preferred future states: Though Card offers a five step process, much of his approach can be divided along the same lines as Sanderson's and Jemisin's approach: into physical (scenery, rules) and sociological components (idea, the past, and language) (1990). The key takeaway from Card's process is he builds rules for his world, and not just the world itself. If we borrow this concept for Transition Design purposes, then we may create rules for a preferred future (what is allowed or enforced) rather than a preferred future state (what is). For example, a wealth distribution rule may decree that no individual can earn more than a societal-wide salary cap, or that corporations must contribute a nominal percentage of their profits back to the communities they operate in. Doing so may help envision what preferred futures policies may look like, and consider what other rules must exist before we achieve a preferred future state.

Creating rules also suggests that Card's process allows for emergence. Similarly, "Transition Designers look for

10. Evolution applies to a fictional species, but could also apply to the future state of humanity.

'emergent possibilities' within problem contexts, as opposed to imposing pre-planned and fully resolved solutions upon a situation" (Irwin, et al, 2015). Worldbuilding allows for emergent design because it aims to build a broader context for exploration rather than a specific solution. It also allows for possibilities outside of a single vision of the future and outside of the original work, as long as those possibilities are coherent with the remainder of the world. It may be beneficial for changemakers to borrow from worldbuilding practices that emphasize creating rules rather than solutions to allow for emergence and flexibility.

FURTHER CONSIDERATIONS

The worldbuilding methods presented above have a number of merits. First, they provide structure and a systematic approach to worldbuilding, which can often seem like an elusive and daunting task for writers, particularly aspiring authors. Second, they distill worldbuilding down to a few critical and digestible components that do not require years of work, so that anyone can engage in worldbuilding regardless of experience, knowledge, or talent. Third, they are flexible enough to allow for interpretation and variation. No author is confined to a specific way of thinking or creating which, in turn, leaves room for exploration and the possibility of generating many different worlds using the same approach. Fourth, none of the authors sharing their perspectives are dogmatic about their particular approach to worldbuilding, and all acknowledge the importance of writing in service of a story rather than a process.

A MATTER OF PERSPECTIVE

Though there are few detailed accounts of how specific authors build their worlds, there is no shortage of opinions on the concept of worldbuilding, how it should be done, and the extent to which a writer should engage in the process. Worldbuilding is divisive, particularly given that many authors have written beloved and/or critically-acclaimed books without a clear, systematic process.[11][12]

Margaret Atwood, author of the *MaddAddam* series, does not offer a systematic approach.[13] Rather than building an iceberg, Atwood's process is like a snowball that becomes an avalanche. She describes her approach to worldbuilding as follows:

> "This may sound silly, but I like to wonder what people would have for breakfast — which people, as their breakfasts would be different — and where they would get those food items, and whether or not they would say a prayer over them, and how they would pay for them, and what they would wear during that meal, and, if cooked, how, and what sort of bed they would have arisen from, and what else they might be doing while having the breakfast — talking to someone (who), in person or on a device (what?), and who would be allowed to do that, and what they might feel safe in saying. Breakfast can take you quite far" (Berkowitz, 2013).

11. Please note: the worldbuilding practices of Frank Herbert, author of *Dune*, were not included due to the lack of publicly available work currently in print, written from the author's own perspective.
12. Please see Appendix C for a disclaimer on authors.
13. Atwood considers herself a speculative fiction writer and not a science fiction writer, though many would argue otherwise.

In sharp contrast to authors who engage in the worldbuilding process before writing a story, **Kim Stanley Robinson,** best known for his *Mars Trilogy,* advocates for the opposite. When asked about how he balanced worldbuilding with characters in an interview, Robinson replied:

> "I focus on the characters and let the worldbuilding take care of itself. Hopefully the story will reveal a lot of the parts of the world. So it helps to pick a cast of characters that do all kinds of different things. It also helps to have a narrator that is also a character, one way or another, that likes to explain things or talk about non-human actors in the story, like landscape and technologies and so on...The world is often more interesting than what people do to each other. That said, novels are about people, so that has to be kept in mind. What I do is give up on the idea of balance, also these various workshop categories like world-building or characters, which in effect pretend to know how fiction works, when they really don't know how fiction works. Fiction is highly mysterious. So I let myself go crazy and see what happens" (Britt, 2017).

It is worth noting that, while his process is less structured and elusive than other writers, Robinson's work is stellar. An article from The New Yorker states that he is "generally acknowledged as one of the greatest living science fiction writers" and "one of the most important political writers working in America today" (Kreider, 2013).

Ursula K. Le Guin, expressed a different sentiment in an open letter titled Plausibility in Fantasy. In this letter, she states that,

> "While I am composing I have no abstract ideas, purposes, or policies in mind, but am intent only on following the story... I have often mentioned events or places which I didn't yet know anything about — for example, some of the later exploits of Ged mentioned early in *A Wizard of Earthsea.* These were, when I wrote them, merely words — "empty" nouns. I knew that if my story took me to them, I would find out who and what they were. And this indeed happened. . .
>
> In the same way, I drew the map of Earthsea at the very beginning, but I didn't know anything about each island till I "went to" it.
>
> Then there is detail. The more realistic, exact, 'factual' detail in a fantasy story, the more sensually things and acts are imagined and described, the more plausible the world will be. After all, it is a world made entirely of words. Exact and vivid words make an exact and vivid world" (Le Guin, 2005).

Le Guin's world reveals itself through an emergent process in which she constructs the world as she writes.

M. John Harrison — author of *In Viriconium*, and a writer revered by other speculative writers — goes one step further than Robinson and Le Guin. Author Warren Ellis quoted Harrison as follows on his blog:

> "Every moment of a science fiction story must represent the triumph of writing over worldbuilding.
>
> Worldbuilding is dull. Worldbuilding literalises the urge to invent. Worldbuilding gives an

> unnecessary permission for acts of writing (indeed, for acts of reading). Worldbuilding numbs the reader's ability to fulfil their part of the bargain, because it believes that it has to do everything around here if anything is going to get done.
>
> Above all, worldbuilding is not technically necessary. It is the great clomping foot of nerdism. It is the attempt to exhaustively survey a place that isn't there. A good writer would never try to do that, even with a place that is there. It isn't possible, [and] if it was the results wouldn't be readable: they would constitute not a book but the biggest library ever built, a hallowed place of dedication and lifelong study. This gives us a clue to the psychological type of the worldbuilder [and] the worldbuilder's victim, [and] makes us very afraid" (2007).

Finally, no discussion remotely related to the intersection of science fiction and foresight is complete without mentioning famed futurist and author of *Neuromancer*, **William Gibson**. In an interview, Gibson referenced author Samuel Delaney, with both writers acknowledging that readers develop a "superstructure of culture on top of [an existing cultural construct] that allows them to enjoy" science fiction (Newitz, 2014). This echoes Le Guin's point on building coherent worlds because, without coherence, a superstructure of culture would be difficult to grasp. On worldbuilding for his book, *Peripheral*, Gibson elaborates on this point:

> "I didn't consciously try to write a book in which those very austere rules of non-exposition were going to dominate. Rather, the text as it continued, demanded it increasingly. It would just stop going forward if I broke down and resorted to writing a "well, Bob, you know" paragraph... Worldbuilding has to be done whether or not you have the "well, Bob, you know." But if you're going to do it with a minimum of intrusive exposition you have to build the world to a much higher resolution than you would if you have bursts of sloppy exposition. It requires a much more high res construct because it has to all make sense on its own. The reader has no way of knowing this directly, but from the author's point of view the characters are reacting to a whole bunch of stuff that I'd actually taken the trouble to work out about their world which is never going to be mentioned. But if it wasn't there, the world would be slick and shapeless in the manner of all too much science fiction" (Newitz, 2014).[14]

Gibson makes an important point: when done well, worldbuilding serves as a backdrop against which story and characters shine. It takes considerable effort to make worldbuilding seem effortless, yet it is a careful and deliberate act of design. When not done well, it becomes a distraction.

CONSIDERATIONS FOR TRANSITION DESIGN

Examine the everyday life: Similar to Atwood's approach to worldbuilding, Transition Design "proposes that the everyday life, and lifestyles, should be the primary context within which to design for sustainable futures and improved quality of life" (Irwin, et al. 2015). Examining futures-based narratives that describe the everyday life could serve as inspiration for design, and creating such narratives could be an effective method for helping others envision change. It may also help individuals understand the implications of deep systemic change for their lives, and increase the desire for change towards a preferred future or decrease resistance to change itself.

14. To clarify, exposition in narrative is when a character provides an (often long-winded) explanation.

Use both world-first and story-first approaches to design: Varying perspectives reveal that even authors do not have consensus on the approach to and value of worldbuilding. Some advocate for privileging a world-first approach while others prefer a story-first approach. This suggests that changemakers may want to consider both approaches, by designing the broader world at large, but also creating opportunities and frameworks that encapsulate everyday life in a preferred future. A story-first approach may be useful for engaging reluctant stakeholders or for achieving consensus because narratives allow us to engage in tangible, human experiences rather than high-level systemic abstractions (Candy, 2010). It may also be useful to take a story-first approach when engaging in design for wicked problems, particularly because narratives invite us to engage more deeply when challenged, rather than default to defending our views and identity, as mentioned earlier in this paper.

Help foster a superstructure of culture: As Gibson advocates, changemakers should seek to help others develop a superstructure of culture; in other words, the modular, foundational components of a culture. Before we can transition towards preferred futures, we have to build the capacity to envision and design alternatives. This not only includes cultivating a multiple futures perspective, but accounting for the multiple perspectives that already exist in the present, in both fiction and reality. Changemakers must recognize science fiction and futures-based narratives as opportunities to help others develop a superstructure, and utilize those narratives as a strategic precursor to widespread change. Doing so may also help us cultivate empathy. The concept of a cultural superstructure may have significant implications for both systemic design and foresight, and should be explored further.

FANTASY AUTHORS

Worldbuilding is not the exclusive domain of science fiction. Fantasy is another speculative genre that engages in expansive worldbuilding, and it is often the deep, immersive worlds presented in fantasy novels that attracts readers to them. It is possible to both lose yourself and find yourself in these worlds. The long list of notable fantasy authors includes George R.R. Martin, J.K. Rowling, and J.R.R. Tolkien, and their perspectives on worldbuilding are outlined below.[15]

George R.R. Martin's *A Song of Fire and Ice* series — better known to a wider audience from its television adaptation, Game of Thrones — is a well-known example of a rich world. An avid historian, Martin derived the idea for his historical fantasy epic from The Wars of the Roses — "a series of dynastic civil wars that lasted three decades" between the Lancasters and the Yorks, much like Martin's Lannisters and Starks (Tharoor, 2015). Taking creative license with historical events, people, and places provides a baseline for a new world. It can serve as a shortcut because a ready-made context exists, and an author can evolve and adapt the existing world and storyline, rather than invent a new one from scratch. By taking this approach, authors like Martin and Sanderson can present a world that is both anchored in reality and fantastical at once.

About his process for *A Song of Fire and Ice*, Martin states: "Basically, I wrote about a hundred pages that summer. It all occurs at the same time with me. I don't build the world first, then write in it. I just write the story, and then put it together. Drawing a map took me, I don't know, a half-hour. You fill in a few things, then as you write more it becomes more and more alive" (Gilmore, 2014). Martin developed his world to the point that he did not need to complete *A Song of Fire and Ice* in order for HBO to continue the television series beyond the provided source material. The world is rich enough that HBO has announced no less than four spin-off shows, all intended

15. The etymology of fantasy author names is a fascinating topic onto itself.

as prequels to the wildly popular television show.

Few stories have achieved mythical status quite like that of the boy who lived. **J.K. Rowling's** *Harry Potter* series is considered a significant work of English literature, and is one of the most impeccable examples of worldbuilding.[16] Rowling described her experience of building that world as follows:

> "It was five years since the train journey where I had the original idea to finishing the book. And during those five years, this massive material was generated some of which, will never find its way into the books, will never need to be in the books. It's just stuff I need to know...partly for my own pleasure, and partly because I like reading a book where I have a sense that the author knows everything. They might not be telling me everything, but you have a sense of confidence the author knows everything" (BBC, 2001).

Rowling's magical world is so expansive that it has become a transmedia entity spanning books, films, theme parks, the growing digital platform, Pottermore, etc. She has returned to the world to produce works outside the immediate *Harry Potter* storyline, including *Tales of Beedle the Bard* and *Fantastic Beasts and Where to Find Them*, with no end in sight for how many stories can be mined from that world.

If any author in literary history should be known as THE worldbuilder, it is **J.R.R. Tolkien**. Over the course of six decades, Tolkien created Middle-Earth — the most elaborate and robust world in literary history (Gilsdorf, 2015). In his essay, On Fairy Stories, Tolkien articulates that fantasy requires 'sub-creation' in which the 'Primary World' (reality) is rearranged into a 'Secondary World' through imagination that embraces "strangeness and wonders" (1939). According to Tolkien, authors draw upon the real world for inspiration and, through their stories, shape reality. He emphasizes that,

> "Probably every writer making a secondary world, a fantasy, every sub-creator, wishes in some measure to be a real maker, or hopes that he is drawing on reality: hopes that the peculiar quality of this secondary world (if not all the details) are derived from Reality, or are flowing into it. If he indeed achieves a quality that can fairly be described by the dictionary definition: 'inner consistency of reality,' it is difficult to conceive how this can be, if the work does not in some way partake of reality. The peculiar quality of the 'joy' in successful Fantasy can thus be explained as a sudden glimpse of the underlying reality or truth" (Tolkien, 1939).

The penchant to borrow from reality is evident in his outcomes. Tolkien created his elvish languages "by taking his favourite real-world languages and splicing them together" including English, Welsh, and Finnish (Jha, 2003). The same can be said of the iconic settings he created. The Shire is located in south-west England, Rohan in Germany, Mordor in Transylvania, Mount Doom in Romania, and Gondor in northern Italy (Jacobs, 2016).

16. J.K. Rowling inspired not only an entire generation of readers, but an entire generation of writers.

CONSIDERATIONS FOR TRANSITION DESIGN

Avoid path dependency, but recognize what is worth saving: Our tendency to draw upon the past can be problematic. While current or historical events, characters, and paradigms can form the basis for a compelling story, they are steeped in old world mentalities. When we approach our images of the future in this manner, we exhibit path dependency. Path dependence is an economic concept that argues that the "decisions we are faced with depend on past knowledge trajectory and decisions made, and are thus limited by the current competence base" (Financial Times, n.d). As a result, "history matters for current decision-making situations and has a strong influence on strategic planning" (Financial Times, n.d). Foresight's version of path dependence comes in the form of continuation scenarios, in which present-day realities are perpetuated into the future (Dator, 2009). Continuation scenarios are easy to grasp because they reflect what we already know and understand.

When we design systems, policies, strategies, etc. we do so based on our understanding of present-day circumstances, and rely on historical data to inform our thinking. Even when we conduct a trend analysis in foresight, we are engaging with what is occurring in the present or emerging out of present-day paradigms to inform future scenarios. Instead of creating radically new images, we end up embedding pieces of the past and the present in the future. We end up with visions that are, at best, suitable to technological and social innovation rather than Transition Design.

Still, changemakers may need to consider if there are elements of the present, or even the past, that are worth preserving and carrying forward (just as authors borrow from the real world to build fictional ones). There are aspects of our current state that are functional and/or desirable, and may continue to provide value in the future. Once we have created a preferred state, it may be beneficial to examine what aspects of that preferred state already exist in the present and can serve as a point to pivot that which is undesirable.

Consider more than what is readily apparent: It is also important to acknowledge that, even if all aspects of a system are not readily apparent to those operating within it, changemakers should approach preferred futures with a holistic view. We should intend to create preferred states that feels complete in and of themselves, rather than addressing parts of preferred states. This includes considering seemingly unaffected stakeholders (background characters in a story, if you will), and having an awareness for how we define every element within each preferred future state. If we focus only on a few aspects of a preferred future rather than taking a holistic view, we may miss a foundational element that could undermine the intended design. For example, it may be just as important to consider the role of art in society as it is to consider the role of the economy. This may involve seeking out hidden systems, networks, and wicked problems that exist beneath the surface. Going at least one step further than we think we should go will ensure our designs are more robust.

Become storytellers: We should acknowledge that there is a mutual influence between fiction and reality, with one attempting to influence the other. For changemakers to effectively leverage Transition Design towards collective preferred futures, we must become storytellers. In other words, we must impart radical new visions of the future through emotionally resonant stories that identify, celebrate, and empower the individual within the context of those new worlds. Futures-based narratives are a component of Transition Design, and if we position people as protagonists, we not only show them visions for collective preferred futures, but the roles they can play in them.

OTHER WORLDBUILDERS

Authors are not the only worldbuilders. Worldbuilding is a exercise undertaken in variety of other fields, though the terminology applied to the process may differ. Two fields related to science fiction that engage in worldbuilding practices include gaming, and film and/or mixed reality experiences.

GAMING

The gaming world is expansive and continues to grow, with players seeking out everything from video games to live immersive experiences to board games. For our purposes, this section will focus on a few relevant worldbuilding aspects of immersive games which offer additional insight on what we have already learned from the approaches taken by authors.

In order for a game to be immersive, it requires game designers to create both an engaging story and world. Popular open-ended games like Dungeons and Dragons (a fantasy wargame) allow players to create aspects of a world within a provided context. These games tend to define parameters and rules so that players can create characters that navigate a fictional world with some freedom. The worldbuilding in these games contain many of the same elements that writers consider when designing their worlds. For example, an avid player of Dungeons and Dragons outlined a number of considerations under categories such as the economy, government, land, society and culture, and magic and science (Cruinne, 2013).[17] This included questions such as "what goods are produced and where are they produced?" and "do people barter or use money?" (Cruinne, 2013). Not all players are as systematic in their approach, but neither are all writers.

Another form of gaming that requires worldbuilding is live action role-playing (referred to as LARPing). LARPing is defined as "a continuation of a tabletop roleplaying game that people choose to act out by becoming a character and staging a fantasy world experience in which their characters live", but can also be considered "collaborative pretending with rules" (This is LARPing, 2016). In a LARP, players embody all aspects of a character, interact as their characters with others, and pursue goals in a fictional setting (Schkolnick, 2016). Each LARP "has its own rules, setting, time limit, and weaponry. The rules define each character's abilities, and it is necessary that the director of the LARP, known as the game master, creates a complete rule set that guides the storyline" (Schkolnick, 2016).

LARPs are collaborative with a writer, gamemaster, and players all contributing to creating the story and the world. Larger games can also have plot committees and non-player roles who contribute to building and propagating the world (Wilson, 2006). It is imperative that "players and staff work together to make the game world a real place for characters to explore, do battle in, and develop relationships. Social contract permeates every inch of the game world, with every participant willing its existence into being. Larping is about the community a game builds" (This is Larping, 2016).

Rules are a significant aspect of immersive games and LARPs often have rule books that define its parameters. These rules may be predetermined but can also evolve as ambiguity arises during play. Rules "make larping possible because the integrity of group pretending is based solely on what everyone ascents to. When a group

17. Please see Appendix D for Cruinne's list. Note that each category is further broken down into a series of questions, closely resembling Patricia Wrede's approach to worldbuilding (included in Appendix C).

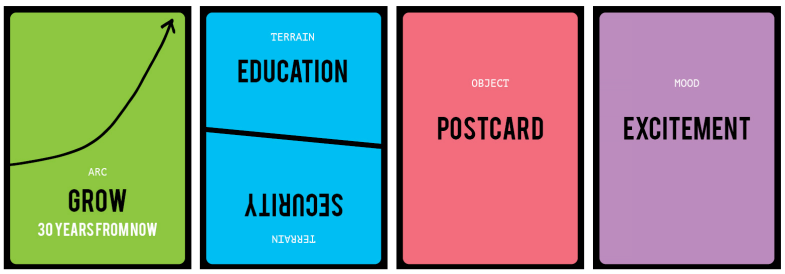
agrees on what is possible via rules, options become available in the pretend space where there were none" (This is Larping, 2016). It is important that rules remain "transparent and seamless relative to the environment in order to achieve" high immersion, and to allow players to embody their characters rather than attempt to play the rules (Mahar, 2016).

What sets immersive games apart from other forms of storytelling is that, unlike most narratives, LARPs can be nonlinear and iterative. For instance, a LARP can evolve beyond the intended play and last for prolonged periods of time, with writers and designers continuing to build gameplay. Shorter LARPs that last for hours or days can also be repeated again and again, in an iterative fashion, yielding variations of events and outcomes (Wilson, 2006).

Studying the non-linear, sometimes iterative nature of LARPs could yield valuable insights for the creation and evolution of systems, particularly because our systems follow linear pathways. Iteration is a key consideration that Transition Design will need to address because it is unlikely a changemaker will create a viable preferred future on her first attempt. In addition, the co-creative, immersive role-playing aspect of LARP games may allow changemakers to collectively envision and explore futures as a form of enacting strategy. This could provide valuable insight for changemakers about how people may behave in a preferred future state or on the pathway to it, allowing them to discern what a preferred future may look like for different individuals. It could also help participants to explore and achieve consensus on what a preferred future may be.

Another game that has application for worldbuilding is The Thing From the Future, created by futurist Stuart Candy and researcher Jeff Watson. The object of this foresight informed "game is to come up with the most entertaining and thought-provoking descriptions of hypothetical objects from different near, medium, and long-term futures" (Situation Lab, n.d.). Players are prompted to generate a "future that the thing-to-be-imagined comes from, [specify] what part of society or culture it belongs to, describe the type of object that it is, and suggest an emotional reaction that it might spark in an observer from the present" (Situation Lab, n.d.). Each future must be created using four cards (please see Figure 6 for an example):

1. An "arc" card which outlines a "plot-type" based on on Dator's Generic Images of the Future;
2. A terrain card that indicates "contexts, places, and topic areas";
3. An object card that provides the type of artifact the player must describe;
4. And a mood card which captures the type of emotion the object should elicit from present day observers (Situation Lab, n.d.).



Arc = "Grow, 30 years from now"
Terrain = Education
Object = Postcard
Mood = Excitement

Figure 6: An Example Prompt From 'The Thing From the Future' Game

Though it is intended as a game, The Thing From the Future can also serve as a narrative tool that lays the foundation to build a world upon. Because there are one hundred and eight cards, and a combination of four cards is required in each round, there is a potential to build 5,359,095 worlds. Amongst the possibilities, we may find valuable opportunities for preferred futures.

CONSIDERATIONS FOR TRANSITION DESIGN

Co-create: Authors may construct most of their worlds in a solitary manner, but other worldbuilders engage in co-creation.[18] Both approaches yield rich and robust worlds. Although Transition Design advocates for "transdisciplinary teams to design new, innovative and place-based solutions rooted in and guided by transition visions," it may be possible to engage in Transition Design with varying degrees of co-creation (Irwin, et al, 2015). In addition, designing for placed-based solutions might work well for some problems, but others may require a different approach. This is partly because people and places exercise a mutual influence upon each other, as outlined earlier in this paper.

Iterate and enact: Experiential futures is an indispensable tool for changemakers. It allows for participatory worldbuilding in real-time, and for users to immerse themselves in aspects of a preferred future state. By interacting with "situations and stuff from the future", we can engage in critical discourse about what a preferred future is and how to get there (Candy, 2015). Not only that, we may be able to design transitional experiences that take people through time rather than to a future state (a journey rather than a destination). Experiential futures also allows for iterations. Short, enacted experiences that are repeated with variations — similar to some LARPs — could help highlight cause and effect, and teach participants about consequences and tradeoffs in the context of sustainable systems and futures. Changemakers could also define rules rather than states to understand what may emerge.

Finally, experiential futures situate the individual in a future context, thereby allowing them to interact with the future in a more tangible form rather than as an abstraction (Candy, Dunagan, 2017). It can also be designed to give each participant agency as they co-create a future with other participants, mimicking real-world complexity. When given a role to play, each individual has the opportunity to reflect on the desirability and plausibility of that future as a system, but also on how that future impacts them, thereby making them a protagonist in a future-based narrative.

Start with a leverage point, then use another: In a facilitated session, tools such as The Thing From the Future could allow for rapid generation and iteration amongst a group, cycling through many possibilities to identify what is preferred and what is not. Each design could begin with a single leverage point, and each subsequent leverage point could create a new iteration of a preferred future state. How to facilitate a Transition Design exercise with this tool is an opportunity for further exploration.

18. Some writers do seek out help from other writers, and published authors tend to have agents and editors that provide substantive feedback. Brandon Sanderson's seven rounds of revisions includes receiving feedback from 'alpha readers', his fellow published authors (Skepton Media, 2016). Authors and editors have an "intimate relationship", and even celebrated authors have revised work based on feedback (Neary, 2015). For example, Harper Lee "radically revised [an] early version of *[To Kill a Mockingbird]* on the advice of her editor" (Neary, 2015).

FILM

Unlike gaming — which strives to co-create experiences with individuals — the visual arts demand less imagination from the consumer and provide a more sensorial experience. Co-creation in film happens at earlier stage when writers, directors, production designers, etc. bring together their expertise to create worlds. Alex McDowell — Professor at the School of Cinematic Arts at University of Southern California, and Director of the World Building Media Lab (WbML) and 5D Global Studio — has developed a worldbuilding model for film and virtual reality, known as the Worldbuilding Mandala (see Figure 7).

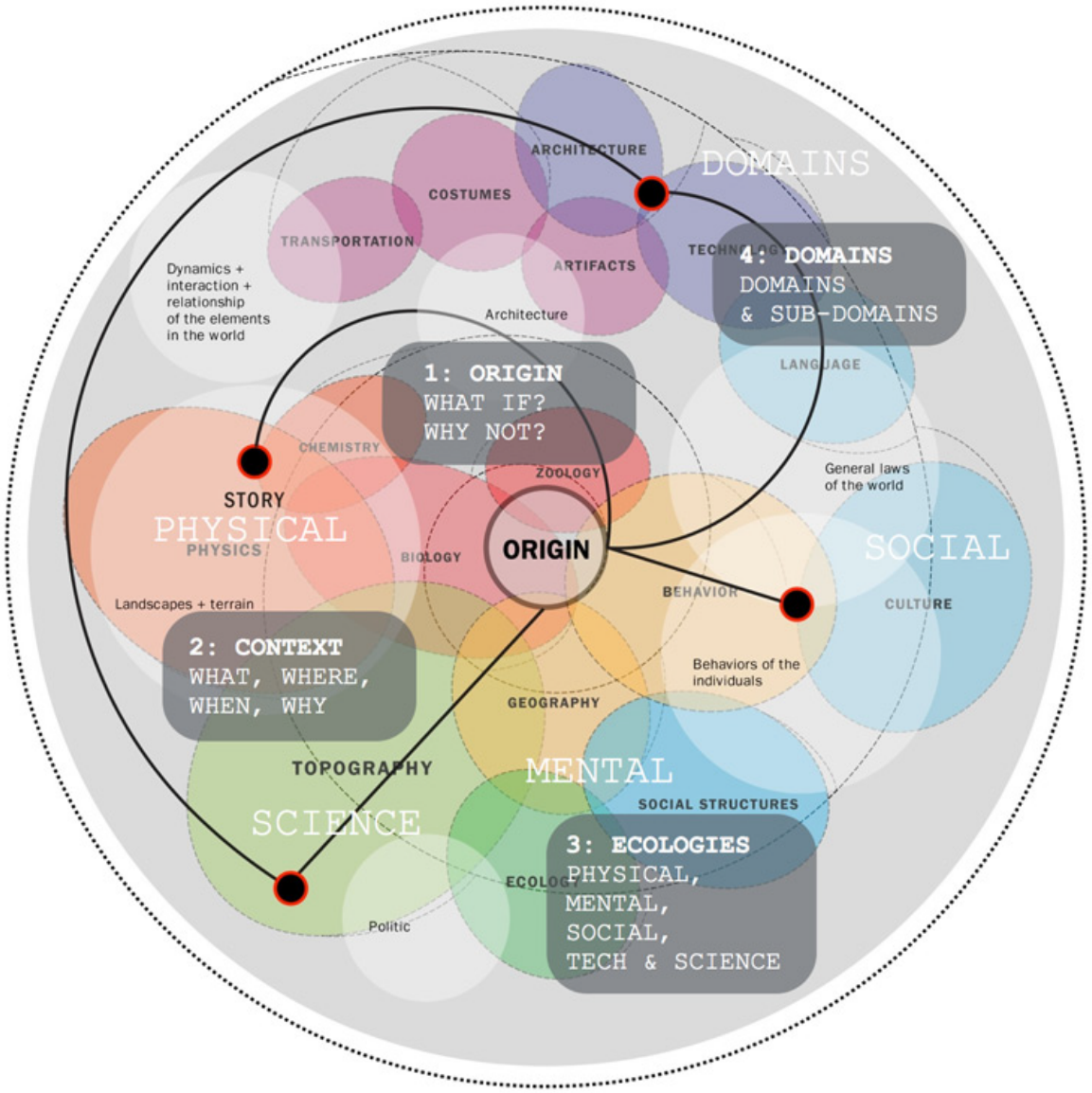


Figure 7: Alex McDowell's World Building Mandala (2015)

McDowell's model integrates elements of story and worldbuilding, beginning with 'what if' and 'why not' origin questions and extrapolating out to develop context, ecologies, and domains (2015). He developed the Mandala after consulting on the popular science fiction film, *Minority Report*, directed by Steven Spielberg. Spielberg's intention was to "create future reality, not science fiction" (Bankston, 2017). According to McDowell, the model is,

> "rooted in a logic-driven world space crafted through deep research and exploration, *Minority Report's* narrative organically evolved out of the refinement of the storyworld. The 21st century digital and non-linear design process replaces the anachronism of the linear, industrial 20th century model and allows for a fluid cross-disciplinary collaboration from the start of development of the story space... The overview indicated in the Mandala represents a Horizontal slice through the world – all the major elements of society, culture, politics, science, technology, history, infrastructure and ecosystem that interconnect the narrative elements of the world. To develop the fine detail of the world, the world builders then engage in a series of Vertical 'core samples' that interrogate the world system in relation to specific elements that have a direct impact on the narrative. These detailed investigations demand answers of the ecologies and domains of the world that in turn tighten the logic" (Stackelberg, McDowell, 2015).

This particular model has a lot in common with the approaches taken by science fiction authors. It does, however, diverge from literary practices on three critical elements. First, McDowell expands upon the physical and social domains identified by Sanderson and Jemisin to include two new domains: science and mental (or cognitive). Second, it places greater emphasis on visual elements of a world (e.g. costumes and landscapes) because film and virtual reality are a form of visual storytelling. Without high attention to these details, the world presented would appear incomplete or incoherent. Third, it incorporates elements of story and character — such as the behaviours of individuals — which authors distinguish from worldbuilding, but do use to excavate aspects of their worlds. Again, this may reflect the medium for which the world is built because an individual's behaviours may help visual storytellers convey facets of the world itself.

McDowell and his colleague, Peter von Stackelberg, are proponents of using worldbuilding and science fiction to inform future studies, stating that "foresight professionals should understand both the role of storyworlds in futures-oriented work and the process of worldbuilding used to create those storyworlds" (2015). Furthermore, "narratives about the future can trigger new directions for thought and exploration that foster the creation of new realities" (Stackelberg, McDowell, 2015). In an interview with The New Yorker, McDowell explained, "We are not actually trying to solve the world's problems. We're trying to conceive how fiction can stimulate new thinking. Then we can say 'Let's apply that.' The worst kind of world-building is when you say 'We have to work with the facts.' My job here is to say 'Hey guys, remember that we have license to use fiction here'" (Hart, 2013). Stackelberg and McDowell also believe that "in addition to providing a temporal and spatial setting for narratives, storyworlds should provide coherent geographic, technological, social, cultural, and other features", reaffirming the role of coherence in worldbuilding (2015).

Since Minority Report, McDowell and "his students at the [WbML]...have envisioned the future of sustainable transportation with the Ford-sponsored City of Tomorrow project, worked with the Obama White House to design the refugee camps of the future, and imagined what life in the floating village of Makoko in Lagos will be like in 2036" (Bankston, 2017). He has stated that "the big difference between what we're doing with worldbuilding and

what you might call 'futurism' or 'science fiction prototyping' is that we are using fiction as a disruptor" (Bankston, 2017). McDowell is leveraging worldbuilding as a changemaker:

> "We want a different outcome. So, let's create a narrative—a fictional world space with multiple narratives—that is moving in the direction we want it to go. Extrapolate that forward over the near horizon, then thread our discoveries back into the present and use that to change direction in our present and move towards a new future" (Bankston, 2017).

CONSIDERATIONS FOR TRANSITION DESIGN

Become worldbuilders: As changemakers who want to leverage worldbuilding practices for Transition Design, we must document both the collective preferred states that we create, as well as the process by which we arrive at those states. Worldbuilding is a process, and the worlds we envision — the futures and systems they are comprised of — are outcomes. By capturing the process, we can create new frameworks and models for change, but also replicate the process to create many possibilities and narratives. In addition to becoming storytellers, changemakers must become worldbuilders.

Engage visual futurists: Here we return to the concept of experiential futures and speculative design once more. There is something powerful about seeing a fictional world come to life, where it is no longer a figment of our imaginations, but a visceral real-world possibility. Whereas we addressed creating 'situations from the future' as inspired by LARPs, here we need to engage in creating 'stuff from the future' (Candy, 2015). The term visual futurist was a "unique and unprecedented film credit" given to Syd Mead, who designed the world of Blade Runner which was, at the time, the "most heavily designed cinematic world that...wasn't fantasy but a realistic future" (Bankston, 2017). Changemakers must engage experiential futurists and speculative designers to provoke conversations about collective preferred futures, through tangible objects that embody or deny those futures.

When we make the abstract tangible, and bring it down to the individual life or an everyday reality, it becomes difficult to ignore. It is one thing to contemplate and discuss climate change as it affects coastlines, and another to see the havoc and destruction it can wreak on a neighbourhood much like our own (Candy, 2010). It is the difference between the abstract political debates about the Syrian refugee crisis, and the harrowing photograph of Alan Kurdi, the three-year-old Syrian refugee who washed up on the Turkish shore (Walsh, 2015).

SUMMARY

The varying worldbuilding practices and perspectives outlined thus far have a number of implications for Transition Design that could help us better understand how to build and shift towards preferred futures. Regardless of how it is undertaken, worldbuilding is essential. It is an important component of creating new images of the future, and there are many ways to go about it, with each method offering value. How to engage in Transition Design so that it yields meaningful processes and outcomes is likely just as varied.

- Balance people and planet, and the interdependence of that relationship
- Design for coherence so that critical components work together in balance, not in competition
- Build rules for preferred futures, not just future states
- Examine the everyday life in futures-based narratives, and design for it
- Use both world-first and story-first approaches to design, so that preferred states serve as a backdrop for many stories and to allow individuals to think of themselves as protagonists
- Help foster a superstructure of culture that allows individuals to cultivate and consider multiple possibilities
- Avoid path dependency, but save what is worthwhile from the present state
- Consider more than what is readily apparent in a system by considering what lies outside the immediate system
- Become storytellers that leverage the power of narratives to engage in conversation and design
- Co-create with others, including those who are not direct stakeholders
- Iterate and enact by using techniques from LARPs to inform the design of experiential futures and transitional experiences
- Identify and design with leverage points that inform variations and alternatives
- Become worldbuilders that document the process of creating collective preferred futures, in addition to potential outcomes
- Engage visual futurists to create powerful artifacts of the future that demonstrate the possibility of a preferred future, and the dangers of not changing our current trajectory

More research at this intersection is required to fully understand all the connections and the possibilities for mutual influence. For now, we must ask ourselves: how do we leverage what we have learned about worldbuilding and Transition Design to create pathways to preferred futures?

CHAPTER FOUR: BRIDGING GAPS

Worldbuilding offers a number of critical insights that may have useful application for Transition Design. However, there are concepts within foresight and systems that we can merge with worldbuilding practices for Transition Design purposes as well.

BACKCASTING

Backcasting is an important consideration in Transition Design that is noted for its application in real-world change-making. It "works through envisioning and analyzing sustainable futures and subsequently by developing agendas, strategies and pathways on how to get there" (Vergragt, Quist, 2011). In other words, it provides a roadmap of how to reach a sustainable future with directions, signposts, opportunities, and obstacles outlined along the way. Backcasting includes the identification of potential signals or events that could indicate the emergence of a particular future amongst the possibilities, allowing stakeholders to plan and shift their efforts accordingly. The intention is to direct an organization towards a desirable future.

In the context of Transition Design, it connects the long-term vision we hold of a preferred future to the present by informing "tangible action in the present and continually updating the long-term vision based upon what was learned from near-term project outcomes" (Irwin, Kossoff, Tonkinwise, 2016). It is through backcasting that we achieve incremental transitions (see Figure 8).

The major distinguishing characteristic of backcasting analysis is a concern, not with what futures are likely to happen, but with how desirable futures can be attained. It is thus explicitly normative, involving working backwards from a particular desirable future end-point to the present in order to determine the physical feasibility of that future and what policy measures would be required to reach that point. - Robinson (1982)

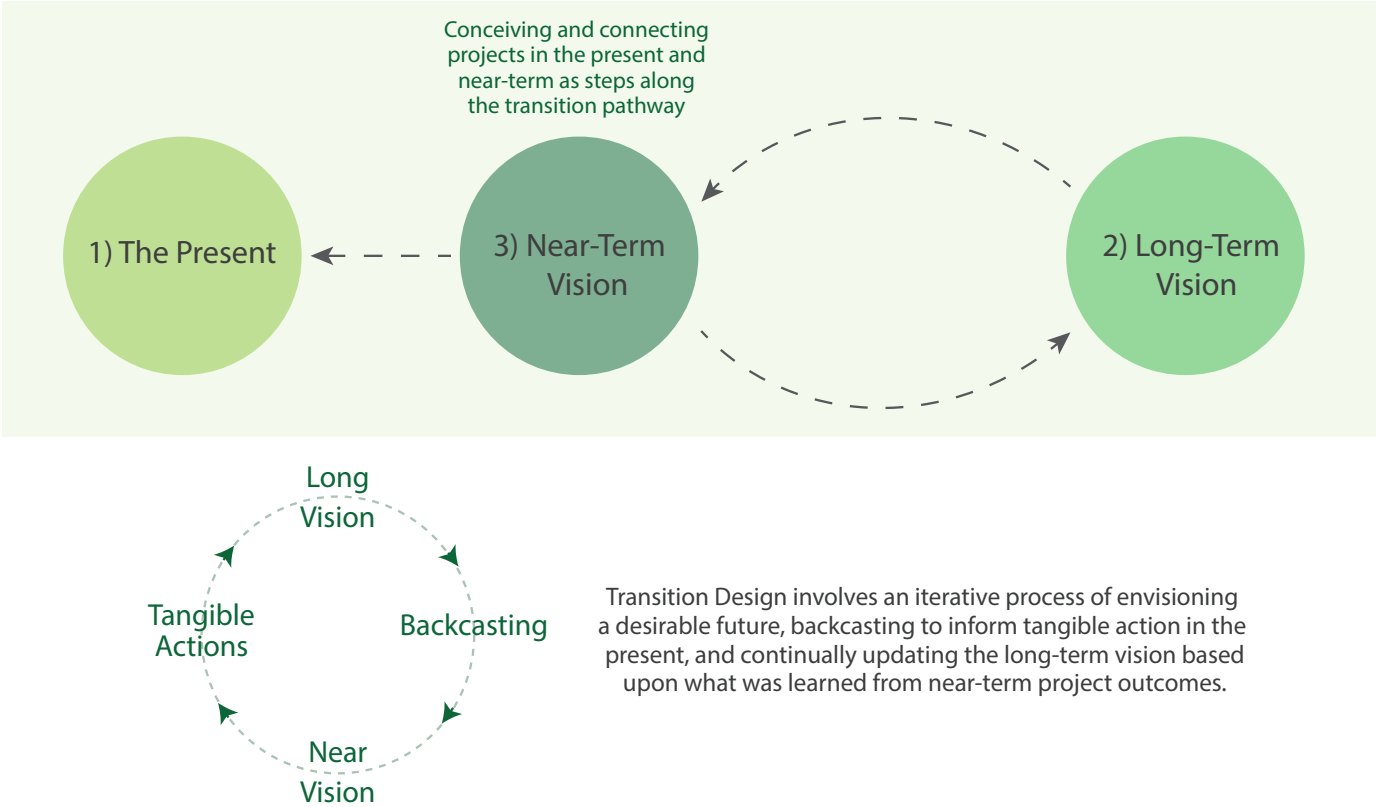


Figure 8: The Visioning and Backcasting Process in Transition Design (Irwin, Tonkinwise, Kossoff, 2016)

Science fiction has a tendency to depict static images of the future. Dystopias and utopias dominate science fiction, both of which begin or end on the precipice of change rather than show us how our world might evolve into those states. In other stories, either the fictional worlds presented to us bear little resemblance to our reality, or the story takes place far away from Earth, leaving our wicked problems behind altogether. Because science fiction does not leverage practices such as backcasting, we lack stories that show transitions between our world and those depicted in fictional futures. For a more detailed analysis of science fiction subgenres and why they depict static images of the future, please see Appendix E.

Backcasting is a missed opportunity in science fiction that foresight practitioners and changemakers can take advantage of. What Transition Design may require is not just futures-based narratives, but narratives that depict transitions between our current state and sustainable images of the future, so that backcasting is baked into the fictional world and the narrative. Doing so will not only provide us with images of preferred futures, but pathways for how to get there. How backcasting is used — and whether or not it proves to be a useful method — may come down to the type of narrative being told. For instance, narratives about collective preferred futures may seem more plausible if the transitions from our current state to those preferred futures were included. Please see Appendix F for an introduction to Transtopias: narratives that depict incremental transitions over time.

PANARCHY

A living systems framework that may be useful to science fiction and Transition Design alike, is the panarchy (see Figure 9).[19] The panarchy accounts for the "dual, and seemingly contradictory, characteristics of all complex systems — 'stability and change' (The Sustainable Scale Project, 2013). It states that ecosystems go through four basic stages: exploitation (rapid expansion), conservation (slow accumulation, stability), release (rapid decline due to changing conditions), and reorganization (a new equilibrium) (The Sustainable Scale Project, 2013).[20] There is potential for exploring how aspects from the panarchy framework could apply to storytelling practices, particularly to create non-linear narratives. Further research on the panarchy, and whether or not it lends itself to narratives, is required.

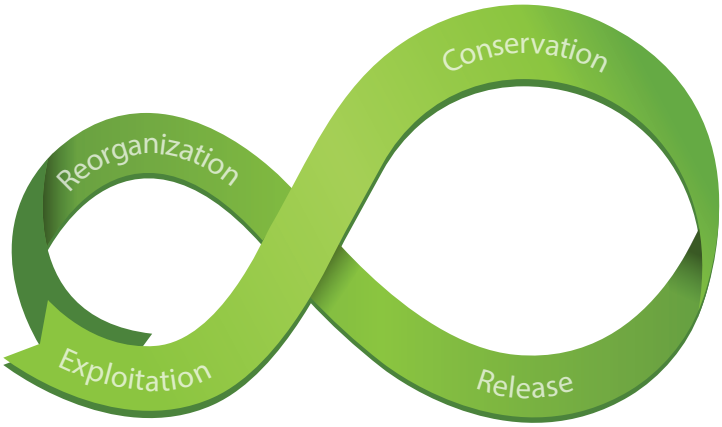


Figure 9: Panarchy Framework: The panarchy is a cyclical framework that moves through exploitation (rapid expansion) in the lower left quadrant, to conservation (slow accumulation, stability) in the top right quadrant, to release (rapid decline due to changing conditions) in the lower right quadrant, and reorganization (new equilibrium) in the top left quadrant (The Sustainable Scale Project, 2013).

19. Thank you to my classmate, Vince Galante, for assisting with the panarchy graphics on page 41, 49, and 51.
20. It is interesting to note the four stages of the panarchy bear semblance to Dator's Generic Images of the Future.

The panarchy also addresses the concept of resilience. Resilience "determines how vulnerable a system is to unexpected disturbances and surprises that can exceed or break that control" (The Sustainable Scale Project, 2013). Transitions to a new equilibrium are difficult because we resist change, and the incentive to maintain the status quo is high, particularly for those in positions of power and privilege. The challenge for Transition Design may be to create smaller or briefer disturbances that can push an ecosystem into a different state, in a controlled and calculated manner.

Perhaps, under the banner of Transition Design, science fiction and systems may form a stronger bond. This will require borrowing and adapting concepts from systems, and applying them in new ways. Doing so may give rise to new visions of the future, and frameworks for creating such visions.

CHAPTER FIVE: BRAVE NEW WORLDS

"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete." - Buckminster Fuller

Before we go any further, let us take a moment to review some key considerations thus far:

1. Changemakers, and their stakeholders, may need frameworks and models that require little to no knowledge of systems and foresight, but allow them to design for change with a sustainability mindset;
2. If we acknowledge that much of reality is fiction (social constructivism), then we can rewrite and transition our systems, shifting away from unsustainable, hegemonic futures;
3. The increasing complexity of our wicked problems require not only social innovation, but Transition Design;
4. As a relatively new, proposed area of design, Transition Design may benefit from models and frameworks made specifically for its purposes, and reflect the concepts it deems vital;
5. The worldbuilding practices of authors can help integrate foresight, systems, and narratives under the umbrella of Transition Design; and
6. To address our complex problems, we need to produce dynamic images of the future that show transitions from one state to another by leveraging backcasting methodology. Our visions must include how change occurs rather than beginning and ending on the precipice of change.

In order to reconcile the above considerations, we require new frameworks and approaches to complex problems that leverage practices and insights from multiple disciplines.

A potential candidate is a new worldbuilding model that will henceforth be known as The Seven Foundations of Worldbuilding. The Foundations are follows: philosophical, political, economic, environmental, scientific and technological, social, and artistic (see Figure 10 for the Essential version of the model).

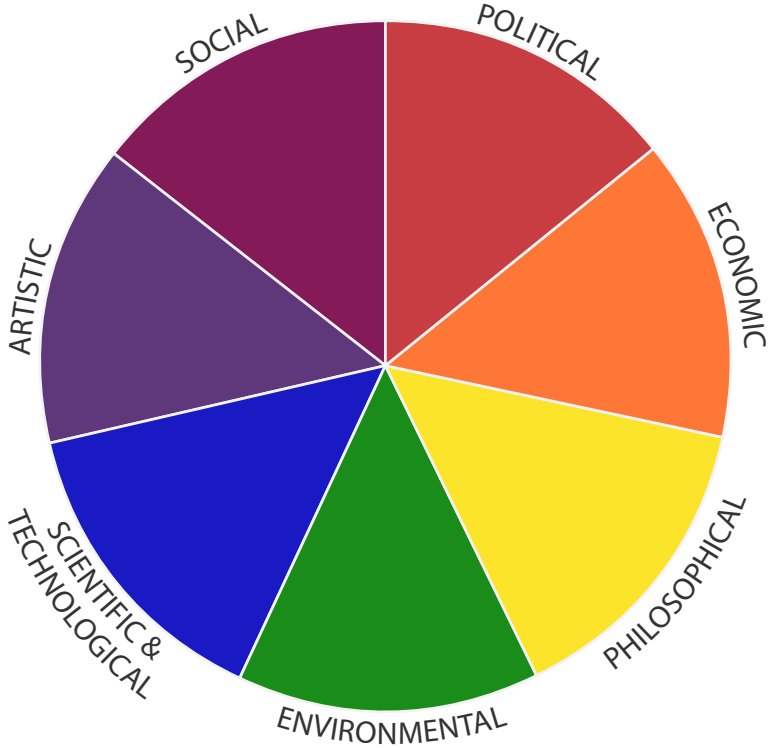


Figure 10: Seven Foundations of Worldbuilding, Essential Version

The intention behind this model is to strip civilization down to its foundations and address what is most fundamental to the reality we have created for ourselves. It is a superstructure or a mental model for culture and/or society. For instance, not every civilization will take the same approach to politics (e.g. a monarchy versus a democratic republic versus a council of elders, etc.) but every civilization has engaged in some form of politics or another. In contrast, not every civilization or society values science in equal measure, but even the suppression of science affects the foundation of a civilization or society, shaping its systems and people.

When we strip away anything that is not foundational, we can begin to minimize our reliance on existing analogies, path dependence, and continuation scenarios by taking a first principles approach to worldbuilding. Instead, we seek to reimagine our future systems in their entirety.

In addition to constructing a world using foundational elements of a civilization, the value in this model lies in each foundation's ability to serve as a leverage point, or "places within a complex system...where a small shift in one thing can produce big changes in everything" (Meadows, 1999). Within each foundation, there are multiple leverage points that can be used to shift the entire system. Any given preferred future could employ one or more leverage point.[21]

At first glance, the model resembles STEEP + V (social, technological, environmental, economic, political, and values), a framework used when conducting trend analyses (Fowles, 1978).[22] STEEP + V relies on observable and measurable changes to ascertain trends, and seeks to establish patterns through incidences. Because all data is historical in nature, it describes the past to find pockets of the future.

In contrast, the Seven Foundations were derived from the worldbuilding practices of authors, and the correlation was noted after the Foundations were formulated. Worldbuilding attempts to form a complete view of a system that has its own logical consistency. It considers how the broader system behaves, and how it interacts with and shapes people. As a result, the leverage points within the Seven Foundations are more expansive than what a STEEP + V analysis typically accounts for. Leverage points within the Seven Foundations are qualitative, more relational than incidental, and allow for both abstract and practical considerations. For example, technology (the artifact of science) is more easily observed than science as a field of study or process, but society's stance, approach, and emphasis on science is critical to how that society functions.

A breakdown of each foundation and some of its potential leverage points are as follows:

PHILOSOPHICAL

The philosophical foundation consists of epistemology (theory of knowledge), metaphysics (nature of reality), value theory (values, ethics, and aesthetics), logic and reason, and anthropology (human nature) (Lageard, 2016). A narrative that addresses philosophical concerns might examine the ethical implications of a benevolent technology, the existential considerations of a society shedding its outdated values, the nature of reality in a world that grapples with escalating climate change, or what it means to be human in a posthuman world.

21. It may be possible to use terrain and object cards from The Thing From the Future game to identify leverage points.
22. The 'V for values' was added at a later date. There are a number of variations of STEEP such as PESTLE which adds legal as a category.

Philosophy is a critical aspect of systems that has been confined to a smaller role than it should play in our society, particularly in regards to a system's ethical and moral conduct, and implications. Philosophers have become increasingly restricted to academia, even though we might make better societal decisions if our political and economic systems demanded their presence. In the absence of philosophy's direct involvement in the design of societal systems, we have created space for compromised political and economic manifestations, such as lobbyists. As science fiction author, William Gibson, said, "The future is already here – it's just not evenly distributed" (1999). It may be philosophy's contribution to civilizational foresight to insist on a more equitable present and future; science fiction can assist by producing narratives that demonstrate how.

POLITICAL

The political foundation addresses the public sphere, the creation, maintenance, and governance of entities and systems such as nations, and political theory including rule of law, existing concepts of world orders, citizenship, rights, liberty, justice, and the nature of power.[23] In science fiction, systemic political changes could include a shift towards systems of governance that improve upon or replace democracy as the default through an evolved version of the internet, new visions of human rights and life-centered design, the establishment of laws and charters that account for sustainability and foresight, or re-imaginings of a world that strives for true equality.

Unlike the philosophical foundation, the political foundation is robust and dominant in our systems. If we could demonstrate a pathway to political change within a preferred future, it could serve as inspiration for real world transitions. In addition, this foundation could tackle a critical wicked problem: "unimaginative conceptions of world-order and of the rule of law" (The Club of Rome, 1970).

ECONOMIC

The management of wealth and resources within a system is the bedrock of the economic foundation. It encompasses world economies, markets, trade, taxes, corporations, natural resources, labour, models of finance and the concept of money as leverage points. Specific examples include the end of work, cryptocurrency or global currency, or a shift away from consumerism.

Along with the political foundation, the economic foundation is a driving force behind our systems, so much so that its needs have superseded those of the others, particularly the philosophical and environmental. As far as Transition Design applies, our economic systems are faltering because they are no longer aligned with current and future world paradigms (Foster, 2010).

ENVIRONMENTAL

The environmental foundation includes our world's ecological systems and resources, but also includes physical and contextual space.[24] For instance, local versus global, urban versus rural, geography, territory, proximity,

23. Though political theory or political philosophy can be addressed under the philosophical foundation, it is important to acknowledge the reality of politics in today's world. Rule of law, world order, systems of governance are operating without adequate consideration of other philosophical domains, particularly value theory.
24. Physical space describes natural and artificial settings (e.g. forest, room, space ship, etc.). Contextual space includes considerations that are relational to others such as proximity to resources and descriptions such as 'urban'.

and populations are facets of the environment. On an individual scale, the body can be viewed as a physical environment for the mind and, in narratives, the environment can be equated to a story's setting. This foundation is often addressed by worldbuilders, and reinforced throughout narratives in the form of setting.

From a living systems perspective, this foundation encompasses all others since civilization cannot exist without a planet to exist on, at this point in time. For that reason, we can make the argument that environmental considerations supersede all others. However, a balanced system would require harmony between the environment and all other Foundations, if for no other reason than the fact that we are flawed beings who struggle with our destructive nature, and have not fully grasped that our planet matters more than profit. This transition will take considerable time and effort.

A preferred future may explore our ecological concerns such as climate change and its consequences, such as unpredictable weather patterns and loss of land mass. Apart from ecological leverage points, this foundation could include the preservation of natural resources such as helium, the creation of sustainable megacities, and the transition of manufacturing from Earth to space.[25] Sustainability is a prominent goal of civilizational foresight, and without a living Earth, we are lost (at least, for the time being).

SCIENTIFIC AND TECHNOLOGICAL

This is the foundation upon which science fiction stands. It entails the observation of and experimentation with the natural and physical world, the consequential innovation and invention, and the systematic, methodical approach to progression of knowledge, research, and its applications. In a science fiction narrative, this foundation is vital. In order for it to translate into preferred futures, it must transcend artifacts and technophilia, and address process and systemic impact. Other than technological advancements, examples of this foundation can include the application of the scientific method to social systems and values, systemic implications of increased funding for scientific research or institutions, or the democratization or open sourcing of science.

Clear demonstrations of how science and technology can be leveraged for Transition Design may not only be beneficial, but achievable. Because science fiction has a significant influence on research and innovation, what gets envisioned, may get done.

SOCIAL

Humans are social beings, and the social systems we create are at the heart of our day-to-day lives. The social foundation refers to the relational dynamics of our world and the systems within it. In other words, it entails the constructs we have developed to facilitate our relationships with each other. Leverage points within this foundation include types of relationships, groups and institutions, language, gender dynamics, play, crime, discrimination, but also more abstract concepts such as status, sentiment, social hierarchies, and scales of participation/organization. Preferred futures could address the establishment of global values, the application of blockchain and a shared reality to societal systems, or the elimination of organized crime.

25. Amazon founder Jeff Bezos has suggested that our manufacturing processes and factories belong in space, a common trope in science fiction (Graham, 2016).

Through the use of characters and events, science fiction does make an effort to address the social implications of science and technology. The argument here is that we need to go further with our efforts, transcending the social paradigms and values of today, aiming instead for the best possible paradigms of tomorrow.

ARTISTIC

Art is a fundamental human endeavor and a defining characteristic of our species. Art is defined as "the expression or application of human creative skill and imagination, typically in a visual form such as painting or sculpture, producing works to be appreciated primarily for their beauty or emotional power" (Oxford Living Dictionaries, Art, 2017). When other Foundations are in discord, it is the artistic foundation that tends to react first in an attempt to compensate. Art and artists sometimes strive to be outside of their time.

Though science fiction itself is an art form, there is an opportunity to better express the significance and impact of art as a leverage point in preferred futures. For instance, political strife may manifest as propaganda from an entrenched power, and graffiti from a rebelling faction. Futures addressing this foundation may include new forms of expression, the implications of a post-work creative society, or the use of experiential futures (a somewhat meta option that will be made possible through augmented and virtual reality).

VISUAL DESIGN

The circular design of the model symbolizes a complete and balanced world. It encourages the user to move from one foundation to another in order to achieve a coherent outcome, in which the foundations work together to create a harmonized whole. Each foundation is given equal weight so that no element is privileged over another, and to encourage the user to give equal consideration to aspects of a system that lie outside readily apparent boundaries.

The colours are laid out as a spectrum to convey that the foundations transition into each other. Though they are presented as separate categories, the lines dividing them are subdued. Some colours are more appropriate for the foundations they are assigned (e.g. the environmental foundation is green representing nature, and the political foundation is red representing power), while others have a less obvious link. For instance, orange has previously been associated with nobility, and orange-red, in particular, is considered active, aggressive, and competitive, making it an adequate representation of the economic foundation (Gage, 1999).

While it may be tempting to think that some foundations contrast or oppose each other, it would be a mistake to interpret the foundations in that regard. Every foundation seeks to complement and balance itself against the others. The two foundations that we are most likely to interpret as oppositional are the philosophical foundation and the scientific and technological foundation. However, a closer examination of the relationship between those foundations will reveal that they "were seen as almost one and the same activity for most of Western intellectual history", with science referred to as 'natural philosophy' until the nineteenth century (Waugh and Ariew, 2008; Cahan, 2003). Both disciplines seek truth, demand critical thinking, and exercise a mutual influence.

IMPLICATIONS

REVOLT

Our real world systems have not been designed with coherence and balance in mind. Much of our reality has emerged with little to no foresight. As a result, our systems are out of balance. The political and economic foundations take precedence over the rest, and continue to receive privilege in the face of growing complexity and uncertainty. When a living system is out of balance it experiences a revolt.

Here, we return to the panarchy framework for inspiration. In an ecosystem, a revolt "occurs when fast, small events overwhelm large, slow ones, [similar to] when a small fire in a forest spreads to the crowns of trees, then to another patch, and eventually the entire forest" (see Figure 11) (The Sustainable Scale Project, 2003). Though the concept does not have a direct translation into the Seven Foundations model, there is an opportunity to adapt the concept for a new use. Within the context of Transition Design and the proposed model, a revolt is when the incidences or dynamics of one foundation overwhelms the others, provoking a response.

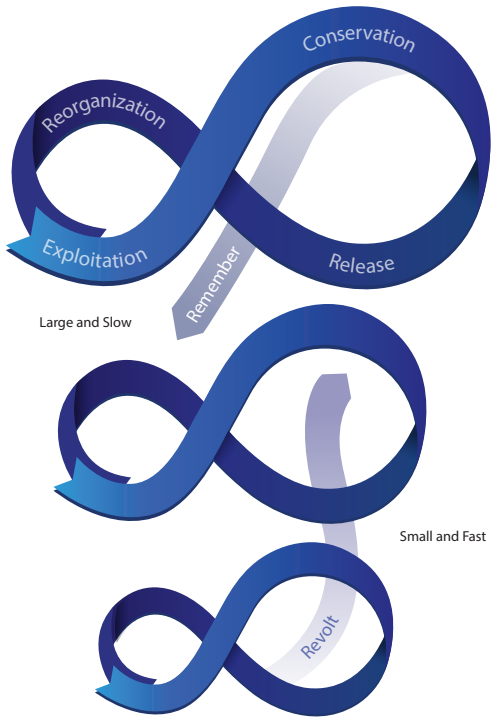


Figure 11: Nested Panarchy
(The Sustainable Scale Project, 2003)

A revolt may be difficult to predict, and akin to what futurists call a 'wild card' — "the emergence of highly disruptive surprises" also known as STEEP surprises (Markley, 2010). Markley posits that there are four types of wild cards:

- Type I Wild Card: low probability, high impact, high credibility
- Type II Wild Card: high probability, high impact, low credibility
- Type III Wild Card: high probability, high impact, disputed credibility
- Type IV Wild Card: high probability, high impact, high credibility (2010).

For example, global warming is a Type II Wild Card and "is viewed as high probability by experts, but has low credibility with non-experts" (Markley, 2010; Hines, 2014). This approach to wild cards may have application for systemic revolts given that they both address unpredictable high impact events, and because the underlying models (Seven Foundations and STEEP) have similarities. A comparative analysis of revolts and wild cards may yield insight into identifying revolts as they are about to occur, and determining whether or not a system is out of balance.

The dynamics playing out in the United States of America reflects the early stages of a revolt, with the Trump Presidency serving as an inciting incident.[26] The economic and political foundations have come to dominate American society at the expense of all others. The economic foundation has seen growing wealth disparity, the rise

26. This example was used given its relevance and significance at the time this paper was written, and because it is globally recognizable.

of the nouveau aristocracy, and a disappearing middle class. The political foundation is shifting from a democracy to an oligarchy, with the government increasingly undermining (if not violating) the rights of individuals and groups. A backlash may already be underway, with revolt coming from within the two inflated foundations, in support of the others:

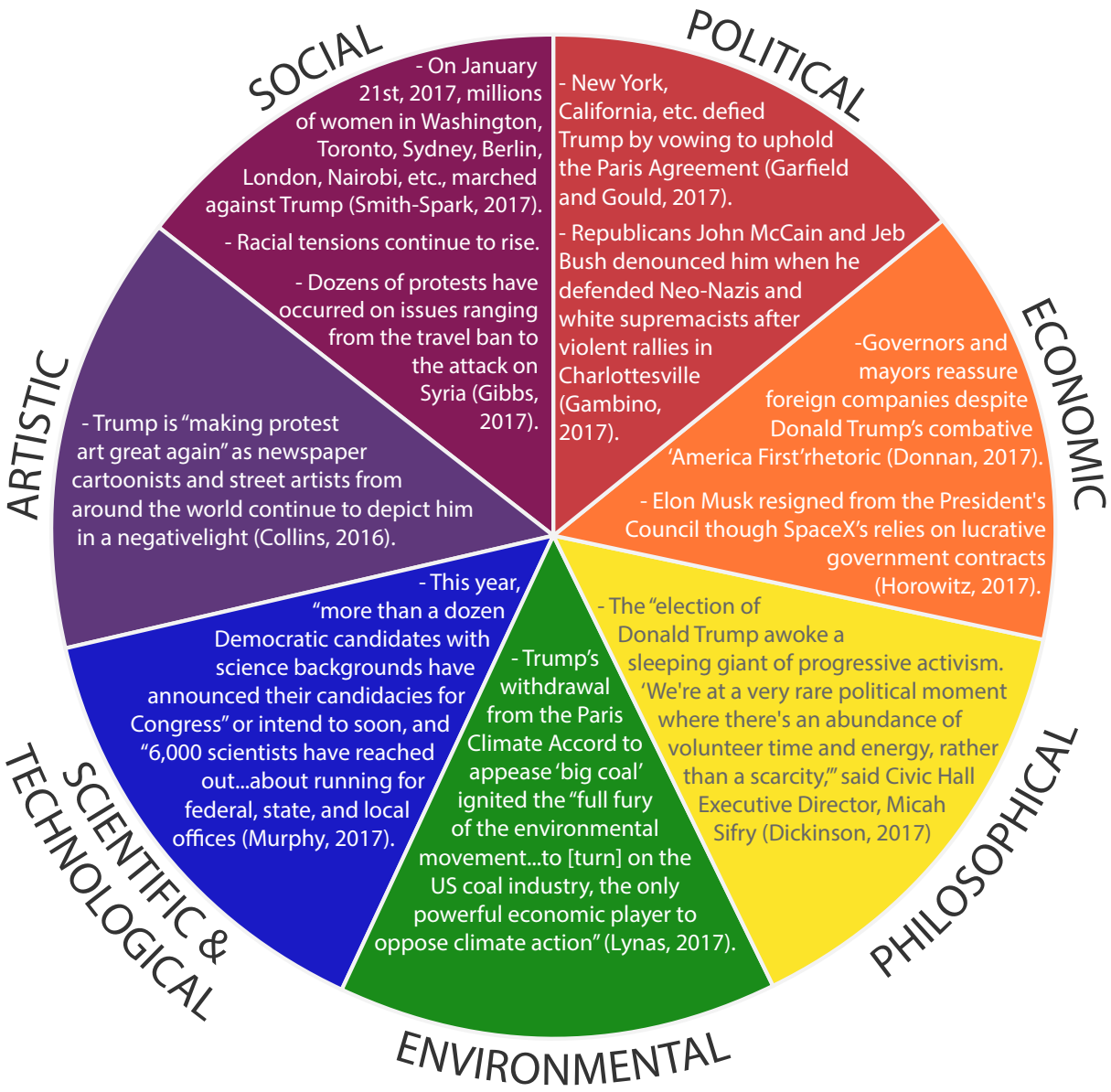


Figure 12: An Example of a Seven Foundations Revolt

The aforementioned signals do not address the revolt occurring on an international scale. It demonstrates how our complex systems can react like a living system when pushed to the brink of its carrying capacity. As with systems, collapse scenarios in foresight also speak of degradation as an opportunity for better things to rise from the ashes.

DESTRUCTION

When we design future states, we focus on what we need to create, but understanding what we need to destroy is equally valuable. The 'concept of creative destruction' — the "incessant product and process innovation mechanism by which new production units replace outdated ones" — has its roots in economics, but has found its way into systems through the panarchy framework (Caballero, n.d.; Liberating Structures, 2017). For our purposes, creative destruction involves discarding or renewing structures, processes, and relationships in a system, in order to create space for new structures, processes, and relationships during a renewal phase (see Figure 13) (Liberating Structures, 2017).

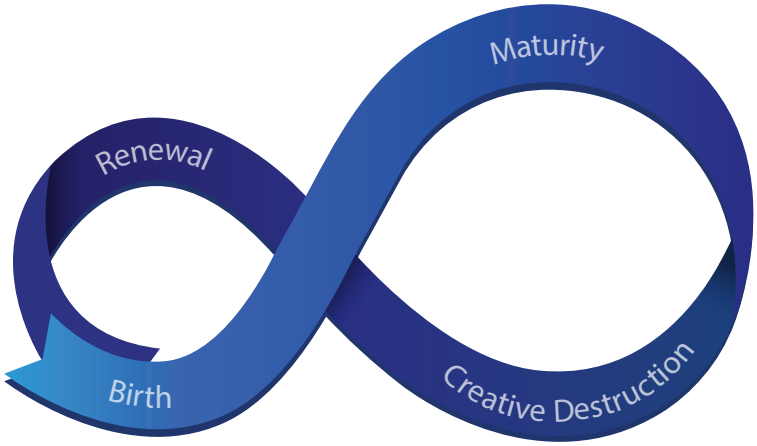


Figure 13: Ecocycle Planning (Liberating Structures, 2017)

We also need to think about what elements of a system should be preserved, not only for the sake of continuity and incremental change, but because not all aspects of every system have failed us. There are structures, processes, and relationships that provide value and may continue to do so in the future.

A potential opportunity to leverage the concept of destruction and preservation for Transition Design is the Systemic Transition Framework (see Figure 14).[27] This framework advocates that, as we backcast from a preferred future state, we determine what needs to be preserved, while forecasting what needs to be destroyed to make room for elements from that preferred future state. This framework can be merged with the Seven Foundations model to transition all foundational aspects of a system.

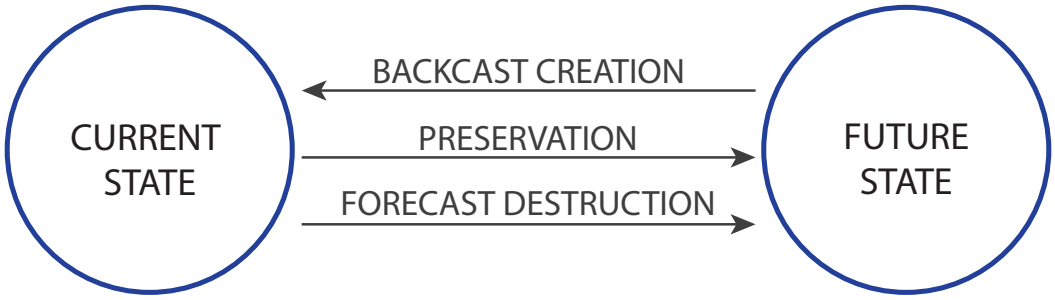


Figure 14: Systemic Transition Framework

27. Though Three Horizon's is viable framework, it does not reimagine the future; rather, it depicts "the three horizons as existing always in the present moment, and that we have evidence about the future in how people (including ourselves) are behaving now" (Three Horizons, 2017). This suggests path dependence. It does not provide guidance on what should be transitioned, and what should be preserved or destroyed in a system. It focuses on a single transitional space rather than a series of transitions. It also does not identify what may be foundational to a system or advocate for coherence, as the Systemic Foundations Transition version does.

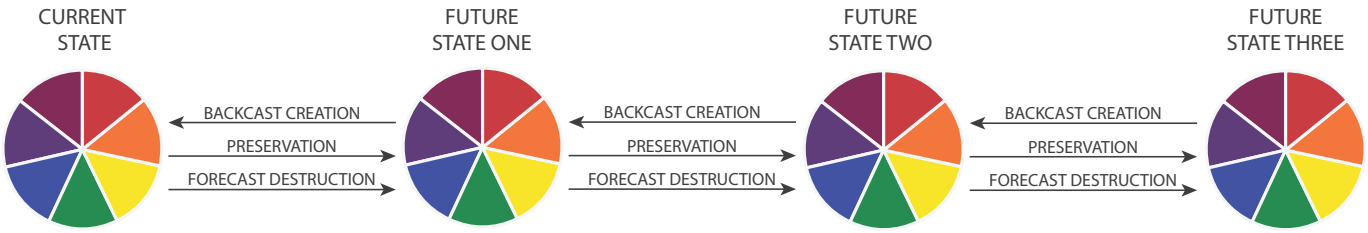


Figure 15: Systemic Foundations Transitions

For example, it would require systematic acts of creation and destruction to shift our society from a state where individuals own gas-powered cars, to a car sharing culture in which a city owns a fleet of electric cars that individuals borrow when in need. Not only do we have to transition the current car culture, but also the infrastructure and systems that support it. As deployment and charging stations are built (creation), gas stations need to be removed (destruction), and major roadways may require adjustment and maintenance (preservation), amongst other things. The transition would likely require a series of planned, staggered steps.

Whether or not this framework is viable has yet to be seen. Currently, it is untested and further research is required to determine its usefulness and validity.

EMERGENCE

It is possible for many realities to emerge as the future becomes the present. Given this — and the fact that worldbuilding allows for emergence — the Seven Foundations model allows changemakers to envision what may emerge without defining the final state in its entirety. To accommodate emergent design, it may be helpful to touch upon the concept of coherence once again. If an emergent factor is inconsistent with the system and/or preferred future designed using the Seven Foundations, then it may indicate a coherence flaw within the components of the proposed state or that the intended pathway for a transition is off course. It may also serve as a framework for creating rules and context rather than design specifics, similar to LARPs. Further research is required to test this hypothesis.

SECOND ORDERS

Though the Seven Foundations model address the foundational aspects of a society, It is the combination and permutations of the seven foundations that gives rise to all others facets of a civilization or system. Second orders emerge from the interactions and relationships between the seven foundations. For instance, culture is an emergent property of the Seven Foundations model, given that it is the "arts and other manifestations of human intellectual achievement regarded collectively" and "the ideas, customs, and social behaviour of a particular people or society" (Oxford Living Dictionaries, Culture, 2017). This makes art, science and technology, social norms, and so on, more foundational than culture itself, especially since culture is also shaped by political decisions, philosophical beliefs, and the creative economy.

Other prevalent second orders include religion, corporations, social networks, most government mandated systems such as healthcare and international relations, etc. The following are three high-level examples of second orders.

CATHOLIC CHURCH (RELIGION)

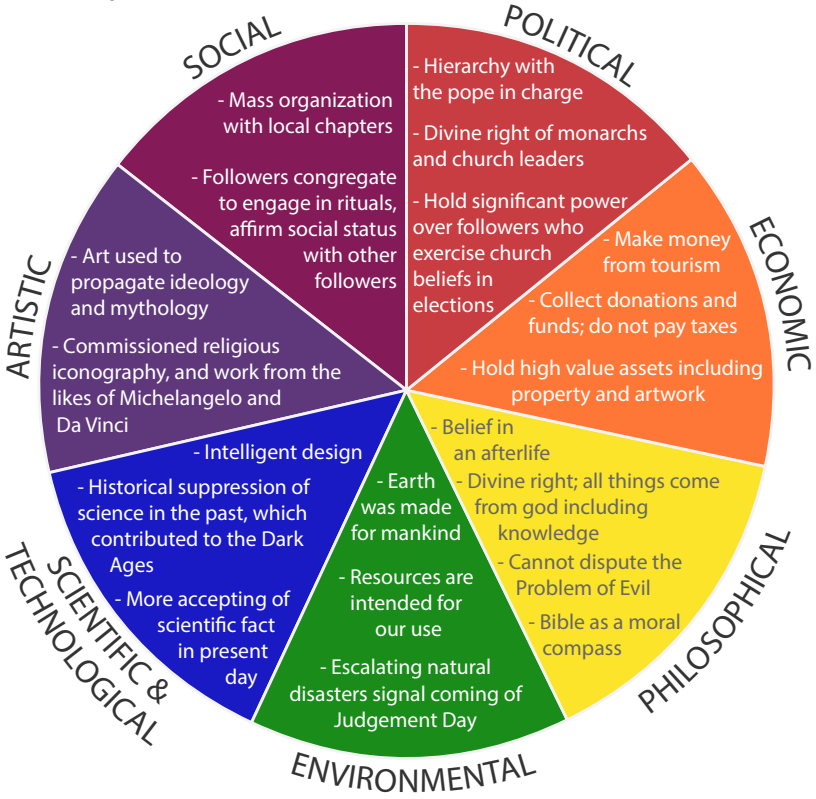


Figure 16: Seven Foundations Example, Catholic Church

PUBLIC SCHOOLS (EDUCATION SYSTEM)

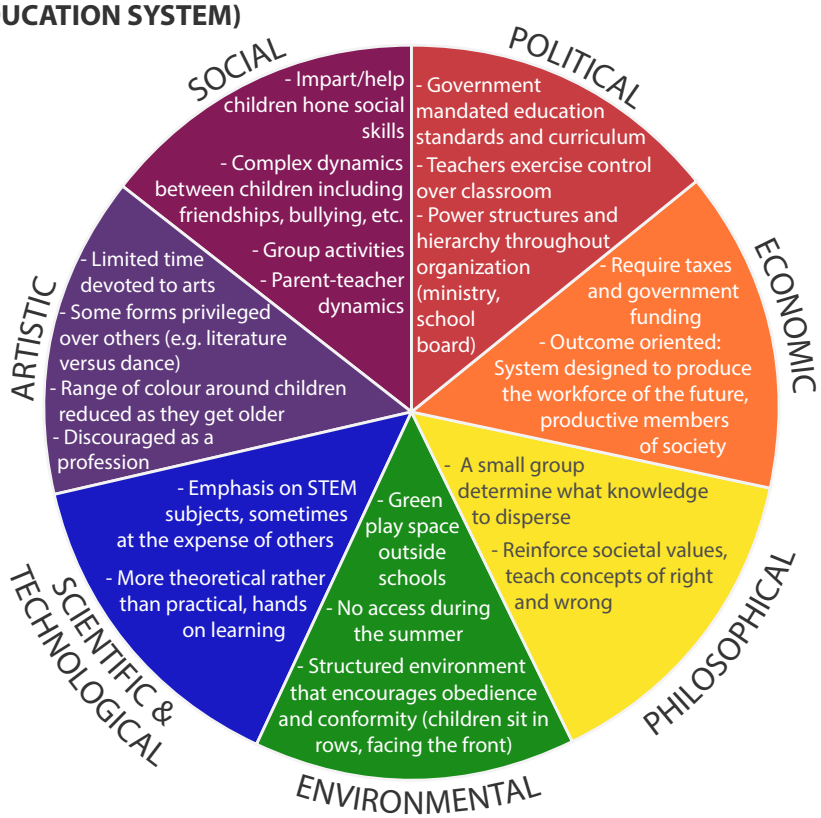


Figure 17: Seven Foundations Example, Education

SILICON VALLEY (ECOSYSTEM)

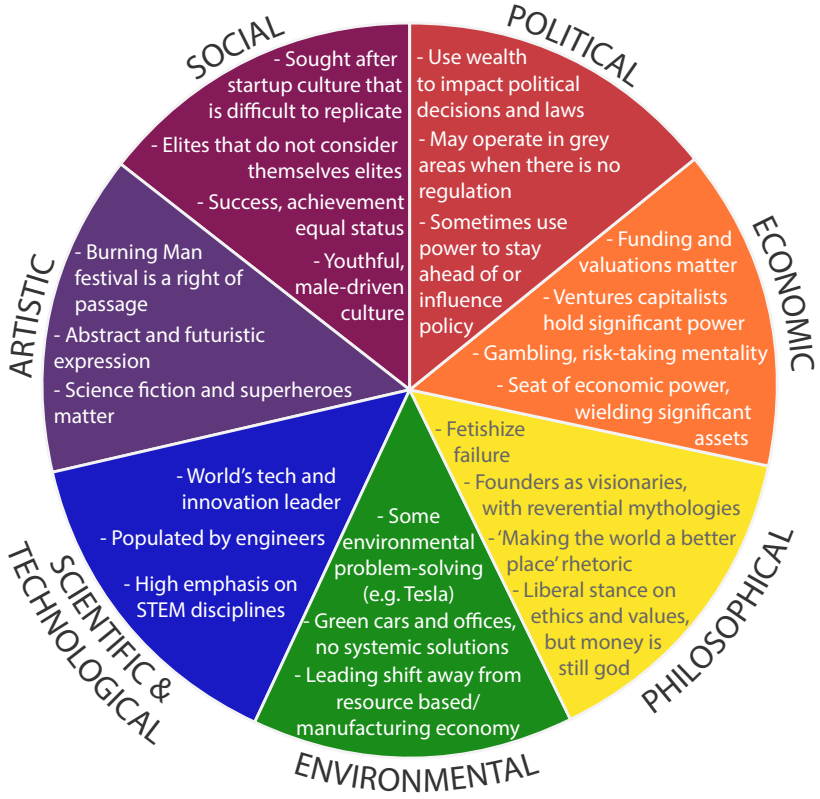


Figure 18: Seven Foundations Example, Silicon Valley

A MATTER OF TIME

In and of itself, the model presented above offers an approach to systemic design and achieving systemic coherence. It is not until we add timescales to the model that its true value emerges. Designing for systemic coherence over time is a challenge because it requires different parts of a system to evolve together in harmony with each other, rather than in competition. Each foundation must compliment the others so that the system maintains balance, and no single foundation dominates the others, forming an entangled relationship much like natural ecosystems. For this reason, the model encapsulates a living systems approach. By adding the element of time, the model becomes a foresight tool that allows for a civilizational outlook and the opportunity to leverage backcasting methodology.

There are two versions of the model that have meaningful application for Transition Design: Generational and Incremental. Both versions can be used to imagine new worlds, systems, and paradigms. They are tools for changemakers — including systemic designers and foresight practitioners — to create new visions of the future. It is important to note that there is no such thing as a single preferred future or a 'right answer' when using this model. Changemakers (or any user) should create multiple iterations, with many preferred states and pathways forward.[28] It is recommended that users identify a single leverage point within one foundation and build upon that, selecting a different leverage point with each iteration.

28. Ideally, a user would create four or more preferred future states to avoid the perception that there is a good, bad, and neutral future (as may be the case if there are three or less futures generated).

GENERATIONAL

The Generational version features a timescale that ranges from the everyday life to that of a civilization or multiple generations (hence the name, Generational). It accounts for time in scales that we have a tendency to parse our lives in. For instance, we think about how our day-to-day lives will play out, but also about how our actions and decisions may impact our children and grandchildren. This version of the model seeks to create a coherent future system that is sustainable in the long-run, without losing sight of the individual at the heart of it all, much like a protagonist at the center of a story (see Figure 19). The colours darken as we consider more people over a broader timescale, and each timescale is a contained system that can be designed for separately. The model is most useful and impactful when all timescales (and their mutual influence) are considered at once.

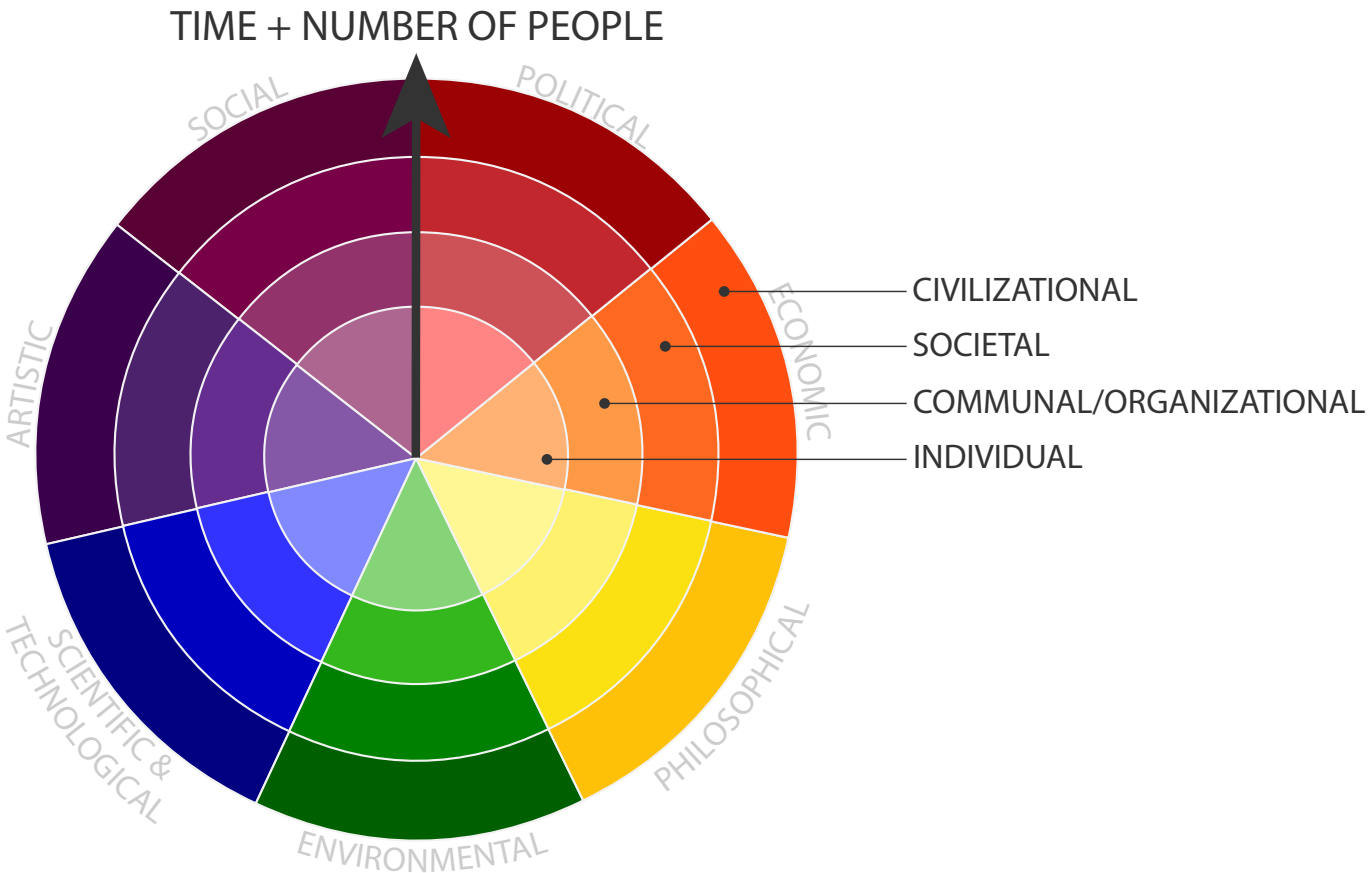


Figure 19: Seven Foundations of Worldbuilding, Generational Version

In order to reimagine the world, a system, or a paradigm, we begin at a civilizational level, with the longview in mind (see Figure 20). From there, we consider the realities that emerge at the societal, communal/ organizational, and individual levels. By thinking about our systems at the civilizational level, we design a sustainable world for generations yet to come, and for paradigms and realities that are between a century or two away (accounting for the lifespans of the multiple generations living within that future). A more daring user might venture farther out into the future. Examples of civilizational change include reimagining deeply entrenched systems such as patriarchy, colonization, racism, and mythologies such as money.

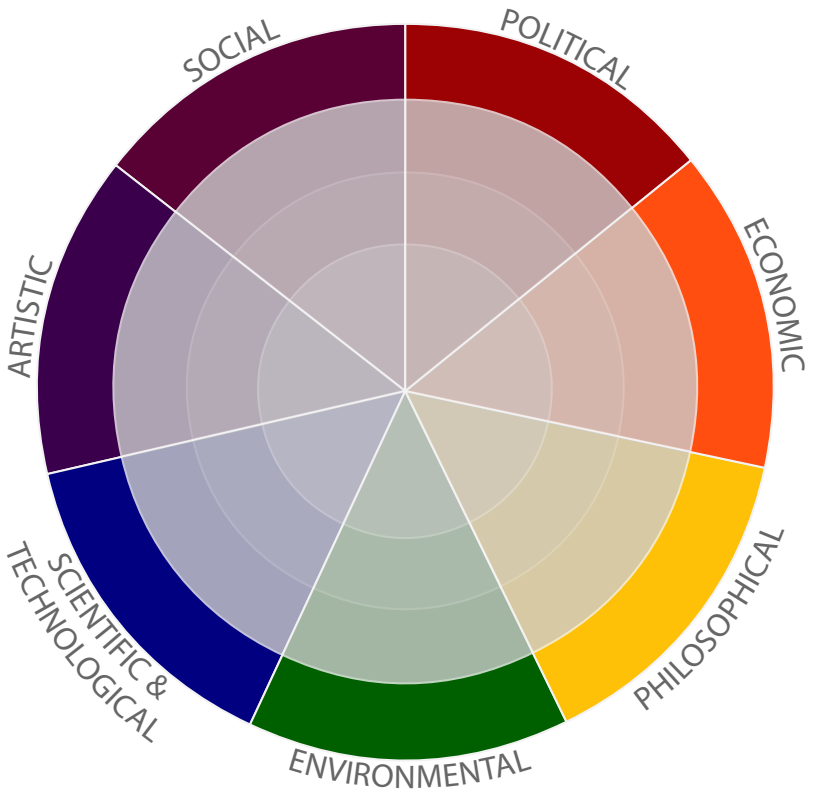


Figure 20: Civilizational Scale of the Seven Foundations, Generational Version

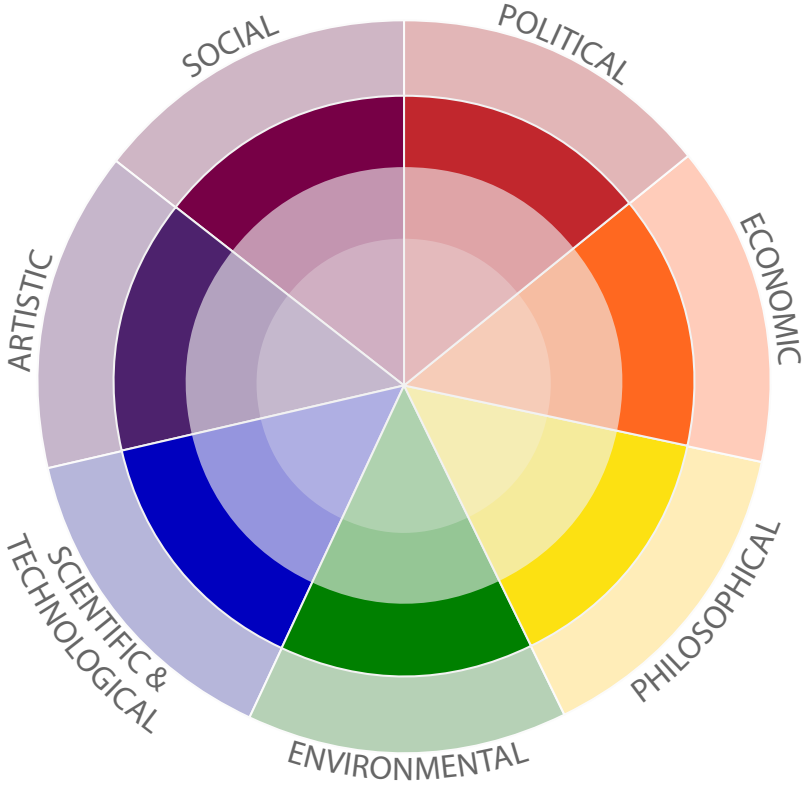


Figure 21: Societal Scale of the Seven Foundations, Generational Version

Next, we consider how those civilizational realities may trickle down into a particular society (See Figure 21). A societal level considers what is possible over decades, and can extend up to a century (towards the higher end of a single human lifespan or one generation). Examples of change on a societal scale include the Industrial Revolution, or the creation and dissemination of the internet.

The communal level accounts for the systemic realities that emerge within a few years, up to a decade for a single community or an organization (See Figure 22). While some communities and organizations do span many decades, here we consider the amount of time it takes to enact a strategy (e.g. a strategy plan). Examples include the advent and rise of social media, change in leadership of a country, or the urbanization of a town.

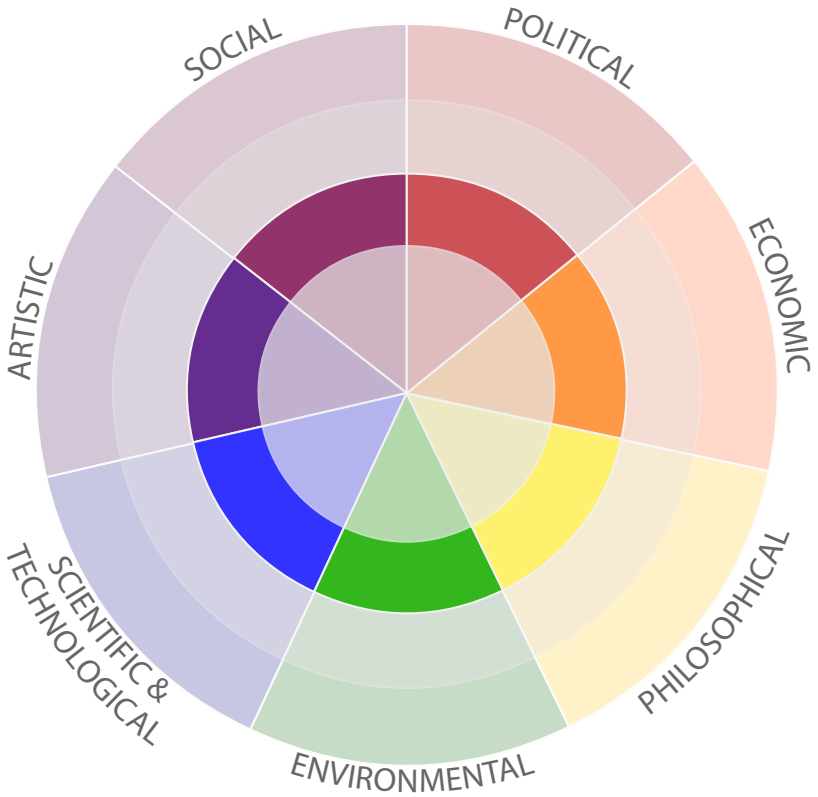


Figure 22: Communal/Organizational Scale of the Seven Foundations, Generational Version

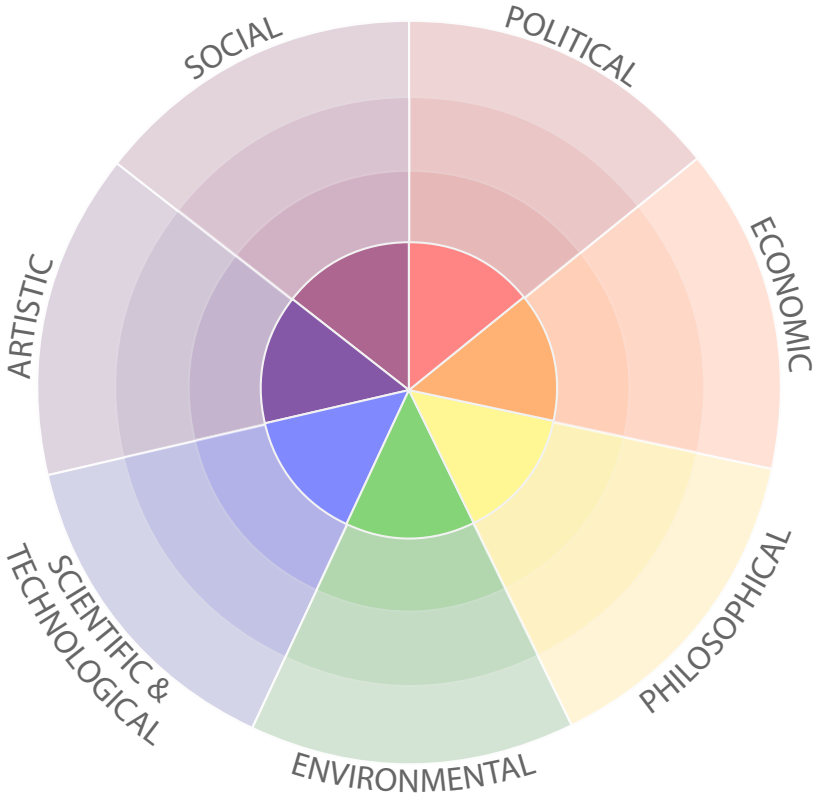


Figure 23: Individual Scale of the Seven Foundations, Generational Version

Finally, we imagine the reality of the individual (See Figure 23). Here, we filter the broader, systemic realities into the day-to-day consequences we must live with, accounting for the human-centered design implications of our systems. Examples of change at this level include a shift in consumption habits, belief systems, or interaction with new technology.

Alternatively, the model can be used from the center out, by starting with the individual day-to-day realities in a new world, system, or paradigm, and examining the consequences of those realities at increasing scales of time. While it is suggested a user start with the civilizational level to account for the long-view from the beginning of the process, there is no definitive starting point. Further research is required to determine if, and to what degree, the outcomes differ by starting at one level of the scale over another.

Overall, the Generational version helps us analyze how decisions and realities at one level of a system affect other levels, while maintaining sight of the system as a whole. It provides an iteration of a complete, coherent world derived through systemic design, with the potential for envisioning new world orders. Additionally, if we reimagine the system at various timescales, and compare it to the existing paradigm, we may be able to identify leverage points that we can use in the present to enact change.

INCREMENTAL

The second version incorporates backcasting methodology directly into the model, and is more relevant to the concept of Transition Design than the first (see Figure 24).

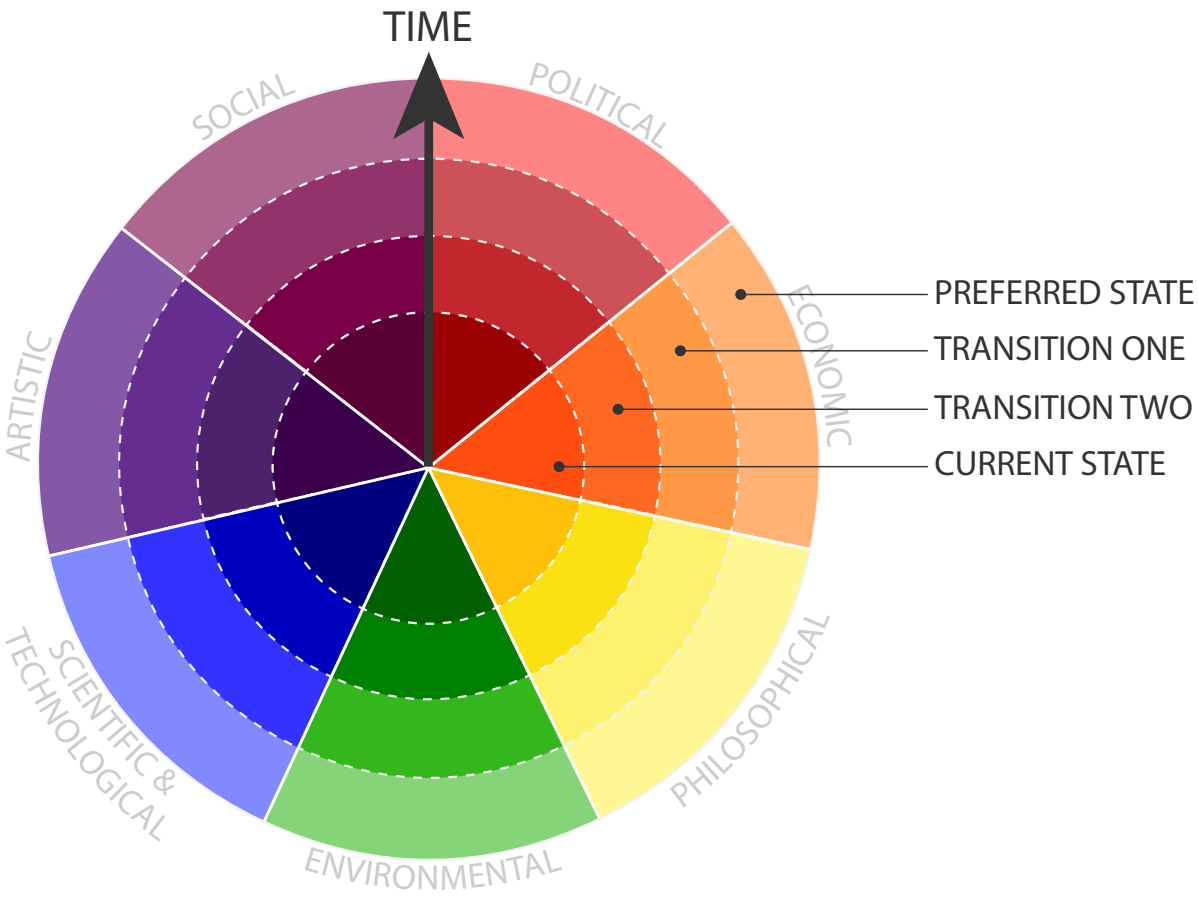


Figure 24: Seven Foundations of Worldbuilding, Incremental Version

Please note that, while Figure 26 is displayed with two transitions between the current and preferred state, a user may choose to work with any number of transitions. The number of transitions selected will depend on the rate of change and the nature of the problem, system, industry, organization, etc. being considered. The transitions are

separated by dotted lines to acknowledge that a transition may occur at any point in time (not only in the specified increments). The colours fade as we go further into the future to signify uncertainty, and each foundation becomes a Cone of Possibilities, with all seven forming a transitioning system (Voros, 2003). It is up to the user's discretion to determine how many transitions are required; the model is not limited to the timescales presented in this paper. Because the model allows for multiple transitions between the current and preferred future state, we can identify where in time a change needs to take place, and whether or not certain changes or innovations must occur before others in order to pave the way for a preferred future. This approach also allows us to plan and chart a pathway for longer time horizons.

We begin with designing the preferred future state at a desired point in time (See Figure 25).

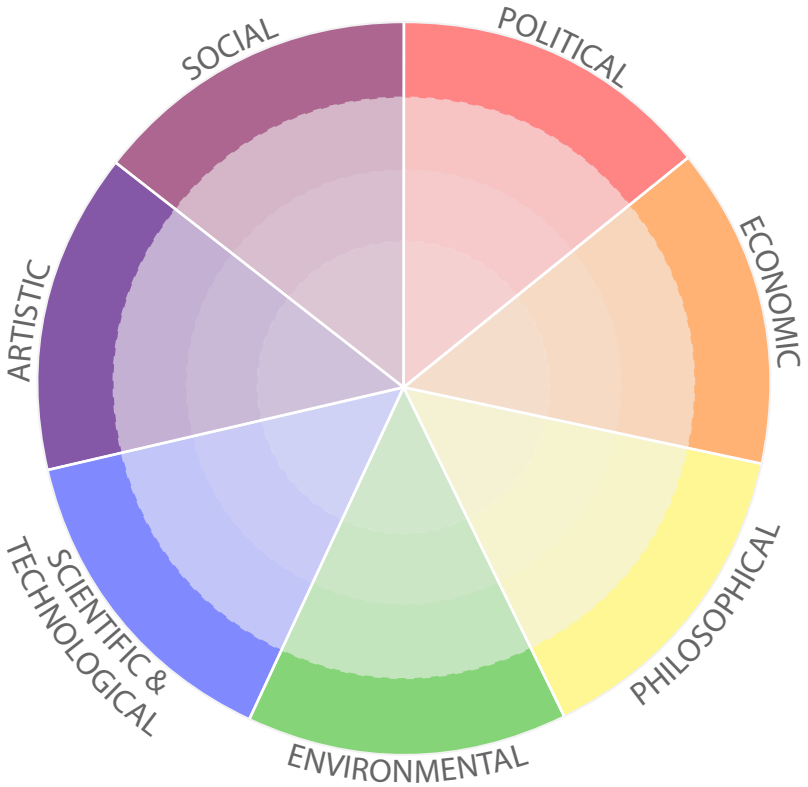


Figure 25: Preferred Future State of the Seven Foundations, Incremental Version

Next, we map out the current state of a system, paradigm, or world according to the Seven Foundations (see Figure 26). The current state can be mapped out before the preferred state, however, by starting with the preferred state, we limit the user's inclination towards path dependency and extrapolation, encouraging her to strive for a new vision of the future. The current state can be derived from examining trends, events, incidences, behaviours, etc. If an understanding of trends and the current systemic state is necessary, a user may choose to map out the current state before the preferred state.

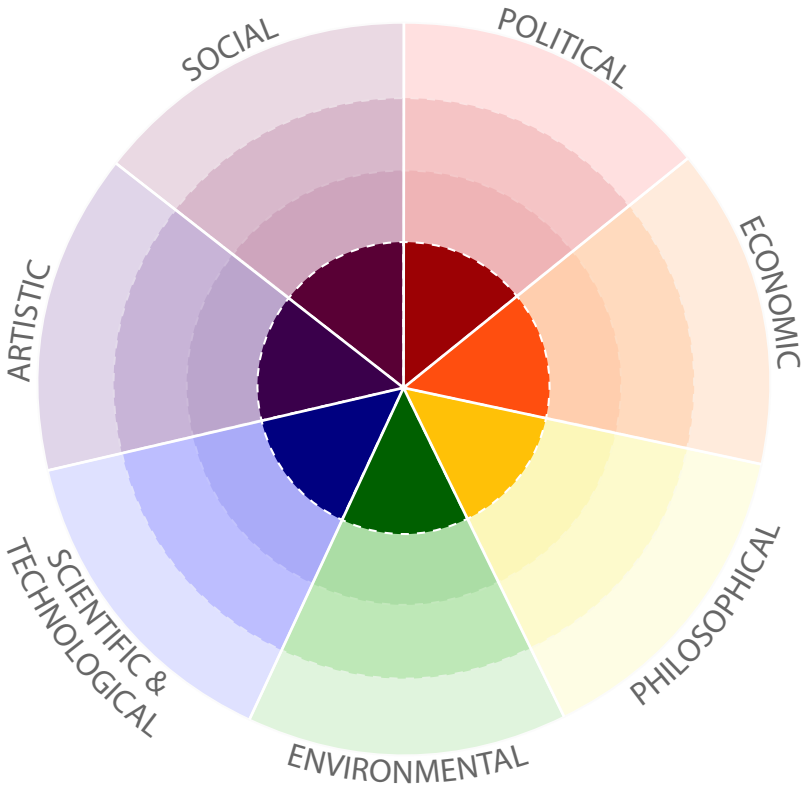


Figure 26: Current State of the
Seven Foundations, Incremental Version

Then, we backcast each foundation within the system, connecting the preferred vision of the future to our present day realities (see Figure 27). It is important that the chosen timescale has an incremental increase between the current state and the preferred state. Any time increment is sufficient (e.g. every 5 years, 20 years, 100 years, etc.).

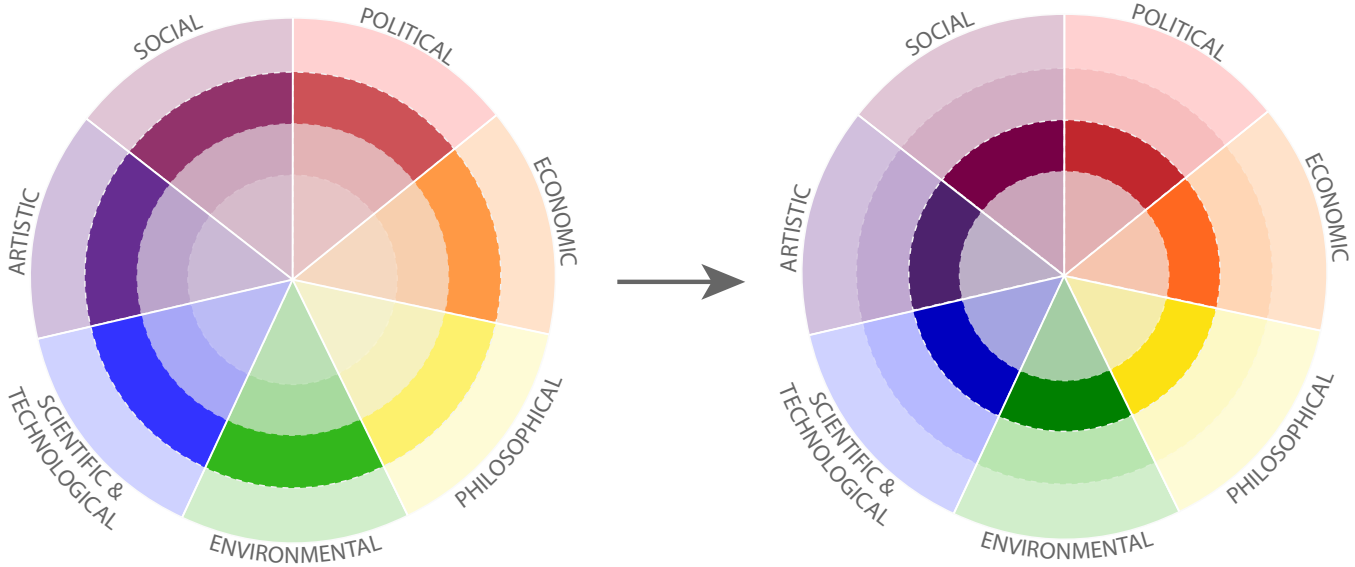


Figure 27: Backcasting Transitions of the
Seven Foundations, Incremental Version

This gives us a pathway from the present to a preferred future, creating a map of how we might transition worlds, systems, and paradigms from one state to another, while maintaining coherence at each stage. Because foresight situates itself in multiple futures to understand what we need to do in the present in order to design and prepare for the future, users should use the model to create multiple visions of the future, and backcast each one to the current state. It may be tempting to start with the current state and plot towards a preferred future, but users should heed caution in doing so; starting with the current state encourages extrapolation rather than foresight. We are more likely to perpetuate undesirable and dysfunctional elements of the present into the future, rather than engage in much needed radical reimaginings as advocated by Transition Design.

PRIMARY USE CASE

The primary intended use for the Seven Foundations model is Transition Design. It combines the foresight, systems, and futures-based narratives aspects of Transition Design in order to envision radically new images of the future, and the pathways required to reach those preferred states. Because this model captures elements of a superstructure, it encourages changemakers to think about the foundational aspects of a society rather than a single approach to those foundations (e.g. alternative governance structures versus the Scandinavian brand of democracy). In accordance with Transition Design principles, the model can be used to examine the 'long now' — time horizons that stretch as far as ten thousand years into the future (Brand, 1996). The Incremental version captures backcasting in its design, and allows changemakers to design multiple transitions. The Generational version captures the everyday life and its systemic consequences, but also allows changemakers to deconstruct the current state of a wicked problem and design a preferred future state in which that problem is minimized or eradicated.

SECONDARY USE CASES

In addition to Transition Design, the model may have the following uses:

STRATEGIC FORESIGHT

- Scenario generation that accounts for the elements of a superstructure
    - May be used in conjunction with other methods such as Generic Images or the 2x2 Matrix
    - Includes creating transitioning scenarios using the Incremental version or systemic scenarios using the Generational version
- Designing a preferred state (or any future state), and backcasting within the same framework using the Incremental version
    - The Essential version can be combined with the Three Horizons framework as an alternative to the Incremental version
    - All versions can be used for shorter time horizons for strategic planning purposes
- Designing a future with consideration for the everyday life, and its implications on a civilizational scale (and vice versa) using the Generational version
- Deconstructing found futures and their implications across time or generations using the Generational version
- High-level worldbuilding in experiential futures, with consideration for a superstructure using the Essential version, or taking a story-first approach using the Generational version

POLICY DESIGN

- Designing for a transition towards a preferred state using the Incremental version
- Deconstructing the current state, and designing a preferred state for a wicked problem using the Generational version
    - The Incremental version can then be used to create the transitions for each Generational timescale (e.g. an Incremental version that shows the transition between a current state for an individual and preferred state for an individual)
- Building 'rules' or policies for all foundational aspects of society around a given issue using all versions (as opposed to building preferred future states)

SYSTEMIC DESIGN

- Designing the current and preferred states of a given system using the Essential version
- Transitioning a system from one state to another using the Incremental version
- Designing or redesigning culture in an organization

TRANSITIONAL NARRATIVES

- Similar to scenario generation, the Generational version will allow for robust worldbuilding and storytelling that places an individual at the center (much like a protagonist)
    - The Incremental version may also be used to create stories that transition across time with consideration for all the foundational elements of a world
    - Please see Appendix F for an introduction to 'Transtopias'

Further testing will reveal if the suggested secondary applications prove useful. Potential uses for the model may emerge or prove invalid as it is tried and tested by changemakers.

EXAMPLES

The following examples demonstrate the use of The Seven Foundations of Worldbuilding model and its variations.

GENERATIONAL VERSION: 1984

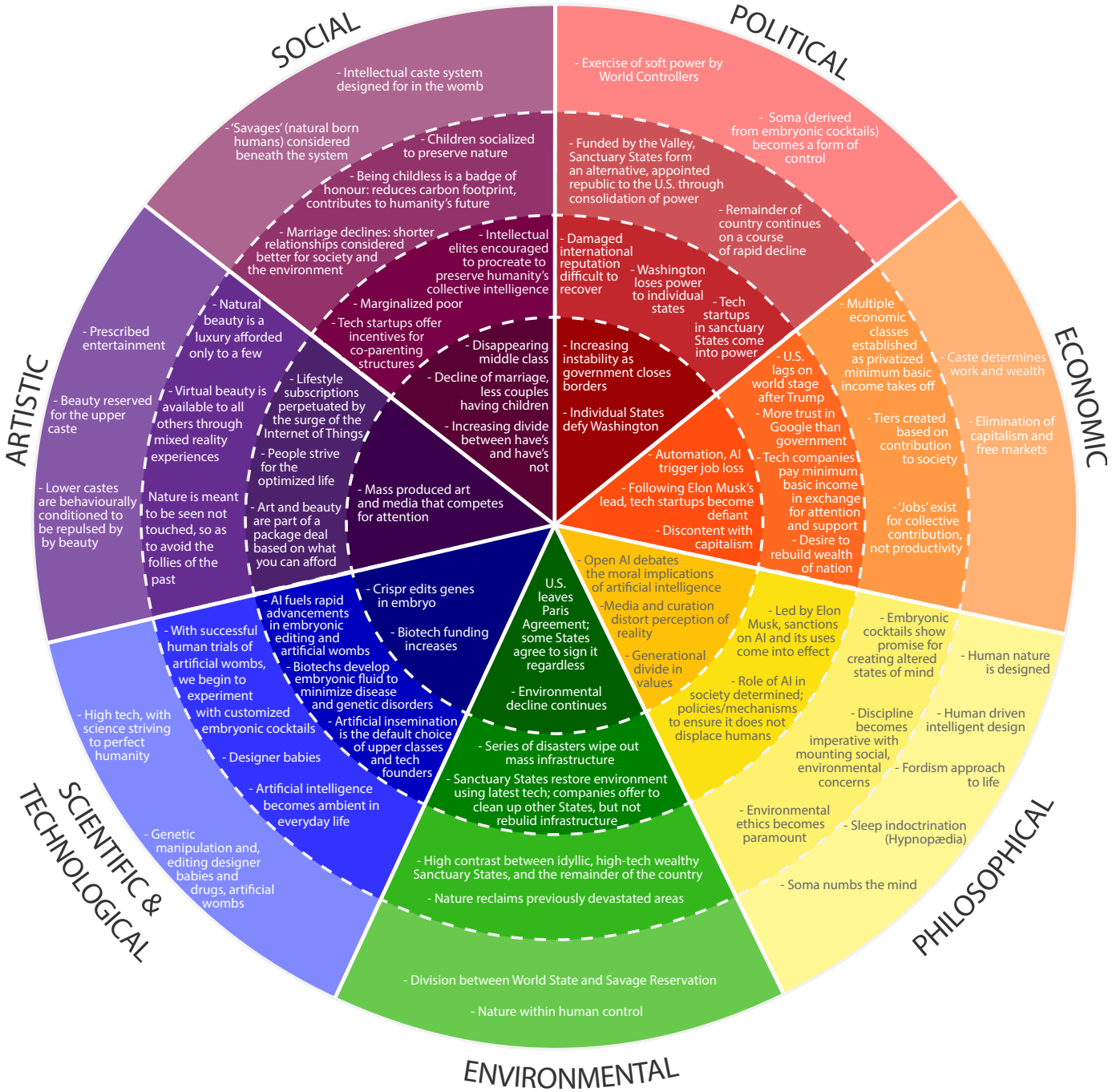
A Generational Seven Foundations for Orwell's *1984* demonstrates the novel's Individual, communal, and societal worlds. A civilizational level was constructed with consideration for coherency with other levels. As a highly recognizable world, it serves as an interesting example of how the life of an individual is shaped by society.

(Orwell, 1949)

Figure 28: Generational Deconstruction of Orwell's 1984

INCREMENTAL VERSION: BRAVE NEW WORLD

This Incremental version demonstrates how American society could transition into Huxley's *Brave New World* in thirty years, given ten year increments. In this version, we see how a few pivotal events can shift the future towards a state intended only for fiction (i.e. if seemingly far-fetched future states are within reach, perhaps sustainable ones are plausible too). As many are familiar with the story, examining Huxley's world, and the transitions that may lead to it, provide an opportunity for discourse on collective preferred futures. For example, what aspects of Brave New World are desirable or undesirable, and what does our opinion of this world reveal about our visions for preferred futures?



(Huxley, 1932)

Figure 29: Incremental Transition Towards Brave New World

PREFERRED FUTURE

Using the same current state as the previous example, this example demonstrates a high-level preferred future (a possibility amongst many). Alternatives are required to determine which preferred states and transitions to act upon. This preferred future state was built as a creative exercise, imagining what may be possible. The transitions were backcasted with consideration for trends and driving forces such as climate change, rapid technological advancement, and growing concerns about wealth disparity. Increasing environmental disasters served as a leverage point to inform the remaining foundations. The preferred future is set in 2047, with two, ten year transitions in between.

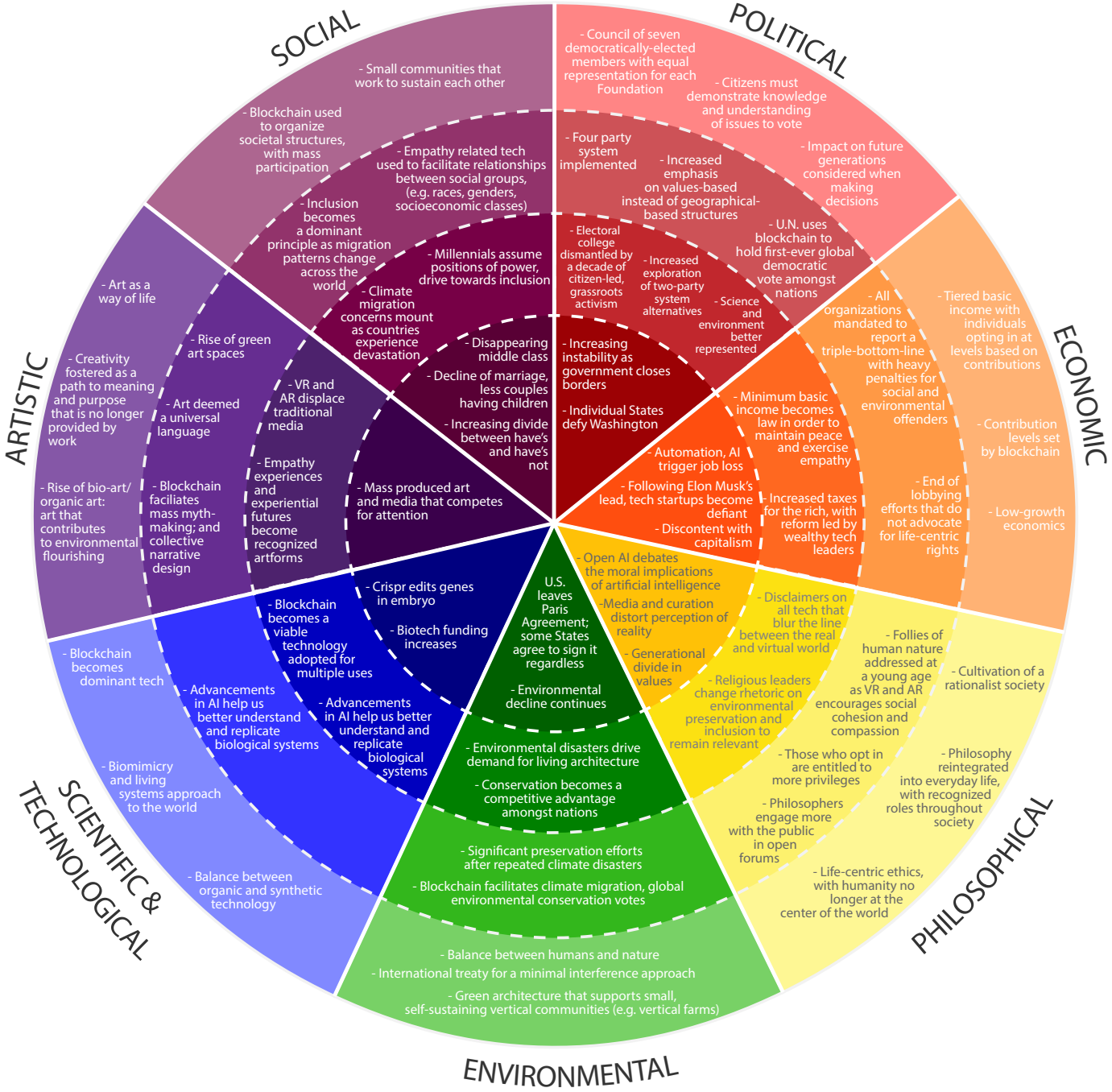


Figure 30: Incremental Transition Towards A Preferred Future State

COMPARISON TO OTHER MODELS

A number of existing models and frameworks faciliate foresight, systems, and worldbuilding practices. Adding to the worldbuilding landscape, the Seven Foundations of Worldbuilding model offers an alternative approach to solving for complex problems, and has a few affordances that other models do not.

Overall, the model privileges the foundational elements of any given system, with intuitive categories derived from a variety of worldbuilding practices. The Seven Foundations require little explanation, and no previous knowledge of foresight or systems to engage with it. Changemakers and their stakeholders can use the model without being foresight and systems experts. It is only when we apply the model for transitional purposes that further instruction is needed and, even then, those instructions can be kept to a minimum.

The model also encapsulates Gibson's concept of a superstructure. It identifies art as a foundation of civilization — a key element of a superstructure that is sometimes addressed by authors but missed as an explicit consideration by foresight models. The expanded categories such as philosophy (as opposed to values), and science (as opposed to just technology) allow us to engage more deeply with those foundations of a society. For instance, we are prompted to consider the role of human nature, and our society's attitudes towards science and research.

Because elements of the superstructure are explicit considerations, changemakers with limited foresight and systems knowledge cannot overlook them when designing a preferred future, or for a complex problem. In particular systems, where the validity or the utility of one or more of the foundations is not readily apparent, changemakers are challenged to think beyond the apparent boundaries. For instance, we may not consider the role of art when designing for the futures of transportation, but in a preferred state, art may play unexpected roles. If a preferred future depicts electric, driverless vehicles, the form and function of those vehicles, both inside and out, may change. Do vehicles in a preferred state become mobile art galleries or experiential learning pods, in which getting from point A to point B is only one of many societal benefits such a construct can provide?

The model also incorporates incremental transitions and adjustable timescales directly into the design to account for backcasting methodology, and does not require the use of additional frameworks or alternative approaches to demonstrate transitions. This allows changemakers and their stakeholders to engage in a complex, yet crucial backcasting exercise in a relatively simple manner. In addition, the contained, circular design of the model encourages users to think about trade-offs within a system — that bolstering one foundation may require taking from another — while recognizing how interconnected any given system may be. The Incremental version captures the interplay between stability and change — a hallmark of the panarchy. Since the Incremental version can depict multiple transitions between the current and preferred state (as opposed to a single transition as per the Three Horizon's framework), we can apply the concept of 'ordering' from Peter Jones' Shared Systemic Design Principles (2014).

Since scenario generation is akin to worldbuilding, and the Seven Foundations model produces future states, there are a few foresight methods that should be noted here. There are three popular scenario generation methods that either complement or contrast the Seven Foundations: Generic Images, the 2x2 Matrix, and Verge.

GENERIC IMAGES

Jim Dator's Generic Images of the Future offers four alternative narratives: continuation (economic growth), collapse (systemic degradation), discipline (order and control), and transformation (high-tech or high-spirit) (Dator, 2009). According to Dator, this method of scenario generation forms the

> "basis for what we call "deductive forecasting" (others might call it "backcasting"). We can 'deduce' possible futures of anything by using the template of the four generic alternative futures, augmented by information about the history and present of whatever the object of our forecast might be. We use such deductive forecasting frequently as the basis of our research, consultations and writing" (2009).

With regards to worldbuilding, Generic Images provides a template around four themes upon which a story can be built. Each alternative future has distinguishable features that describe the world at large. In continuation, "the purpose of government, education, and all aspects of life in the present and recent past, is to build a vibrant economy, and to develop the people, institutions, and technologies to keep the economy growing and changing, forever" (Dator, 2009). A collapse scenario can include fears about the economy, environment, resources, morals, ideologies, "or a failure of will or imagination" (Dator, 2009). Often equated with dystopias, collapse scenarios can offer hope to start anew. In contrast, discipline (self-imposed or otherwise) argues for a "need to refocus our economy and society on survival and fair distribution" and "that we should orient our lives around a set of fundamental values — natural, spiritual, religious, political, or cultural — and find a deeper purpose in life than the pursuit of endless wealth and consumerism" (Dator, 2009). Last but not least, transformation is a vision of the future in which we flourish. It speaks to the "power of technology — especially robotics and artificial intelligence, genetic engineering, nanotechnology, teleportation, space settlement, and the emergence of a 'dream society' as the successor to the 'information society'" (Dator 2009).

Using these four templates, we can envision many possibilities and specifics around a readymade construct. The features of each generic image are already aligned with themes in science fiction. Because Generic Images lends itself to backcasting, it compliments the Seven Foundations of Worldbuilding. We can create both Incremental and Generational versions for each generic image, so that the scenarios transition. We may also be able to use the Incremental version to show transitions between the four alternative futures within one future. The Essential version of the model can be used to build the foundational elements of the scenarios.

2x2 MATRIX

Another method that foresight practitioners use to generate scenarios is the 2x2 Matrix: a deductive method developed by the Global Business Network that plots two critical uncertainties against each other to generate four scenarios (see Figure 31), (Ogilvy and Schwartz, 2004). The scenario in each quadrant is created based on how the two critical uncertainties may interact with each other (Ogilvy and Schwartz, 2004). Adding systems thinking, narratives,

Figure 31: 2x2 Matrix Example (PIU, 2001)

and characters to scenarios allows foresight practitioners to flesh out scenarios so that they are more robust and tangible (Ogilvy and Schwartz, 2004). Some practitioners will incorporate the STEEP + V framework into each quadrant to guide the generative process. When STEEP + V is combined with the 2x2 Matrix, it begins to resemble the approach of some science fiction authors and offers a more systemic view of the future.

Again, this approach complements the Seven Foundations model because of the similarities they already share. Practitioners can embed the Essential version of the Seven Foundations into each quadrant to address all the foundational elements of a world within a scenario, accounting for a complete, rather than partial, superstructure.

VERGE

Verge was developed by Richard Lum and Michele Bowman as an alternative to STEEP in order to "perceive and understand change, and specifically to provide categories for environmental scanning" (Lum, 2014). The six domains of Verge have been used to generate scenarios. They are as follows:

1. Define: The Define domain speaks to the concepts, ideas, and paradigms we use to define ourselves and the world around us. This includes things like worldview, paradigms, and social values and attitudes.
2. Relate: Deals with the social structures and relationships that organize people and create organizations. Here we look at things like family structures, business models, and governance structures.
3. Connect: Encompasses the technologies and practices used to connect people, places, and things. Connect looks for things like information technology, urban design, and language.
4. Create: Concerned with the technology and processes through which we produce goods and services. This is all about things like manufacturing, efficiency, and rule-making.
5. Consume: About the ways in which we acquire and use the goods and services we create. This domain is about issues like modes of exchange, consumer preferences, and marketing.
6. Destroy: About the ways in which we destroy value and the reasons for doing so. Here we are concerned with phenomena like violence and killing, waste, and attempts to undermine rules and norms, (Lum, 2014).

Lum argues that Verge "domains generate much richer and more vivid details of actual life as lived by real people than the traditional categories like STEEP, which have a greater tendency to make people think in large, structural, and abstract terms" (2014). For example, asking people "how they will relate to another or how they will create value for others immediately evokes imagery of daily life, imagery that helps make the future more real" (Lum, 2014). This suggests that Verge may facilitate worldbuilding through a story-first approach (unlike Generic Images and the 2x2 Matrix which generate worlds before narratives). As individuals create narratives, elements of the world emerge — an approach taken by many science fiction authors.

Verge has been combined with Bill Sharpe's Three Horizons framework to demonstrate transitions (see Figure 32).[29] This combination could prove useful for Transition Design purposes.

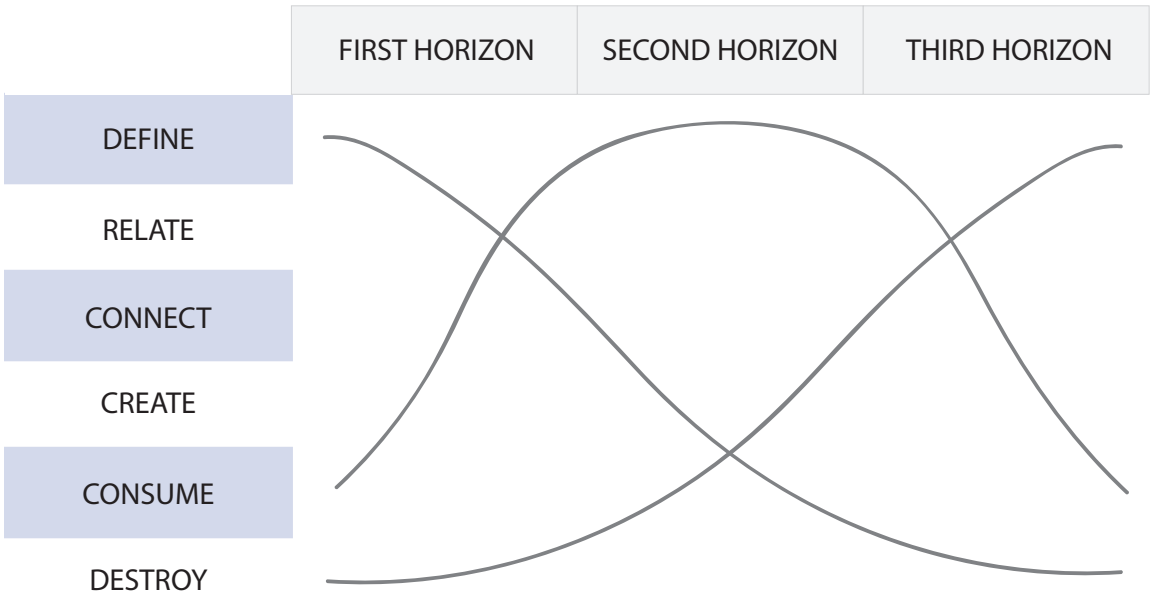


Figure 32: Combining Verge with Three Horizons (Lum, 2013)

This method is an alternative to the Generational version of the Seven Foundations model because it takes a story-first approach. It may be interesting to compare the outcomes produced by using both models if the parameters and instructions provided to users are the same. For example, what similarities and differences would we see if users were asked to imagine the 'preferred futures of work' using both models?

Given that the models are all attempting to envision a future state, overlaps and similarities are inevitable. The following table provides a brief outline of the similarities and differences between the Seven Foundations model and other worldbuilding models.

29. The Three Horizons framework also addresses transitions. The framework describes "three patterns of activity and how their interactions play out over time" and "maps a shift from the established patterns of the first horizon to the emergence of new patterns in the third, via the transition activity of the second (Three Horizons, 2017). The first horizon (H1) "is the dominant system at present...but as the world changes" it "will always be superseded by new patterns of activity" (Three Horizons, 2017). The third horizon (H3) "grows from fringe activity in the present that introduces completely new ways of doing things but which turn out to be much better fitted to the world that is emerging than the dominant H1 systems" (Three Horizons, 2017). The second horizon (H2) is a "pattern of transition activities and innovations, people trying things out in response to the ways in which the landscape is changing. Some of these innovations will be absorbed into the H1 systems to prolong their life while some will pave the way for the emergence of the radically different H3 systems" (Three Horizons, 2017).

METHOD	SIMILARITIES	DIFFERENCES
Planet and People (or Physical and Cultural)	The categories under 'people' are similar, given that culture is comprised of all Seven Foundations.	The Seven Foundations addresses foundational elements of a civilization, that may or may not get addressed otherwise. The divide between culture and the environment is not so clear cut in the real world. This approach is effective if the user is extrapolating from a few details, not necessarily reimagining the world, a system, or a paradigm. Coherence is not accounted for from the beginning.
World Building Mandala	Overlapping categories. Recognizes science in addition to technology. Both consider individual behaviour (the Seven Foundations does so through the Generational version).	The Mandala is built with a visual world in mind, emphasizing the design of elements such as architecture and costumes, second orders in the Seven Foundations model.
2x2 Matrix with STEEP+V	Both are deductive methods, with STEEP + V closely resembling the categories of the Foundations. STEEP + V can be replaced by the Seven Foundations in the matrix.	The categories of the Foundations are broader than those defined for STEEP + V (e.g. we consider the role of science not just technology, and art is vital). Reducing scenarios to two critical uncertainties may be overly simplistic for Transition Design and reimagining complex systems. The Matrix yields four scenarios, while the Foundations yield one and must be used multiple times to generate alternatives.
Generic Images	Both provide templates to work from (deductive methods). Both address different types of foundations: Generic Images identifies that there are four alternative futures while Seven Foundations identifies the foundational elements of a civilization. They are complementary and can be used in conjunction with each other.	Generic Images yields four scenarios, while the Foundations yield one and must be used multiple times to generate alternatives. Foundational elements of a civilization may or may not get addressed using Generic Images.
Verge	There are overlaps in the categories (e.g. Verge's 'connect' resembles Seven Foundation's 'social'). Verge can be used with other models such as Three Horizons to depict transitions.	Verge is a story-first method (rather than a world-first method) that may lend itself more to facilitated sessions. It has a heavy focus on goods and services. Creation and destruction have different meanings in both models. For example, Verge speaks to the destruction of value while Seven Foundations addresses the destruction of unwanted/undesirable structures, processes, and relationships.

TRANSITION DESIGN MODEL ASSESSMENT CRITERIA

Strategic foresight practitioners already employ some of the Transition Design considerations extracted from worldbuilding practices, as presented earlier in this paper. For instance, existing foresight methods such as Generic Images and Verge discourage path dependency and encourage users to build new worlds in the form of scenarios. Some considerations — such as co-creating, iterating and enacting, and becoming storytellers — speak to the process that changemakers should undertake to build preferred futures, and disseminate those images (again, some of which are common practices amongst the broader foresight, systems, and design communities) (see Figure 33).

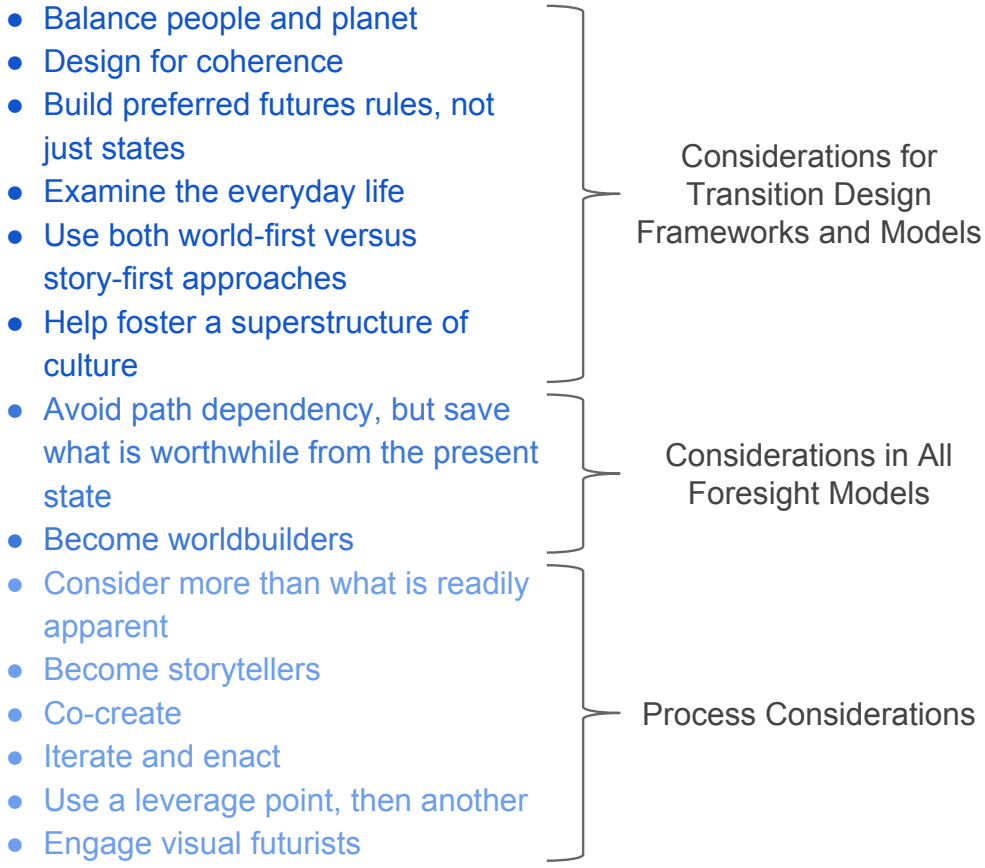


Figure 33: Types of Considerations in Transition Design

However, six of the outlined considerations can be built directly into models and frameworks to facilitate Transition Design practices. A brief comparative analysis of how existing foresight models compare to the Seven Foundations model based on criteria relevant to Transition Design is available in the following table.

CRITERIA	GENERIC IMAGES	2x2 MATRIX WITH STEEP+V	VERGE	SEVEN FOUNDATIONS
Balance People and Planet	The environment may or may not be a consideration in each scenario generated depending on the foresight practitioner, and the intended objectives. It may be a prominent consideration in a Collapse scenario, if the scenario describes environmental degradation.	The environment is identified as a category within STEEP + V, and is accounted for when generating scenarios.	The environment may be accounted for under the 'Destroy' category, but is not an explicit consideration. It may or may not be factor depending on the foresight practitioner, and the intended objectives.	The environment is a foundational element in this model, and is accounted for in designing states and generating scenarios. It must be considered regardless of the user and the design objectives.
Design for Coherence	Aims for a logical internal consistency for all scenarios generated.	Aims for a logical internal consistency for all scenarios generated.	Aims for a logical internal consistency when used to generate scenarios.	Aims for logical internal consistency. The visual design of the model demands coherence.
Build Preferred Futures Rules, Not just States	Rules may be embedded in the scenarios generated, and extracted in the form of strategies.	Rules may be embedded in the scenarios generated, and extracted in the form of strategies.	Rules may be embedded in the scenarios generated, and extracted in the form of strategies. The framework accounts for rule-making under the Create category, "which is concerned with the technology and processes through which we produce goods and services" (Lum, 2014). Rule-making is not acknowledged in other categories such as Connect or Consume, where such an approach could be beneficial.	Rules may be embedded in the scenarios generated, and extracted in the form of strategies. All versions of the model may be used to design rules for preferred states, in addition to or lieu of preferred states. The Incremental version of the model also allows us to consider what rules need to be in place in the near-future, in order for other rules to exist further into the future.

CRITERIA	GENERIC IMAGES	2x2 MATRIX WITH STEEP+V	VERGE	SEVEN FOUNDATIONS
Use Both World-First Versus Story-First Approaches	Scenarios are a snapshot of a world in the future, and reflect a world-first approach.	Scenarios are a snapshot of a world in the future, and reflect a world-first approach.	Employs a story-first approach when generating scenarios, and is less amenable to a world-first approach.	The Generational version of the model allows for both story-first and world-first approaches (depending on the starting point). The Incremental version of the model is a world-first approach.
Examine the Everyday Life	Narratives reflecting everyday life can be derived from scenarios once they are generated.	Narratives reflecting everyday life can be derived from scenarios once they are generated.	Use of verbs and story-first approach allows individuals to construct everyday life narratives, as opposed to more abstract scenarios.	Generational version allows for a direct examination of everyday life, and connects it to broader societal systems across multiple generations.
Foster a Superstructure of Culture	While elements of a superstructure may be addressed depending on the scenario generated, this approach does not guarantee that a practitioner will address all foundational elements of a superstructure in any given scenario (e.g. a foresight practitioner may not consider the role of art in a Collapse scenario).	When STEEP + V is combined with scenario generation models such as the 2x2 Matrix, we begin to foster thinking around a superstructure. However, STEEP + V is limited to what is observable and measurable, and the categories have limitations when worldbuilding (e.g. when we consider only values, we miss broader philosophical implications such as human nature).	Because the model is action-oriented, and relies on verbs (e.g. create, destroy, etc.), the model does not address the foundational elements of culture and does not explicitly foster a superstructure.	The seven categories were derived from foundational aspects of any given civilization. The model directly speaks to foundational elements of a superstructure, and challenges users to give equal consideration to all foundations of a society, while building capacity to think about those elements.

DISCLAIMERS

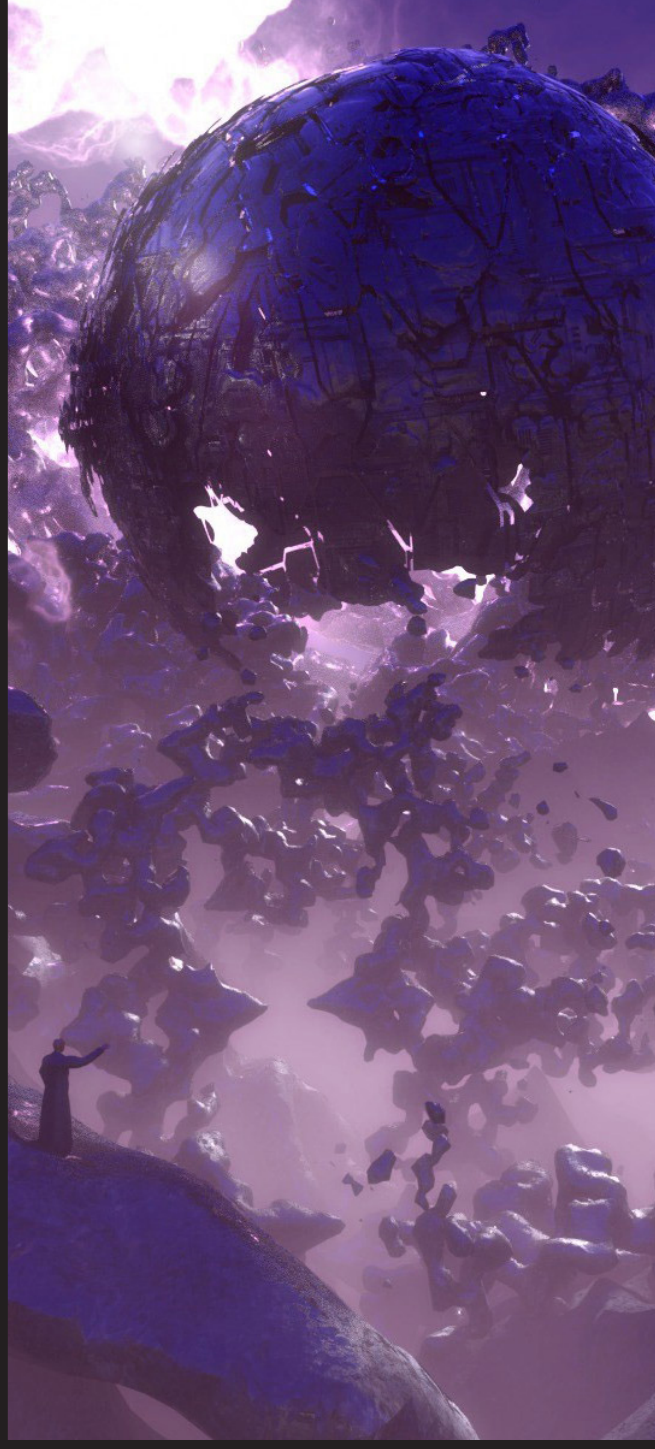
As with any tool, the Seven Foundations model has its limitations. Plenty of authors have created impactful, memorable, and life-altering worlds without the use of any model whatsoever. That is not to say that no model is useful; rather, it suggests that there are many ways to build worlds that are equally valid as the Seven Foundations approach, including the approach that worldbuilding is an elusive and ethereal art form that cannot be caged. The models and worldbuilding perspectives presented in this paper are not dogmatic or prescriptive, and should be used in conjunction with other models (mentioned within this paper or without) to derive the greatest possible value.

Not every user will find equal value in using the Seven Foundations, and some individuals may find variations of it more suitable to their needs. For instance, while established authors may prefer their own approaches to worldbuilding, it is possible that less experienced writers may find the Seven Foundations useful in developing coherent worlds that address the foundational aspects of a fictional civilization. It is also possible to engage with the model at different depths. Some users may want to construct high-level scenarios, while others may want to engage in a detailed exploration under each of the categories. The model may be useful as a diagnostic tool that authors, foresight practitioners, and systemic designers can use to test the coherence of their stories, scenarios, or systems as they develop them, rather than at the beginning of the process.

The Seven Foundations model was developed to inform Transition Design practices, and may be better suited for that purpose than any other. It is a starting point for inquiry rather than the period at the end of a definitive sentence. More importantly, no single model will serve as a grand unifying theory of design, and further exploration that either builds upon the Seven Foundations or negates it is encouraged. As many artists will attest, mastery is not only knowing how and when to follow the rules, but how and when to break them.

Having a path forward is an important step, but simply holding that vision without acting upon it will not lead to change. Though disengaging ourselves from continuation scenarios and path dependencies is a difficult task, it is more difficult to implement change in the real world. Additional research into how we can translate visions of collective preferred futures into reality is required.

CHAPTER SIX: RESEARCH STUDY



In order to explore the use of and experience with the Seven Foundations of Worldbuilding model as it relates to preferred futures, the model was tested in a generative workshop attended by practitioners who have worked in government/policy, systemic design, strategic foresight, social innovation, and/or an arts organization. A total of nine participants attended the event. [30] For a list of participants and their qualifications, please see Appendix G.

During the workshop, participants were asked to work in groups of three to design a preferred state for a given system in thirty years. The groups chose to design for the preferred futures of food, autonomous transportation, and urban spaces (please see Appendix H for photos of the artifacts). Over the course of eighty minutes, they created a preferred future state, mapped the current state of the system, and backcasted to link the preferred future to the current state using the Incremental Seven Foundations model. The intention of the exercise was to test the model as a prototype to determine if it could facilitate the design of preferred futures and the transitions required to achieve those futures. For more details on the workshop methodology, please see Appendix A, Generative Workshop Schedule.

OVERALL OUTCOMES

All participants were able to produce a preferred future state for their chosen system, and backcast two transitions between it and the current state. However, participants did express that the exercise was a challenge, and would require more time than was allotted if they were to use the model in a professional capacity. The participants declared mixed intentions about using the model in a professional setting, with six participants stating that they would use it in a professional capacity, one stating that he or she was unsure of using it at work (i.e. not in a workshop setting but perhaps in policy design initiatives), and two stating that they would not (with one stating that he or she would not unless it was a facilitated session).

Participants expressed that the model would be particularly useful for policy and government initiatives because of its focus on a long time horizon and its holistic view on society. The model encouraged participants to think about the coherence and cascading effects within a system, in a manner that painted a 'bigger picture' than they had previously considered when using other frameworks. Almost half of the participants also expressed that not-for-profit organizations would benefit from using the model, and two participants stated that the model would be useful in game and transmedia design.

INSIGHTS ABOUT THE EXPERIENCE

The study revealed a number of critical insights about the experience of using the Seven Foundations model. First, there is a dissonance between the model's expected ease of use and the actual ease of use. In their feedback, participants expressed that designing coherent preferred states and coherent transitions at ten year increments was difficult. This may not be a reflection of the model alone; it may speak to the difficulty individuals experience when engaging in foresight and systems practices. It is not easy to reimagine the future, and avoid extrapolating what we are already familiar with into a future state. Neither is it easy to think systemically about how the foundations in a given system are related to each other and across time. It is possible the model may not be the

30. One workshop attendee voluntarily removed his or her name from the study results on the grounds that the project was further along than this individual had realized, and he or she felt uncomfortable providing feedback at such a late stage. Because Chatham House rules were in effect, and the written feedback provided was anonymous, all written feedback was included in the workshop outcomes though the individual is no longer associated with the study.

simple, intuitive tool it was intended to be; it may be an advanced foresight tool that requires expert facilitation. However, in written feedback, one participant expressed that the model "simplifies a massive system".

Participants also expressed that the model forced them to think about trade-offs. One participant stated that it was the first model that made him or her realize that when we apply resources to one foundation in a system, we may have to take from another or make a sacrifice elsewhere. The circular design and layout of the Seven Foundations model encouraged participants to consider integral components of a system they would not have otherwise (e.g. the role of art in that system), and the interconnectivity of a system. Participants had to move across the preferred state and the transitions to draw connections. This approach made the concept of backcasting more digestible and easier to engage in, as participants were able to connect the future to the present in increments using a single framework. One participant mentioned that it helped him or her understand the concept of backcasting.

INSIGHTS ABOUT THE MODEL

As a research method, the workshop produced additional insights about the Seven Foundations model that changemakers may want to consider:

- People may interpret the foundations differently, but most do have a high-level understanding of what each foundation is comprised of without detailed explanations. For instance, economic regulations may cross over into policy design. When this occurs, it may be a matter of breaking down the concept further. For example, industrialization falls into many foundations and may be too broad in and of itself. Breaking it down into components such as the technology that allows for industrialization (science and technology), organizational profitability (economic), laws around work (politics), and values surrounding mass production (philosophy) may be useful.
- There is tremendous value in co-creating preferred futures. The model challenges individuals to engage in a conversation about what a preferred future is and what it means to different people. One individual's concept of a preferred future may be unrecognizable to another, and using the model may help draw out those differences and help build consensus.
- As with all tools, the model may not be used as prescribed. The model may tempt users to map the current state first and extrapolate out into the future, and users may not always aim to build coherence between the foundations. Users may also not backcast from the preferred state to the current state, but may move through time in both directions to create connections.
- Building coherence is difficult. We are not accustomed to thinking in systems, and how those systems may evolve over time while remaining intact.
- The model allows for different levels of abstraction. Each preferred state — and the subsequent transitions required to get there — may be designed on a high-level, with iterations delving deeper into abstractions (e.g. a first iteration that lists industrialization as an economic leverage point, with a second iteration looking at its specific components across each foundation).
- Providing completed, unrelated examples may help users identify the level of detail expected, how bold a preferred state may be, how coherence is created, and how connections are made across time.
- Integrating the concept of preservation and destruction into the model (i.e. splitting each foundation into creation, destruction, and preservation categories) will increase the complexity of the design and decrease ease of use.

LIMITATIONS OF THE STUDY

It is important to acknowledge that a number of limitations in the design of the research study prevented optimal results. Half of the participants scheduled to attend cancelled the week or day of the event, which left little time to recruit replacement participants. This also resulted in the loss of perspectives that would have added value to the study (including that of published authors). The workshop was scheduled for three hours in order to be conscious of the time participants had volunteered. As a result, there was not enough time to allow participants to create multiple preferred futures. Participants expressed that more time was required to think through and converse about the preferred future they were building. The time constraint also did not allow for an exercise using the Generational version of the model. Some participants had expressed that approaching the model from a daily life/ individual perspective may have helped make the exercise more tangible, and a preferred future easier to envision. This suggests that there may be value in using both versions of the model in conjunction with each other.

THE PREFERRED RESEARCH STUDY

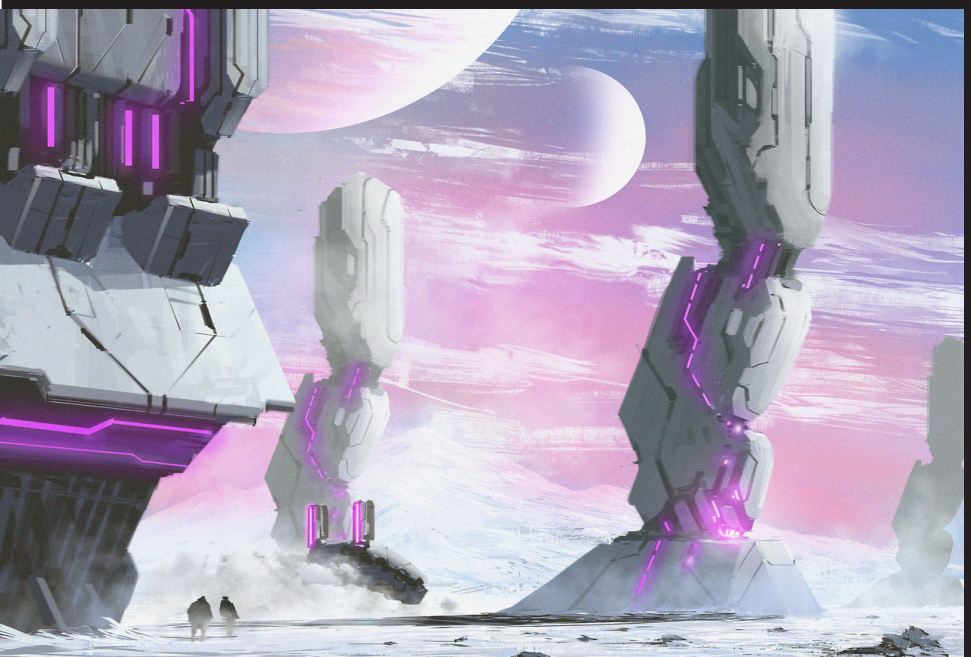
In an ideal scenario, the research study would take place over months. It would involve a greater number of participants from a variety of professional backgrounds who are at different stages in their careers. In day-long sessions, participants would create multiple preferred futures for the same system, using different leverage points to build the system with. For example, the preferred future of food may be different if the initial leverage point is food as an artistic expression versus food as an economic engine. Multiple groups would work on the same system to generate multiple preferred futures. The study would also include a control group of non-experts to determine if the tool requires facilitation and expert knowledge to produce useful and meaningful results. Finally, the study would include an application component to test whether or not the designed preferred futures could facilitate Transition Design in a real-world scenario.

NEXT STEPS

Further testing of the model will yield insights into its uses, merits, limitations, and applicability for the design of collective preferred futures and changemaking purposes. The model must be tested in a real-world capacity as a foresight tool, and to design or interrogate a system, policy, or strategy. Specific next steps for the Seven Foundations model include:

- One-on-one and group prototyping with science fiction authors that work as consultants
- Testing in a policy design environment
- Peer review from foresight practitioners and systemic designers
- Review and critique of the complete study by Transition Designers

CHAPTER SEVEN: A FUTURE OF FUTURES



If changemakers provide images of sustainable and desirable preferred futures, would society mobilize towards it? This very question lies at the heart of Ray Bradbury's *The Toynbee Convector*. In this short story, "a man named Craig Bennett Stiles pretended to travel into the future, 'returning' with tapes and films which he had faked to simulate a glorious world free of pollution, free of war. The time traveler's benign trickery was accepted by the millions who watched his televised report on the future: Thus inspired, humankind proceeded to make Stiles's lie a reality" (The Toynbee Convector, 2017). The Toynbee Convector is an optimistic story that posits that if we could see a brighter future, and be assured that such a future is within our grasp, we will all rush towards it.

In reality, change is difficult and comes at the cost of what is arguably humanity's greatest fatal flaw: our willingness to settle for that which is convenient over that which is necessary or desirable. If that is true, the fundamental problem is not our images of the future, but human nature itself — a problem that cannot be resolved within the confines of this, or perhaps any, research paper.

That is not to say that collective preferred futures are not worth pursuing. While "our apparent binary choice between unthinkable dystopia and unimaginable utopia" are a hindrance, what is unachievable can still contribute to societal progress (Candy, 2010). The insights offered in this paper are not the only path forward, and further exploration, dialogue, and critique from other researchers will be required.

Earlier in this paper it was suggested that narratives and science fiction are a form of power. As with all other forms of power, how an idea is wielded is of the utmost importance. Whether it is used to imagine and build better worlds or used as a mechanism for oppression, is a collective decision made through our words and our silence, through our actions and our in-actions. How we wield the power of our ideas, will determine the path that we take and which vision of the future becomes our reality.

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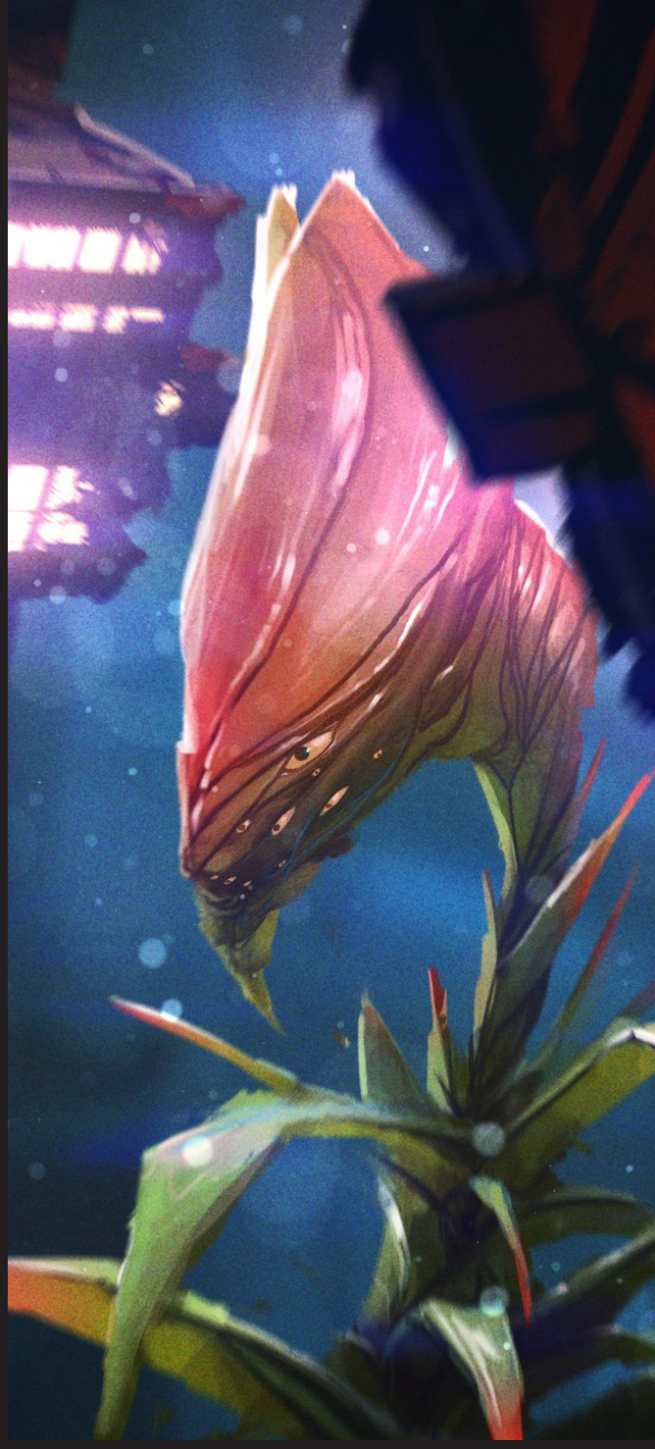

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APPENDICES

APPENDIX A: RESEARCH METHODOLOGY

The research methodology underlying this paper included an extensive literature review on the emerging practice of Transition Design, and how it relates to science fiction, foresight, and systemic design. Insights from leading foresight practitioners, systemic designers, and authors were included to build upon the initial concepts of Transition Design, as well as provide a boundary for exploration. This paper also includes a literature review of the worldbuilding practices and processes of authors, an underexamined research opportunity. The literature review informed the creation of the Seven Foundations of Worldbuilding, which then needed to be socialized and tested amongst experts and practitioners.

LITERATURE REVIEW

Transition Design knowledge was drawn primarily from the Transition Design Monograph published by the Carnegie Mellon School of Design. The role of science fiction in society, as well as the practices and perspectives of well-known science fiction authors was the initial point of investigation. The intersection of science fiction and foresight became the gateway into the world of design. Insights related to foresight were derived from leading practitioners including (but not limited to) Stuart Candy, Richard Slaughter, Jim Dator, Ivana Milojevic and Sohail Inayatullah, and Paul Raven and Shirin Elahi. The scenario generation practices of foresight practitioners served as the dominant foresight methodology explored in the literature review. The living systems approach, and specifically the panarchy framework, served as the basis for systemic design considerations. The works of Donella Meadows, Fritjof Capra, Peter H. Jones, informed the systems aspects of this paper, along with the concept of adaptive cycles and resilience by C.S. Holling, L. H. Gunderson, and G. D. Peterson.

GENERATIVE WORKSHOP: PROTOTYPE TESTING

Once the Seven Foundations of Worldbuilding model was complete, it was important to conduct an initial round of testing. A three-hour expert attended, generative workshop consisted of the following activities:

TIMING	DESCRIPTION
15 Min	Introduction and Icebreakers Introduction to and research objectives of the workshop.
25 Min	Introduction to the Prototype Participants were presented with key insights from the literature review, introduced to the Essential and Incremental version of a worldbuilding model, and provided with the intention behind the research.
30 Min	Activity 1: Novel Deconstruction As a warm-up exercise, participants were presented with well known works of science fiction and asked to break down the systems presented in those worlds according to the Essential version of the Seven Foundations of Worldbuilding model. Each group was assigned a work of fiction according to preferences they indicated prior to attending the workshop. The deconstruction exercise involved looking at the worlds of *Hitchhiker's Guide to the Galaxy*, *1984*, and *Jurassic Park*.
80 Min	Activity 2: Systemic Design Having established some familiarity with the prototype presented, participants used the Incremental version of the model to construct their own sustainable systems. Participants will be provided a system to examine based on the collective expertise of their groups. Systems may include but are not limited to education, healthcare, governance, tech sector, etc.
30 Min	Feedback and Discussions As per the guiding questions outlined below, participants provided feedback in written form on their experience using the prototype to build design a preferred future. Participants were then invited to share any insights they wished to express to the group on a volunteer basis.

WORKSHOP QUESTIONNAIRE

During the workshop, a questionnaire was distributed to participants, who were asked to write down their thoughts and considerations both during and at the end of all activities. The questions asked were as follows:

Activity #1: Narrative Deconstruction

- Area of expertise (please select all that apply):
    - Literature/Art
    - Foresight
    - Tech Startup
    - Policy Design
- Describe your overall experience of using this prototype to deconstruct a novel.

- What do you like about the model?
    - What does it allow you to do consider that you did not previously?
    - What benefits do you see to using the model?
- What do you dislike about the model?
    - What limitations does it have?
    - What did the prototype not allow you to do that you would like it do?
- Did this exercise help you better understand:
    - Transition Design: Yes No
        + Rationale:
    - Foresight: Yes No
        + Rationale:
    - Systems: Yes No
        + Rationale:
- Would you use this prototype in a professional capacity?
    - Why or why not?
    - If so, how?

Activity #2: Preferred Future Design

- Describe your overall experience of using this prototype to build a preferred future.
- What do you like about the model?
    - What does it allow you to do consider that you did not previously?
    - What benefits do you see to using the model?
- What do you dislike about the model?
    - What limitations does it have?
    - What did the prototype not allow you to do that you would like it do?
- Did this exercise help you better understand:
    - Transition Design: Yes No
        + Rationale:
    - Foresight: Yes No
        + Rationale:
    - Systems: Yes No
        + Rationale:
- Would you use this prototype in a professional capacity?
    - Why or why not?
    - If so, how?

APPENDIX B: WORLDBUILDING LISTS

While some authors have laid out a process, others offer a list of questions authors should ponder while constructing their worlds. As the author of several young adult books — including the junior novelization of *Star Wars, Episodes I-III* — Wrede is not a well-known speculative writer. However, she has compiled an extensive list of worldbuilding related questions and considerations that are available on the Science Fiction and Fantasy Writers of America (SFWA) website. The questions are geared towards building fantasy worlds, but many are applicable to writing science fiction as well.[31] After all, fantasy is a speculative genre and science fiction's kissing cousin. Wrede's list includes questions about the world (e.g. Earth or not Earth), its physical and historical features, social organizations, commerce, daily life, etc. Wrede further expands each subcategory to include a series of questions that a writer may or not want to consider about her world. For example, under the category 'Social Organization: Weapons', Wrede asks:

- How do the weapons of this country compare with those of surrounding cities and countries? Have there been recent innovations that may upset the balance of power, or is everyone more or less equal?
- What are the accepted conventions of making war (e.g., only fight in winter when nobody is busy with crops; don't make war on civilians; only certain kinds of weapons are available, etc.)? (Wrede, 2009).

The World • Basics • Alternate Earth • Not Earth at All Physical and Historical Features • General • Climate and Geography • Natural Resources • World History • Specific Country(s) History Magic and Magicians • Rules of Magic • Wizards • Magic and Technology • Miscellaneous Magic Questions Peoples and Customs • General • Customs • Eating • Greeting and Meeting • Gestures • Visits • Language • Ethics and Values • Religion and the Gods • Population	Social Organization • General • Government • Politics • Crime and the Legal System • Foreign Relations • Waging War • Weapons Commerce, Trade, and Public Life • General • Business and Industry • Transportation and Communication • Science and Technology • Medicine • Arts and Entertainment • Architecture • Urban Factors • Rural Factors Daily Life • General • Fashion and Dress • Manners • Diet • Education • Calendar

Figure 34: Patricia Wrede's Worldbuilding List

31. Amongst the obvious departure from science fiction is the inclusion of the category 'Magic and Magicians'. Systems of magic often replace science and technology in the fantasy genre.

The figure below represents two subcategories and the detail to which the questions delve into.

POLITICS	WEAPONS
• Is magic a profession, an art, or just a job? What is the status accorded to magicians in this society? Are they forbidden overt political action, or are wizards and the wizard's guild knee-deep in court intrigue? • Are magicians a force in politics, or are they above it? Are there national politics that revolve around magic/wizards (i.e., trying to outlaw, protect, or promote certain kinds of magic, trying to draft wizards into a ruler's army, licensing of magicians, etc.)? Do wizards have a lobby? Do they need one? • Is there tension, rivalry, or outright hostility between any of the actual gods? How does this affect church politics? People's everyday lives? Does the level of technological advancement match the level of social and political advancement? • Is the relative power of a country or ruler usually measured by the size of its army, the number and ability of its wizards, or the amount of money/trade flowing through it? • What are the easiest/most common ways to advance in status — amass more money, marry well, get the ruler's eye, etc.? How much resistance is there to someone advancing in social status? • What are the major political factions at present? How long have they been around? Which factions are allies, which enemies? Are there any potential new forces on the political scene (e.g., a rising middle class, a university gaining unexpected power because of certain magical discoveries, etc.) • What are the controversial political issues of this day/time/country? What positions on these issues are considered conservative? Liberal? Unthinkable? • How much influence do "special interest groups" such as merchants, wizards, or various religions, have on court politics? How do they exercise their influence — indirectly (by talking nobility or council members into taking their sides) or directly (by bribery, coercion, having their own representatives on the council)? • Are there any shaky political alliances between disparate groups? Why were they formed? How long is it likely to be before they fall apart? When they do, what will the effects be? • What ancient rivalries and hatreds still affect current attitudes and political positions (examples: Scottish and Welsh separatist groups; Catholics vs. Protestants vs. Muslims; dwarves vs. elves; Hatfields vs. McCoys)?	• How do the weapons of this country compare with those of surrounding cities and countries? Have there been recent innovations that may upset the balance of power, or is everyone more or less equal? • Are magical weapons available? Can magic be used in warfare? In what ways? Are spells fast enough to be useful in hand-to-hand combat, or is magic more of a siege weapon, used only for long, slow things? • How has the presence of magic affected weapons technology? Can magic make weapons more effective? Do you have to do anything special to walls, armor, or weapons to make them better able to resist enemy spells? • How much has the presence of magic affected strategy and tactics in general? Is magic used primarily for intelligence gathering (spells of invisibility, scrying, etc.), or are there spells that are of use on the battlefield (summoning a demon to attack the enemy, casting fire storms at them, etc.)? If battlefield magic is possible, how can it be defended against? • How has the presence of magic affected weapons technology? Can an ordinary, non-weapon-type object be enchanted to make it extremely lethal (the Frying Pan of Death) or will this work properly only on things that are already weapons? Can ordinary objects be enchanted to make them (or their user) supremely good at something (the Frying Pan of Ultimate Gourmet Cooking, the Comb of No Bad Hair Days Ever)? How common and useful are such enchantments? • What personal weapons are available to anyone who can afford them? Are some considered "for nobles only" either by custom or by law? Are there laws forbidding certain classes from being armed at all? • What is the level of weapons technology? Are there guns, and if so, how sophisticated (flintlock, matchlock, rifle, Uzi)? • What major weapons of war are available (e.g., siege towers, catapults, cannon, A-bombs)? • What weapons and armor are standard for armies? Mercenaries? Nobility? Your average peasant trying to defend his/her home? • Are weapons, such as swords or pistols, a standard part of dress for any/all segments of society? • What are the accepted conventions of making war (e.g., only fight in winter when nobody is busy with crops; don't make war on civilians; only certain kinds of weapons are available, etc.)?

Figure 35: Patricia Wrede's Worldbuilding List,
Questions About Politics and Weapons

In her introduction, Wrede acknowledges that the list is not prescriptive or even complete (Wrede, 2009). She states that,

> "It is not necessary for an author to answer all, or even any, of the questions in order to start writing, (or to finish writing, either). The idea is simply to provoke people into thinking about the ways their settings and backgrounds hang together … or don't. If it's useful, use it. If not, don't. Some questions apply to more than one topic, and have been duplicated under more than one heading. This should not be considered as an exhaustive and final list, but as a beginning point from which each individual writer can compile a personal list" (Wrede, 2009).

On a similar note, Shariann Lewitt — author of *Memento Mori* and lecturer at the Massachusetts Institute of Technology (MIT) — also shared a list of worldbuilding related considerations in her lectures on Transmedia Storytelling. Lewitt posted her list of questions and worldbuilding elements to MIT's OpenCourseWare platform:

- Is the planet Earth? If so, when?
- What kind of planet is it? What kind of star/star system?
- What kinds of people are they? What do they look like? Are they human?
- How do the people live? Do they have cities? Fast transit?
- How do they trade goods? What do they have? What do they need?
- Is their technology primitive or advanced?
- What are their main sources of food? What do they believe? What do they fear?
- What is the main conflict in the culture? (Or for a given character or class of characters?) (Lewitt, 2014).

Her questions reflect what she considers important elements of a world as depicted in Figure 36.

Elements of a world –
- geology – astronomy –] spaceship?
- geography] artificial?
- resources
- climate
- population(s)
- societies
- governments(s)
- **<u>economics</u> !!!**
  - back to resources-
    - food
    - energy

->Is it Earth? If yes, when? (extrapolate)
If no – where? What?
What conditions?
Who lives there?
What theres are there?
(Cities? Villages? Factories? Farms? Spaceports? Trade satellites?)

Figure 36: Elements of a World by Shariann Lewitt (2014)

Both authors offer elements of a world that can be divided into people and place, bearing a strong resemblance to Sanderson's list. While Wrede's questions are granular, many of her questions hint at tropes, and may unintentionally provoke authors to extrapolate rather than envision new worlds. For instance, her questions related to history include "What does this country import? Export? How important is trade to the economy? How is currency exchange handled, and by whom? What is the system of coinage, and who mints it?" (2009). Questions such as these imply that trade is necessary, currency is a given, and a central figure or agency should control money. Though these questions are valid and relevant to our world, they do not inspire novelty or creativity. The reliance on past paradigms to inform new worlds becomes pronounced when questions such as "how do most of the citizens make their living — farming, fishing, trade, manufacturing?" do not address current paradigms (e.g. digital, information age, etc.), let alone future ones (Wrede, 2009).

In addition, the sheer number of questions may lead to confusion about what is essential to the story and what is not, and render the process of building a coherent world challenging, especially if writers are picking and choosing questions from different categories. Wrede's approach would require significant effort to achieve coherence if the questions are not answered with coherence in mind (a disclaimer she does not provide). Lewitt also does not address coherence as a consideration.

APPENDIX C: A DISCLAIMER ON AUTHORS

Though authors have a vast spectrum of opinions on what worldbuilding is and how it should be handled, we lack empirical evidence about the act and process of creative writing. While the processes and perspectives previously outlined are that of critically-acclaimed and/or commercially successful authors, there are some considerations and discrepancies worth noting.

Even if authors claim to follow a systematic process or outline one for others to follow, whether or not they adhere to that process is another story. Authors may simply share what they perceive as best practices or what they aspire to do, rather than capture the reality of their experiences, particularly because revelations about worldbuilding tend to come in the form of advice to aspiring authors. Without further research, we cannot be certain if a dissonance exists.

We should also note that all the authors mentioned in this paper have had years worth of experience to draw upon. Given that they have had longstanding careers as writers and have published multiple works, they may have developed an ingrained skill set for worldbuilding that seems elusive and emergent on the surface, but is underscored by years of hard work and practice. Rather than actively engaging in a systematic process, worldbuilding could be to a seasoned author what muscle memory is to an elite athlete. Dissenting views on the value of formalized, in-depth worldbuilding may be a reflection of gained expertise, rather than the value of worldbuilding itself. Debut or aspiring writers may have different vantage points on the value of worldbuilding, and how to go about building a world.

Worldbuilding is as much about what is undisclosed or discarded, as it is about what is shown to the reader or canonized by the author. Fragments of a world that are incoherent or unnecessary are either not included in the story or are cut away during revisions. Decisions to include certain features and not others are acts of worldbuilding, regardless of what point in the overall writing process those decisions are made or if those decisions are documented.

APPENDIX D: DUNGEONS AND DRAGONS WORLDBUILDING LIST

THINGS WORLDS HAVE

Society & Culture
- Arts, Entertainment, & Recreation
  - Architecture
- Calendar
- Daily Life
- Diet

Dining Customs
- Education
- Ethics & Values
- fashion & Dress
- History
- Language
  - Gestures
- Manners
- Meeting & Greeting
- Religion & Philosophy
- Social Organization
- Specific Countries
- Visits

Economy

Government
- Crime & Legal System
- Foreign Relations
- Politics
- War

The Land
- Physical & Historical Features
- Climate & Geography
  - Natural Resources
- Population
- Rural Factors
- Urban Factors

Magic & Science
- Magic & Magicians
- Magic & Technology
- Rules of Magic
- Wizards

Medicine

Science & Technology

Transportation & Communication

Figure 37: High-Level List of 'Things Worlds Have' in Dungeons and Dragons (Cruinne, 2013)

Expanded questions listed under 'Economy':

- What goods are produced and where are they produced?
- What are the major trade goods?
- Are there trading centres?
- What economic systems are used?
- Are there banks?
- Do people barter or use money? (example: Ancient Ægypt)
- If money is used, is it valuable itself or is it fiat currency?
- If there is fiat money, who guarantees it?
- What are people's attitudes toward money?
- What are people's attitudes toward poverty?
- Are there generally acceptable standards for coins?
- How easy and common is counterfeiting? (Cruinne, 2013)

APPENDIX E: SCIENCE FICTION AND ITS SUBGENRES

To better understand why science fiction is not informing preferred futures, we must examine the relationship and consider the nature of its predominant subgenres. These subgenres are not the only forms of science fiction, but are popular with mainstream Western audiences. The subgenres outlined below are dystopias and utopias, alternative realities, and new worlds.

DYSTOPIAS AND UTOPIAS

Our love affair with dystopias and utopias has deep roots that extend far back in history, long before either term was coined.[32] One of the earliest forms of this narrative is the concept of an afterlife. Heaven and hell are the archetypal templates for the utopias and dystopias that inform so many of our images of the future. Meanwhile Earth, home to all of mankind's systemic complexity, is said to lie in between as a mere temporary docking station for our souls. Since religion is a significant aspect of our social fabric, dystopias and utopias have a symbolic pull that makes it difficult for us to look past their dichotomy to the possibilities beyond.

The year is *1984* and Orwell's protagonist, Winston Smith, is trapped under the all-seeing eye of Big Brother…At its heart, the novel, *1984*, is a resonant dystopia that warns of the dangers of exchanging freedom for security (Orwell, 1949). The reality that has unfolded since its publication lies off-center to the disturbing paradigm Orwell described. Big brother exists, but his shape and form differs from our expectations. Our reality is a subtle, subversive variation of *1984* in which we have readily traded our privacy for convenience (Orwell, 1949). Given that the now infamous Edward Snowden argues that "privacy is the fountainhead of all other rights" because it is the space in which we form thought without judgement, the trade-off is a monumental one, (The Intercept, 2016).

Though it has, in concept and language, permeated our society, the novel's underlying message failed to mobilize society into action. We lost the opportunity to envision a collective preferred future in which privacy was not sacrificed for security. We overlooked *1984's* speculative design potential to develop better government policies, socio-economic infrastructures, and relationships with technology — objectives that could have been achieved by setting aside its dystopic frame and engaging with its iterations and alternatives. By not taking an active role in designing a preferred future, we disengaged from alternative possibilities and, consequently, allowed some of the dystopian elements of *1984* to become our everyday reality.

Some argue that the prevalence of negative images of the future is preventing us from achieving a brighter one. *Project Hieroglyph*, a science fiction anthology of short stories, offered optimistic images of the future to inspire a better world in place of ours (Stephenson, 2014). A critical review of the anthology suggested that "the best contributions to Hieroglyph are the least optimistic, and the best attuned to the human reality that technology so often obscures...They also tackle the obvious problem of technological innovation, the looming menace of climate change, environmental degradation and resource depletion that go hand in hand with new technologies" (Walter, 2014). In other words, the least optimistic stories had the greatest potential for civilizational foresight. Despite the premise of Ray Bradbury's short story, *The Toynbee Convector* — if people were shown a brighter future, they would rush towards it — positive images of the future may not be enough to inspire societal change (1984).

32. The term 'Utopia' was by coined by Thomas More in 1516 in a book bearing that title, while the term 'Dystopia' was first used by John Stuart Mill in one of his parliamentary speeches in 1868, (Wikipedia, Dystopia, n.d.).

The problem is not necessarily that our images of the future are negative. The problem is that we fail to internalize the lesson and values conveyed by dystopic futures, and implement those lessons in a manner that redirects our future away from undesirable outcomes. Combined with an emphasis on artifacts (Orwell's telescreens) as opposed to underlying values (privacy), we beget technological innovation void of social innovation (Orwell, 1949). As comedian Keith Lowell Jensen notes, "What Orwell failed to predict is that we'd buy the cameras ourselves, and that our biggest fear would be that nobody was watching" (2013). Privileging technological innovation over social innovation is naive at best and heartless at worst.

Perhaps the greatest shortcoming of dystopian stories is that many end on the precipice of change. Science fiction shows us, in graphic detail, how to wage war but not how to make or sustain peace. As a result, we lose the process through which societal change might occur, along with the vision of the new order that emerges from that once dystopian world.

Though they masquerade as the opposites of dystopias, utopias are simply the other side of the same coin. Lois Lowry's *The Giver* (1993) and Iain M, Banks' *The Player of Games* (1988) are both utopias with seemingly perfect worlds, yet each has its own sinister undertones. Similar to dystopias, utopian stories often begin long after the hard work is done. What they offer about the future is hope — a form of emotional time travel that holds a desirable image of the future as a destination in our present day psyche. We are indulged in a more or less idyllic world without a roadmap of how to reach such a destination. Details of how political, economic, social change, etc., emerged are rarely given, and tend to be summed up in sweeping statements or buried in backstory. This is unfortunate since utopian stories provide the greatest opportunity for civilizational foresight through backcasting. What we need as much as positive images of the future are the steps required to get there.

ALTERNATIVE REALITIES

Time travel, steampunk, and cyberpunk — stories situated in our world, but not necessarily representative of its paradigms — are types of Alternative Realities. A form of retrofuturism, these stories offer images of the present or possible futures if a critical event or technology was somehow altered (Newitz, 2012). For example, the steampunk subgenre explores possibilities stemming from the Victorian era, in which nineteenth century steam technology prevailed in the industrial age. Prominent examples of Alternative Realities include H.G. Wells' *The Time Machine* or Philip Pullman's *The Golden Compass*, book one of the *His Dark Materials* trilogy.

While these stories present an alternate world from which we can extrapolate some value, like dystopias and utopias, they jump forwards or backwards in time and place artifacts on a pedestal. Again, we either lose sight of the transition society has undergone, or are presented with an incomplete picture of the underlying system that the story is navigating.

NEW WORLDS

Another popular subgenre within science fiction is what can be referred to as New Worlds. For our purposes, New Worlds encompass stories involving space travel, new planets, and parallel universes. Like utopias, New Worlds are laced with an element of hope. Here, we leave our one and only Earth behind in search of a better, brighter world. At times we are met with wonder and adventure (Douglas Adams' *The Hitchhiker's Guide to the Galaxy*) while other

worlds offer struggle and disaster (Ray Bradbury's *The Martian Chronicles*). In New Worlds, Earth and its problems are out of sight. The systems and wicked problems that require our attention are either non-existent in these stories, or their circumstances differ so greatly from our own that they provide little insight into how we can better shape our world and our future on a societal level.

NON-WESTERN SCIENCE FICTION

Though the focus of this paper is on Western science fiction, non-Western science fiction has gained prevalence in recent years and the genre is richer for it. While some may argue that science fiction is inherently a Western concept and art form, and that non-Western cultures have no science fiction, the claims are dismissive. Though the genre may have been canonized by the West, futurists Ivana Milojevic and Sohail Inayatullah posit that Western theorists ignore "Asian and Chinese science fiction history, and western science fiction continues to 'other' the non-West as well as those on the margins of the West (African–American woman, for example)" (2003). As a result, the contributions of non-Western science fiction authors are overlooked or lost. For instance, readers may not be aware that "the 'robot' has been in the Chinese literary tradition since the fourth century" (Milojevic, Inayatullah, 2003).[33]

Far from receiving adequate representation, non-Western science fiction deserves more attention than it receives because it asks different and "intriguing questions about the future of the world and everyone's place within it" (Greene II, 2016). Different cultures and values produce images of the future that expand on the possible, and provide us with alternatives that we have not considered. For example, collectivist cultures value family and community, whereas individualistic ones place emphasis on taking care of oneself. The stories that emerge out of these two value systems can be entirely different. In a collectivist scenario, an ancient alien race asks Earth for refuge and help, and we find a way to provide it. In an individualistic scenario, they want our resources and we go to war. The former narrative could have more to offer civilizational foresight than the latter.

Another difference is that in "non-western science fiction the future is seen outside linear terms: as cyclical or spiral, or in terms of ancestors" (Milojevic, Inayatullah, 2003). Thinking in cyclical terms may be of value to the long-term approach required by civilizational foresight. It is also interesting to note that though "most western science fiction remains trapped in binary opposites—alien/non-alien; masculine/feminine; insider/outsider — writers from the west's margins are creating texts that contradict tradition and modernity, seeking new ways to transcend difference" (Milojevic, Inayatullah, 2003). While there may be some similarities between Western and non-Western science fiction, (dystopias and utopias are archetypal), further examination and research at the intersection of non-Western science fiction and foresight is required.

In literature, science fiction is meant to be the genre of change when it is, in fact, a series of static images of the future, bookended by opportunities for change that lie outside the written narrative. The much needed prescription for societal change lies after a dystopia is dismantled, before a utopia is achieved, and in a different time and place from the alternatives and the new worlds that lie in between. This chasm in science fiction is where civilizational foresight can thrive.

33. Milojevic and Inayatullah state that in the Daoist text, *The Book of Lie Zi*, written around 307 to 313 A.D., "Yanshi, a clever craftsman, produces a robot that is capable of singing and dancing. However, this robot keeps on staring at the emperor's queen. This enrages the emperor who issues an order to kill Yanshi. But then Yanshi opens the robot's chest and the emperor beholds the artificial human" (2003).

APPENDIX F: TRANSTOPIAS

The ideas presented in this paper may come down to a single statement: beautiful and powerful stories can change everything. For science fiction, this entails challenging authors to address wicked problems and their systemic implications, adopting foresight practices such as backcasting, and creating space amongst the subgenres for stories that demonstrate societal transitions.

The answer is not to do away with current approaches to or tenets of storytelling, which still have much to offer. Instead, adding a new concept to the science fiction lexicon might address what is missing. One such concept is a Transtopia.

A transtopia is a society in transition from one state to another on the vast spectrum between dystopia and utopia. It is a dynamic and systematic march towards the future, rather than a static depiction of a singular point in the future. Not only does it encapsulate events, characters, and relationships, it also discusses and/or demonstrates processes for social change. The starting point of a transtopia should bear an identifiable resemblance to Earth's current realities or near-future plausibilities. The outcome of a transtopia is to show the transitions and steps between systemic states, in addition to systemic realities. Ultimately, the fictional world should achieve a more desirable or preferable state by the end of the narrative.

Transtopias can be designed using the Seven Foundations of Worldbuilding model. The Generational version of the model allows authors to explore the relationship between a character's everyday life and the broader world they envision. The Incremental version of the model facilitates the design of a transitioning story, in which the world evolves throughout time.

Unlike dystopias and utopias — which begin or end when the greatest opportunities for systemic change exists — transtopias demonstrate the incremental steps required to shift a system and achieve Transition Design. By adopting foresight practices such as backcasting — a methodology currently not used by authors — transtopias are strategic explorations of the future. Futurists and foresight practitioners that work with organizations, governments, and academia might find value in transtopias as they are intended to depict plausible and preferable futures. The field of foresight could also adapt the concept of transtopias by combining scenario generation and backcasting practices in order to generate a series of transitioning, incremental scenarios for strategic purposes.

While the concept has not previously been coined or presented as a subgenre of science fiction, there are examples in literature that have elements of a transtopia. *The Mars Trilogy* by Kim Stanley Robinson (1996), *Seveneves* by Neal Stephenson (2015), and the *Foundation* series by Issac Asimov (1942-1993) show transitions in society occurring over time. However, the change depicted in these books occurs over extensive periods with lengthy gaps in between, (fifty years in The Mars Trilogy, five thousand years in Seveneves, and decades to millennia in Foundation). As a result, they lack a clear pathway to a more desirable future state, along with the opportunity to exercise backcasting.[34]

34. A non-science fiction example that meets some of the criteria of a transtopia is Orwell's *Animal Farm*. Because the story transitions from a desirable state to an undesirable one, it provides valuable insight that can be applied to social innovation in a system. In regards to backcasting, it could be used to extract potential risks and pitfalls that could veer civilizational foresight efforts off track.

The true value of transtopias will emerge as more of these stories are written, because no single story will be enough to inform Transition Design. Instead, we will need to produce many transtopias in order to better grasp the infinite futures that lie ahead. Each narrative should serve as an iteration or option, rather than a definitive path forward or outcome. As time goes on, and possible futures become realities, new narratives must be written to reflect those emerging realities.

APPENDIX G: WORKSHOP ATTENDEES

The Transition Design workshop participants are listed in alphabetical order by last name:

Richard Gentry, MBA/MTI, CBAP, LSSGB
Business Transformation Consultant at the City of Toronto
Relevant Expertise: Policy and government, systemic change

Maggie Grayson, MDes. Strategic Foresight and Innovation
Foresight Innovation and Content Specialist, Myant
Relevant Expertise: Foresight and narratives

Michael Keoshkerian, MDes. Strategic Foresight and Innovation Candidate
Manager - Research, Projects, and Partnerships, Ryerson University
Researching the concept of care in game design
Relevant Expertise: Government and game design

Nicole Knibb, MDes. Strategic Foresight and Innovation Candidate
Senior Education Officer at the McMaster Museum of Art
Researching the futures of art galleries
Relevant Expertise: Arts, education, and foresight

David Kuperman, MS Transportation Technology and Policy
Manager, Surface Transit Projects at the City of Toronto
Relevant Expertise: Policy and government, systems management and design

Christine McGlade, MDes. Strategic Foresight and Innovation Candidate
Founder of Analytical Engine Interactive Inc.
Researching the futures of social innovation at sLab, and impact on machine learning business models on social justice
Relevant Expertise: The intersection of arts and technology, foresight, systems thinking, and social innovation

Vanessa Toye
Senior Associate, Design and Innovation at MaRS Discovery District
Relevant Expertise: Systemic change and social innovation

Melissa Tullio, MDes. Strategic Foresight and Innovation Candidate
Innovation Strategist at Great-West Life
Researching the futures of social innovation at sLab, and the futures of green spaces
Relevant Expertise: Government and policy, foresight, systems thinking, and social innovation

APPENDIX H: WORKSHOP OUTCOMES

The following photographs depict the preferred future state of three systems, designed using the Incremental Version of the Seven Foundations of Worldbuilding model. Each preferred future has a 30 year horizon, and has two, ten year transitions (as per the examples provided earlier in this paper).

A PREFERRED FUTURE OF URBAN SPACES

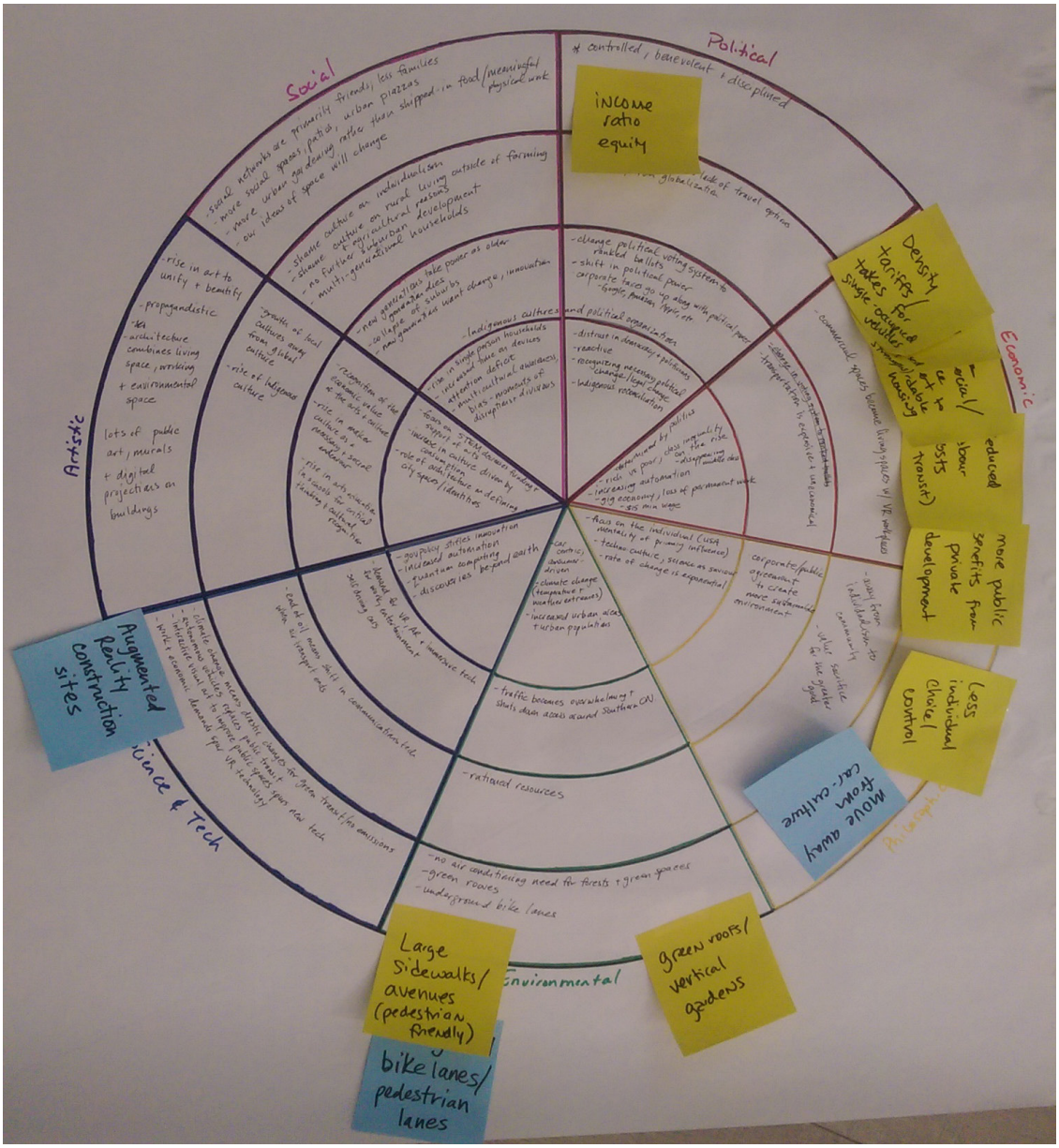

Figure 38

A PREFERRED FUTURE OF AUTONOMOUS TRANSPORTATION

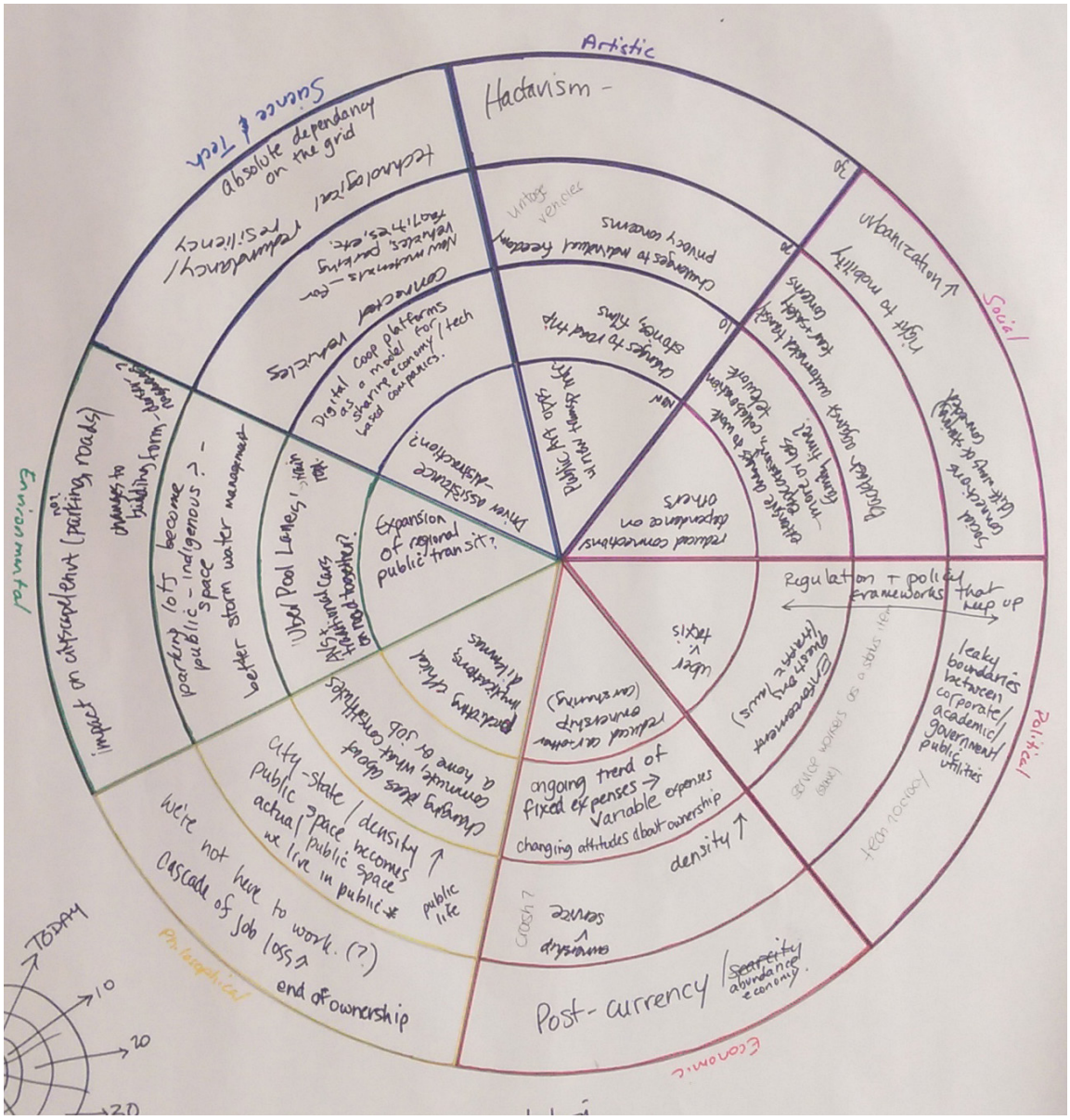

Figure 39

A PREFERRED FUTURE OF FOOD

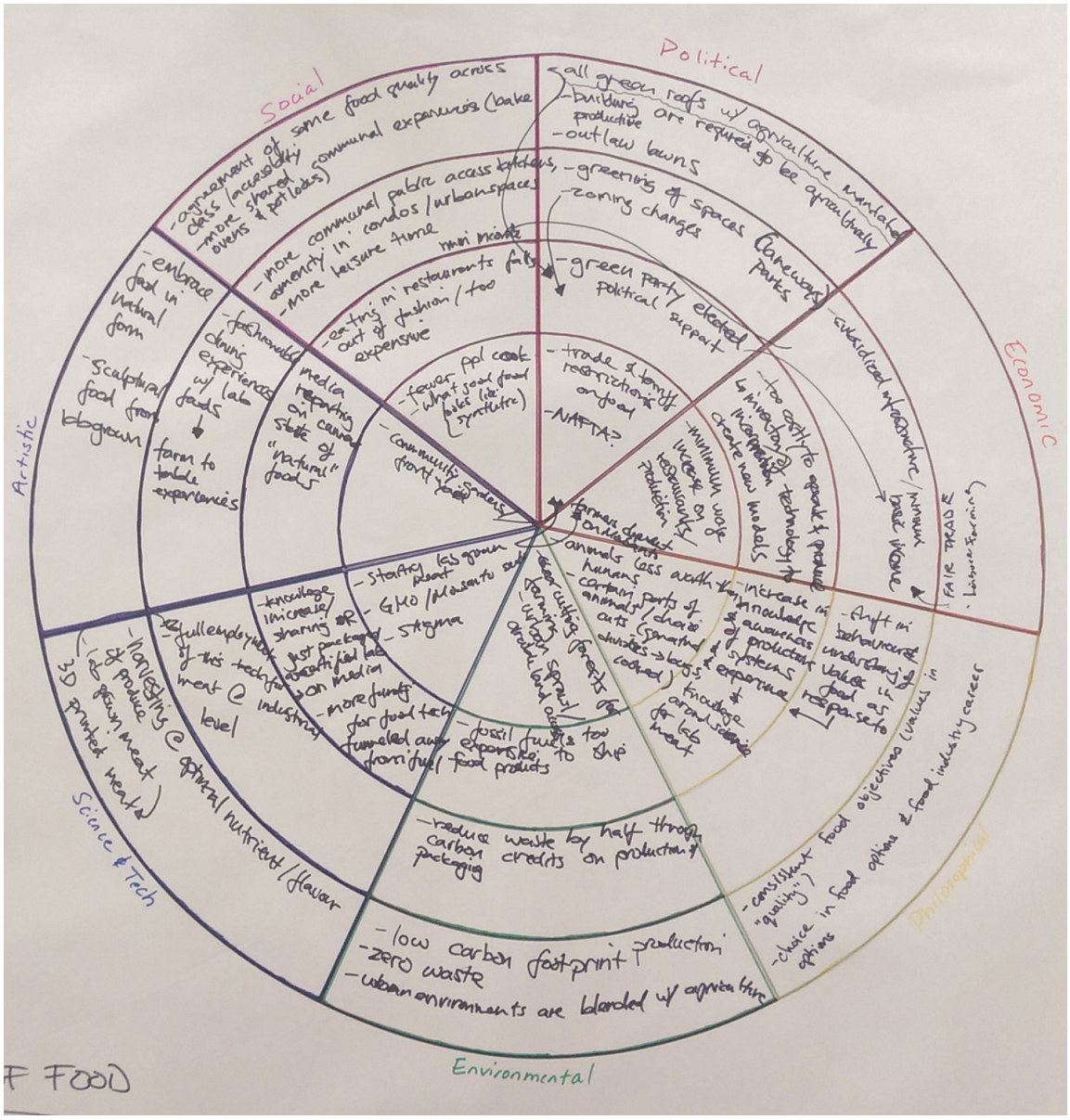

Figure 40