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The six scenario archetypes framework: A systematic investigation of science fiction films set in the future

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ABSTRACT

We propose a new scenario archetypes method generated by extracting a set of archetypal images of the future from a sample of 140 science fiction films set in the future using a grounded theory analytical procedure. Six archetypes emerged from the data, and were named *Growth & Decay*, *Threats & New Hopes*, *Wasteworlds*, *The Powers that Be, Disarray,* and *Inversion*. The archetypes in part overlap with and confirm previous research, and in part are novel. They all involve stress-point critical conditions in the external environment. We explain why the six archetypes, as a foresight framework, is more transformational and nuanced than previously developed scenario archetypes frameworks, making it particularly suited to the current necessity to think the unthinkable more systematically. We explain how the six archetypes framework can be used as predetermined images of the future to create domain specific scenarios, making organizations more resilient to critical, disruptive futures. We finally present and discuss a case study of the application of the method to create scenarios of post-Covid-19 futures of work. A video abstract of the article is available here: (https://www.youtube.com/watch?v=q82_X7fN_XA)

1. Introduction

A higher frequency of disruptive, critical events and phenomena in the external environment reminds us of the need to reimagine foresight practice. In futures and foresight, we are at the forefront of anything forward-looking. We should therefore also be the first to reinvent our methods and approaches when conditions demand it. We acknowledge that we need to stretch the boundaries of foresight imagination, to revive the field with an injection of transformational[1] thinking, to think the unthinkable more systematically and plan for it. That is why much attention in our field has recently turned to science fiction.[2] The richness of imagination of science fiction artifacts offers plenty of opportunities in all these directions. However, in practice, we have been slow to translate insights from science

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[1] The terms *transformation* and *transformational* are used in this article with the following meaning: that which significantly alters the structure of society (MacDonald, 2012).

[2] This is symbolized by several recent thematic events on this domain within the futures & foresight community and beyond. E.g. Science Fiction as Foresight conference (https://docs.google.com/document/u/2/d/e/2PACX-1vQOAbKxXyYAUqvxweMD0QdAbWU6WqglA5ZLPKW1NxWJs1ZAScz ZpiREretU8-USQc8UUYL7r_O6Yvj2/pub); Sci-Fi Futures Houston foresight annual spring gathering (https://www.andyhinesight.com/talks/sci-fi-futures-draft-agenda/); etc.

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fiction into our foresight methods in a systematic manner.

Following the formulation of the many and much beloved acronyms[3] and theories to convey the unpredictability of the environment we live in -VUCA (Mackey, 1992), TUNA (Ramírez & Wilkinson, 2016), BANI (Cascio, 2020), Post-normal times (Sardar, 2010), etc.- we have been often times shy to move beyond the recommendation to use widely available foresight tools in response. Although promising initial attempts have been made to extract methodological insights from science fiction to the avail of foresight practice (Bina, Mateus, Pereira, & Caffa, 2017; Furr, Nel, & Ramsoy, 2018; Zaidi, 2017), futures and foresight research is yet to explain how this is to be done systematically, that is, in a manner that goes beyond the use of a limited set of science fiction artifacts and that gathers insights from larger datasets. As science fiction is used in a "case study" manner (e.g. Furr et al., 2018; Johnson, 2009, 2011), foresight practitioners still use long-lasting and established foresight methods to help others imagine alternative futures, such as the four generic scenario archetypes[4] method (Dator, 1998, 2009, 2012, 2014, 2017, 2020; Dator, Sweeney, & Yee, 2015), and the Shell approach (Schwartz, 1996).

These methods have served us outstandingly well, inspiring generations of foresight researchers and practitioners and catalyzing action in communities and organizations. They are widely understood and widely appreciated. However, the limitations of scenario techniques in challenging human thought about the future have been acknowledged (see Curry & Hodgson, 2020; Rotmans et al., 2000; Wright, Bradfield, & Cairns, 2013), limitations to which these methods are not immune. Even more importantly, given our pressing methodological requirements to better prepare for unthinkable conditions in the external environment, these methods do not make fruitful use of the potentially more transformational images of the future provided by science fiction artifacts.

In view of the above, we propose a new scenario archetypes method, which we generate by extracting a set of archetypal images of the future from 140 science fiction films set in the future using a grounded theory analytical procedure. We find six archetypes, which we rename *Growth & Decay, Threats & New Hopes, Wasteworlds*, *The Powers that Be, Disarray,* and *Inversion,* according to their underlying themes. These archetypes in part overlap with and confirm previously developed archetypes, and in part are more nuanced and transformational. The most distinct feature of the six archetypes is that they all present critical stress-point conditions in the external environment, albeit in six different forms.

While maintaining scenario archetypes' advantages of parsimoniousness and straightforwardness of application (Boschetti, Price, & Walker, 2016; Serra Del Pino, 1998), the six generic archetypes we propose, considered as a framework for foresight practice, emphasizes the necessity to grow prepared to and reinvent in critical conditions of the external environment. This aligns with intuitive logics scenario planning methods, where forces of changes are considered outside of the control of the organization (Chermack, 2011; Schwartz, 1996), which differs from the development of a vision of the future as in previously developed scenario archetypes frameworks (Bezold, 2009a, 2020; Dator, 2009). This, we believe, is well suited to the current requirement of foresight practice to create scenarios in turbulent environments and grow prepared to critical, disruptive futures.

The article is organized as follows: in the next section, we explain the theoretical rationale behind the investigation of scenario archetypes through science fiction films set in the future. We then report our methodological approach, present the six archetypes we found, and discuss them. We explain how the archetypes can be used in foresight practice as a framework to create scenarios and make organizational strategies more robust to stress-points events and phenomena in the external environment today. Finally, we provide a case study of the application of the six archetypes framework as predetermined images of the future in a project on post-Covid-19 futures of work in South Bend, Indiana. We conclude by noting the limitations of our research as well as future research directions.

2. Theoretical background

2.1. Previous scenario archetypes[5] frameworks and their limitations

The idea to investigate scenario archetypes in science fiction films set in the future originates from the limitations of previously developed scenario archetypes frameworks to imagine the future.

The most prominent of these is perhaps Dator's Four Generic Scenario Archetypes method (Dator, 1998, 2009, 2012, 2014, 2017, 2020; Dator et al., 2015), also informally known as the method of the Mānoa School of futures studies (Jones, 1992), Mānoa School Scenario Modelling method (Dator et al., 2015) Deductive Forecasting (Dator, 1998; Dator et al., 2015) or Incasting (Serra Del Pino, 1998). This method consists in using the four[6] overarching predetermined archetypes (*Continued) Growth, Collapse, Discipline,*[7] and

[3] VUCA (volatile, uncertain, complex, ambiguous), TUNA (turbulent, uncertain, novel, ambiguous) and BANI (brittle, anxious, non-linear, incomprehensible) are acronyms indicating the many causes of unpredictability of the business environment.

[4] A scenario archetype is a family of similar scenarios of the future of mankind. It is a generic, abstract meta-image of the future, to which several images of the future of different medium of communication can be reduced. Scenario archetypes are mutually exclusive and have different assumptions about how the future will unfold.

[5] For relevance, in this literature review, we consider only *scenario archetypes*, as defined in footnote 4 above, and not global scenario case studies, behavioral or systems archetypes (e.g. Kim, 2000; Senge, 1994), or Jungian archetypes such as figures, symbols, and events (Papadoupolos, 2006).

[6] Dator (1978: 319–323) had previously proposed ten images of the future, then later converged on four. In this earlier categorization, however, he included both archetypal images of the future, as well as ideologies about the future.

[7] Differently from the other three archetypes, which seem to have been referenced in the same manner by authors, the archetype *Discipline* has been called in several other ways including *Steady State* (Amer et al., 2013: Fergnani, 2019; Inayatullah, 2008), *Reversion to the Past* (Inayatullah, 1993), *Disciplined Society* (Dator, 1998; Park, 2013), *Conserver (Society)* (Bezold, 2009b; Cruz, 2013), and others.

Transform(ation) to imagine alternative futures of any domain. The archetypes are used as a scaffolding framework within which it is possible to imagine different driving forces and emerging issues having different outcomes in four different ways (Bezold, 2009b; Dator, 2009, 2017; Dator et al., 2015; Fergnani & Jackson, 2019). *Continued Growth* is a future of steady economic and technological progress; *Collapse* is a future where human societies reach a limit and break down; *Discipline* is a future of equilibrium, limits to growth and/or sustainable development; and *Transformation* is a radical departure from the present due to a transformative event or phenomenon, either technological or spiritual (Bezold, 2009b; Dator, 2009, 2017; Dator et al., 2015; Fergnani & Jackson, 2019). The rationale behind this method is that the four archetypes can parsimoniously explain the vast variations of human imagination about the future. Dator reached this conclusion after having perused public plans, politicians' statements, books and essays about the future, science fiction novels, films, and opinion polls, all of which could be reduced to one of the four archetypes (Dator, 2009, 2012). Indeed, in more than one occasion, Dator contended that these archetypes were not "made up" or invented, but rather the result of years of empirical research (Dator, 2012, 2014, 2020).

However, Dator never reported having tested this claim empirically. To date, we can't be certain that Dator's four archetypes represent the full range of images of the future in human imagination. We are left wondering whether other sources of data about the future, such as certain fictional artifacts, might hide different archetypes, which might be more transformational and serve us better in foresight practice in current turbulent environments than the original four images.

Indeed, Dator's framework is not immune to the often-raised criticisms levelled at scenario planning. Scenario have been criticized for being unimaginative, not dissimilar to the present (Rotmans et al., 2000) as such, traditional scenario techniques may have difficulties in challenging conventional thinking (Wright et al., 2013) as well as individuals' underlying assumptions (Curry & Hodgson, 2020). As organizations face increasingly unanticipated situations, the drawbacks of existing scenario techniques become more apparent, as well as the need to introduce unconceivable, unbelievable, unusual or unknowable elements into scenarios to match the high degree of turbulence of the external environment (Postma & Liebl, 2005). Echoing these criticisms, Dator also suggested that the four archetypes should be rethought as we are entering a new era where, unlike the past, energy is not abundant, climate change and sea level rises cannot be ignored, and neo liberal systems of governance are no longer viable (Dator, 2014). Dator asserted that the four archetypes already exist, in combined form, in the present rather than in the future (Dator, 2014). This calls into question the usefulness of the four archetypes to imagine transformational futures.

In view of this, the necessity to investigate and extract new and possibly more transformational scenario archetypes from undervinvestigated human artifacts becomes more apparent. Additionally, this necessity is amplified by Dator's seminal influence in futures and foresight, as prominent contributors of the field have largely drawn from Dator's framework, thus carrying along its limitations without having attempted to develop new archetypes.

For example, drawing from Dator's framework and other sources, Bezold (2009a, 2020) developed a set of three scenario archetypes: *Best Estimate/Best Guess, What Could Go Wrong?* and a *Visionary Scenario* that can also be used as predetermined images of the future to create domain-specific scenarios, a scenario planning method with a distinct organizational focus that he called Aspirational Futures. The first scenario is Bezold's version of Dator's *Continued Growth* (Bezold, 2009b) also called *Official Future*, representing "what is thought to be most likely" (2020: p.145). The second scenario is Bezold's version of Dator's *Collapse*, where the organization faces challenges, hard times, or bad news (2009a, 2009b, 2020), but is not completely "sent over the cliff" (2020: p.146) as in Dator's *Collapse* archetype. The third scenario represents "what success would look like" (2020: p.146). A fourth scenario may be added in the form of an alternative path to the *Visionary Scenario* (2009a).

Hines and Bishop (2020) also developed a variation of Dator's four archetypes: *Continuation, Collapse, New Equilibrium,* and *Transformation,* which form the basis of a scenario planning method not dissimilar to Dator's, but with more emphasis on the *systematic change* of the domain under investigation in each scenario archetype (Hines & Bishop, 2020: p. 206). Frameworks like these did not attempt to empirically investigate whether new archetypes can be found in human imagination. Rather, they followed the contribution of (an undoubtedly seminal) figure in our field.

A similar argument can be made for another, semi-deductive, equally seminal, but also equally limited scenario framework: the major scenario plots offered by Schwartz (1996); *Winners and Losers, Challenge and Response,* and *Evolution.*[8] *Winners and Losers* is a future where a mindset of resources' scarcity lead to contentions; *Challenge and Response* is a future where imbalances test the resilience of organizations; and *Evolution* indicates an incremental growth and improvement of the system over time (Schwartz, 1996). These plots are part of the widely established Shell approach. Although Schwartz maintained that scenarios should emerge inductively via dialogue, he also suggested that these major plots can be used deductively as potential predetermined archetypes, substantiated by their previous occurrence as common patterns in the global social-economic system in the past, as they "show up constantly in modern times" (Schwartz, 1996: p. 141). Yet in times of increased unpredictability, new events will depart significantly from past patterns, pointing towards the need for more imaginative and transformational images of the future, possibly originating from untapped realms of human creativity.

Additionally, some authors have attempted to empirically investigate scenario archetypes, efforts that may have had the potential to address the above noted limitations. Unfortunately, however, they have only done so by using secondary scenarios and surveys as source of data, rather than less proximal genres of human artifacts about the future such as science fiction. For instance, MacDonald (2012) analyzed twenty sets of scenarios, consisting of a total of sixty-four scenario storylines, and concluded that all of these fall under

[8] Schwartz's (1996) emphasis in proposing these plots is on their underlying narratives. However, the plots can be considered scenario archetypes as they are allegedly representing families of previously built scenarios, and because each of them entails a different set of assumptions about how the future will unfold.

four archetypes: *Progress, Catastrophe, Reversion,* and *Transformation*, that largely mirror Dator's four generic futures. Morita et al. (2001) analyzed 124 scenarios, and concluded that these could be clustered in four major groups, *Current Trends Scenarios, Pessimistic Scenarios, Sustainable Development Scenarios,* and *High-tech Optimist Scenarios,* also substantially overlapping with Dator four archetypes. The Global Scenarios Group (Raskin et al., 2002; Raskin, 2016; Rothman, 2008) proposed three classes of scenario archetypes: *Conventional Worlds, Barbarization,* and *Great Transition*, that "recurs throughout the history of ideas" (Ruskin, 2016: p. 25). Each of these classes has two subvariants, all of which can be reduced to one of Dator's four generic archetypes. These classes of scenarios, as well as their respective subgroups, were later validated by Hunt et al. (2012) with a sample of more than 160 scenarios. Finally, Boschetti et al. (2016) used surveys to ask Australian citizens about their views of the future, and uncovered a factor-analytically robust set of five scenarios: *Social Crisis, Eco Crisis, Techno Optimism, Social Transformation*, and *Power and Economic Inequality*. The first four of these can be reduced to Dator's generic archetypes. All these efforts did not investigate whether different images of the future exist in human artifacts concerned with the future other than secondary scenarios and surveys, such as science fiction. Moreover, none of these efforts explained how the uncovered archetypes are to be used in foresight practice to create domain-specific scenarios.

In view of the above, in this article we attempt to respond to these limitations by a) investigating archetypal images of the future in science fiction films set in the future and b) proposing a foresight method to translate the uncovered archetypes into domain-specific scenarios.

2.2. Science fiction

As it seems that extant scenario archetypes frameworks might not be ideally suited to the degree of transformational thinking required by current foresight practice, we attempt to uncover more transformational archetypal images of the future from science fiction.

Fictional images of the future are powerful and influential in shaping the public's images of the future (Lombardo, 2006, 2015), driving economic decisions (Beckert, 2013, 2016) determining economic fluctuations (Shiller, 2019) and inspiring technological prototypes (Bina et al., 2017; Borup, Brown, Konrad, & Van Lente, 2006; Johnson, 2009, 2011). Most importantly, they help us think the unthinkable. This is especially true for fictional images of the future presented in the arts, or science fiction.

Indeed, science fiction is perhaps the artistic genre where one can find the highest number of novelties, which are represented in many forms. Science fictions presents a variety of visual, aesthetic, lexical, as well as symbolical *neologies* in each aspect of human society (Csicsery-Ronay, 2008). It also systematically portrays *novums,* i.e. radical structural transformations of the trajectory of human history itself (Csicsery-Ronay, 2008) thus "dislocating audience's orientation towards its familiar reality" (Csicsery-Ronay, 2008: p. 7).

Unsurprisingly, numerous corporate organizations, including Google, Microsoft, Apple, Visa, Ford, Pepsi, Samsung, Nike, Ford, Hershey's, Lowe's and Boeing hire science fiction writers to help them exploring fictional futures that would have been unthinkable otherwise (Furr et al., 2018; Merchant, 2018; Peper, 2017; Romeo, 2017). Recently, science fiction writers have also been employed by organizations in the public and military sectors, including NATO, the U.S. Army, and the French Army, to envision upcoming threats (BBC, 2019; Merchant, 2018). Many other organizations are also likely going unnoticed due to confidentiality. Indeed, the first author was involved in a science fiction writing project for a major automotive company in September 2018.

The importance of science fiction in our discipline has also been clearly recognized. Science fiction has been considered a research tool to investigate the futures (Raven, 2017); it has been compared to futures and foresight methods, including scenario planning and causal layered analysis, as it substantially encourages futures thinking (Von Stackelberg & McDowell, 2015); its boundaries with our discipline have been considered permeable (Miles, 1993); and its use as a source of inspiration has been advised in organizations by private consultancies (Gibbs, 2017), and practitioners' magazines (Peper, 2017). Yet unfortunately, little scholarly effort has been done in futures and foresight to rigorously explain how insights taken from a large number of images of the future in science fiction can be used in a systematic and holistic manner in organizations' foresight practice. With a single exception (Bina et al., 2017) scholarship on the usage of science fiction in futures & foresight has been circumscribed to science fiction prototyping case studies (e.g. Birtchnell & Urry, 2013; Burnam-Fink, 2015; Merrie, Keys, Metian, & Österblom, 2018; Postada & Zybura, 2014; Wu, 2013), interpretation of selected films and writings (Bell, Fletcher, Greenhill, Griffiths, & McLean, 2013; Burri, 2018; Keane, Graham, & Burnes, 2014; Mengel, in press), or essays (Carrasco, Garcia Ordaz, & Martinez Lopez, 2015; Dolan, 2020; Graham Raven, 2015; Zaidi, 2019) with little or no scientific rigor. These works consider a limited number of images of the future, often in a "case study" manner. Most importantly, no attempt has been made so far to systematically extract archetypal scenarios from science fiction. However, this domain is an untapped source of data consisting of a large number of artifacts, which can potentially hide several images of the future.[9]

In view of the above, we set out to propose a new scenario archetypes method by investigating archetypal images of the futures systematically in a sample of science fiction films with a grounded theory approach. In line with the objective of discovering plausible and potential futures of mankind, rather than fantasy, we specifically consider films *set in the future*. Given that science fiction films set

[9] In science fiction and cinema scholarship, previous systematic interpretations of images of the future in science fiction artifacts are scant; limited in scope as they only analyzed isolated themes; limited in time span of analysis; and thus limited in sample size. The most notable examples in this stream of literature are Franklin (1983), who systematically reviewed all Anglo-American films set in the future produced between 1970 and 1982, revealing that the main themes featured bleak images of disintegration and despair; Clarke (1992), who documented fictional depictions of future wars since the 18th century; Gold (2001), who explored the depiction of cities in most relevant science fiction films of the 20th century; and, more recently, Carrington (2016), who analyzed imaginations of the future of black ethnicity reflected in science fiction and fantasy works. This limited literature precludes us from understanding recurring archetypal images of the future in science fiction.

in the future extend the boundaries of imagination and "challenge" the present in such way that few other human artifacts about the future can do, we expected to find a more transformational set of archetypes compared to previously developed sets of archetypal scenarios currently available to foresight practitioners. In view of a status quo presenting us with a high frequency of unthinkable and unexpected events and phenomena, we believe that investigating transformational archetypal images of the future in science fiction films set in the future fits well with the current need of foresight practice, as these can then be used as predetermined archetypes to build transformational domain-specific scenarios, and thus grow prepared to critical, disruptive futures.

3. Methods

3.1. Epistemological approach

To extract archetypal images of the future from science fiction films set in the future, we followed a qualitative approach using constructivist grounded theory guidelines (Charmaz, 2014). Grounded theory is an inductive qualitative research methodology originally developed by Glaser and Strauss (1967) that consists in letting theory emerge from the data without pre-imposing hypotheses or categories. To date, grounded theory has branched into several different schools of thoughts and has been used extensively throughout the social sciences (Charmaz, 2014). Constructivist grounded theory acknowledges that the interpretation of data is in part relative to the conscious and subconscious values, emphases, and omissions of the researcher, or "constructed" (Charmaz, 2014), which we are transparent about. Indeed, memos were kept throughout the whole analytical process, and were made available to all the research assistants. These memos contained insights on new surprising findings and reflections on our role of researchers in the project.

3.2. Sample

We chose to investigate science fiction artifacts presenting enough information about the future of mankind so that they could be categorized under archetypal images of the future. Therefore, our sample had to be limited to science fiction artifacts *set in the future*. We chose to investigate *films* for two reasons. The first is the exigency of this research. Indeed, although we maintain that it will be necessary to investigate the full spectrum of science fiction artifacts set in the future (more on this in Section 6 below), including TV series and novels, a large sample of films presents us with rich information about the future while being more analytically approachable. Secondly, films often mirror the content of TV series and novels in the form of abridged versions and adaptations.

We started by identifying the population of films of interest. We used Wikipedia's list of films set in the future, which presents a good estimate of the larger population of films set in the future.[10] We therefore did not consider science fiction films set in the present, e.g. *Jurassic Park* (Kennedy, Molen, & Spielberg, 1993), as these seldom represent projections of archetypal futures. Indeed, these films tend to focus on limited aspects of the present, extended to the fantastic and the paranormal, with little information of the future of our planet and species as a whole. From this list, we narrowed down to the population of films of interest. First, we included feature-length theatrical films, and excluded television films and short films. This facilitated our analysis, as during the sampling process we noticed that these latter two categories present significantly less details about the future of mankind compared to feature-length films. Then, we excluded films set in a fictional future as a result of a fictional past, or featuring a substantial amount of fantastic, and/or surreal phenomena, superpowers, monsters (not aliens), magic, the supernatural, splatter, eros and time travel to the past that modifies the present/the future[11] due to concerns of plausibility and relevance. Finally, we excluded films set in a future where mankind is portrayed with no detectable transformational change from the present. These selection criteria allowed us to reach a population of imaginative while plausible films, in line with our aim to find novel and transformational archetypal images of the future.

We then watched films from this population, initially at random, then according to theoretical sampling, to find common patterns in them. Our final sample consisted of 140 films from the predefined population. We watched and coded the sample according to the analytic procedure below. Descriptive information about the sample is displayed in Table 1.

3.3. Analyses

To analyze the films in the sample, we followed Charmaz's (2014) data analysis guidelines to create grounded theory. These are flexible guidelines to conduct inductive qualitative research, less procedural and mechanistic than objectivist/postpositivist grounded theory approaches, which was in line with the unprecedented goal of adapting grounded analysis to the extraction of information from films. Our analytical procedure consisted in two steps: *films transcriptions* and *identification of archetypal images of the futures,* whereby we adapted part of Charmaz's guidelines to the interpretation of futures through films. These two steps were not sequential, but iterative.

Films transcriptions (the first non-sequential step) consisted in watching the films and describing their portrayal of the future in written form according to twelve independent dimensions of interest to our research goal: *economy, (atmospheric) environment, society,*

[10] This is a dynamic list containing, at the time this research started, 512 films. The list is available at: https://en.wikipedia.org/wiki/List_of_films_set_in_the_future.

[11] We have only considered time travel to the future and not to the past because while the former has been proved to be possible due to time dilation (Chou, Hume, Rosenband, & Wineland, 2010), the latter is highly unlikely as it would cause temporal paradoxes (Bolonkin, 2011: p. 32). Additionally, there is absence of time travelers from the future in present times.

Table 1
List of films in the sample.

Name	Year of production	Year of setting	Country of production	Archetype[a]
Metropolis	1927	2026	Germany	1-4
1984	1956	1984	USA	4
Fahrenheit 451	1966	2050	UK	4
2001: A Space Odyssey	1968	2001	USA, UK	6
Planet of the Apes	1968	3978	USA	6
Beneath the Planet of the Apes	1970	2978	USA	6
Conquest of the Planet of the Apes	1972	1991	USA	6
Soylent Green	1973	2022	USA	1
Zardoz	1974	2293	Ireland, USA	4
A Clockwork Orange	1975	unspecified	UK, USA	1
Mad Max	1979	1994	Australia	3
Alien	1979	2122	UK, USA	1
Mad Max 2: The Road Warrior	1981	1999	Australia	3
Blade Runner	1982	2019	USA, Hong Kong	1
Parasite	1982	1992	USA	4-1
2019, After the Fall of New York	1983	2018	Italy, France	3
2010: The Year We Make Contact	1984	2010	USA	6
Mad Max 3: Thunderdom	1985	2012	Australia	3
Aliens	1986	2179	USA	1
The Running Man	1987	2017	USA	1
Alien Nation	1988	1991	USA	1
Jetsons: The movie	1990	2100	USA	1
Total Recall	1990	2084	USA	1
RoboCop 2	1990	1991	USA	1
Solar Crisis	1990	2050	Japan, USA	2-1
Alien 3	1992	2179	USA	1
Demolition Man	1993	2032	USA	4
Waterworld	1995	2500 approx.	USA	3
Judge Dredd	1995	2139	USA, UK	1-4
Johnny Mnemonic	1995	2021	Canada, USA	1
Barb Wire	1996	2017	USA	5
Alien Resurrection	1997	2379	USA	1
The Fifth Element	1997	2263	France	1
Starship Troopers	1997	2200	USA	2
Gattaca	1997	unspecified	USA	1-4
The Postamn	1997	2013	USA	3
Lost in space	1998	2058	USA	1-2
Deep Impact	1998	2000	USA	2
The Matrix	1999	2199	USA, Australia	2
Battle Royale	2000	unspecified	Japan	1
Cowboy Bebop: The Movie	2001	2071	Japan	2
A.I. Artificial Intelligence	2001	2142	USA	1
Final Fantasy: The Spirits Within	2001	2065	USA	6
Ghost of Mars	2001	2176	USA	6
Impostor	2001	2079	USA	6
Minority Report	2002	2054	USA	1
The Time Machine	2002	802701	USA	6
Equlibrium	2002	2072	USA	4
The Adventures of Pluto Nash	2002	2080	USA	1
Battle Royale: Requiem	2003	unspecified	Japan	1
The Matrix Reloaded	2003	2199	USA, Australia	2-6
The Matrix Revolutions	2003	2199	USA, Australia	2-6
Code 46	2003	2050	UK	4
I, Robot	2004	2035	USA	2
Appleased	2004	2131	Japan	4
FAQ (Frequently Asked Questions)	2004	unspecified	Spain, USA	4
The Island	2005	2019	USA	1
AEon FLux	2005	2415	USA	4
Serenity	2005	2517	USA	4
V for Vendetta	2006	2028	UK, USA, Germany	4
Idiocracy	2006	2505	USA	5
Children of Men	2006	2027	UK, USA	5
Ultraviolet	2006	2076	USA	4
I Am Legend	2007	2009-2012	USA	2
Sunshine	2007	2057	USA	2
Vexille	2007	2077	USA, Japan	1-4
Wall-E	2008	2805	USA	3
Doomsday	2008	2035	UK	1-2-3

(*continued on next page*)

Table 1 (*continued*)

Name	Year of production	Year of setting	Country of production	Archetype[a]
Babylon A.D.	2008	2027	France, UK, USA	3
Death Race	2008	2012-2013	USA, Germany, UK	1-5
City of Ember	2008	unspecified	USA	4
2012 Movie	2009	2012	USA	2
Avatar	2009	2154	USA, UK	1
The Road	2009	unspecified	USA	3
Surrogates	2009	2017	USA	1
Gamer	2009	2034	USA	1
The Age of Stupid	2009	2055	UK	3
Moon	2009	2035	USA	1
Eyeborgs	2009	unspecified	USA	4
Tekken	2009	unspecified	USA, Japan	1-4
Cargo	2009	2267	Switzerland	1
Book of Eli	2010	2043	USA	3
Daybreakers	2010	2019	Australia, USA	1-6
In Time	2011	2169	USA	1
Rise of the Planet of the Apes	2011	2016	USA	6
Prometheus	2012	2093	UK, USA	1
Hunger Games	2012	unspecified	USA	4
Cloud Atlas (future 1)	2012	2144	Germany, USA	4
Cloud Atlas (future 2)	2012	2321	Germany, USA	3
Total Recall	2012	2112	USA	1
Dredd	2012	unspecified	UK, South Africa	5
Pacific Rim	2013	2020-2025	USA	2
After Earth	2013	3071	USA	6
Elysium	2013	2154	USA	1-4
Her	2013	2025	USA	1
Oblivion	2013	2077	USA	2-6
Hunger Games: Catching Fire	2013	unspecified	USA	4
Star Trek into Darkness	2013	2259	USA	1
Ender's Game	2013	2083	USA	1
The Purge	2013	2022	USA	4
Snowpiercer	2013	2031	USA, Korea	4
RoboCop	2014	2028	USA	1
Maze Runner	2014	unspecified	USA	4
Automata	2014	2044	Spain, Bulgaria	1
Interstellar	2014	2065-2154	USA, UK	2
Edge of Tomorrow	2014	2020	USA	2
The Giver	2014	2200	USA	4
Transcendence	2014	2021	USA	2
Dawn of the Planet of the Apes	2014	2026	USA	6
Hunger Games: Mockingjay 1	2014	unspecified	USA	4
Divergent	2014	unspecified	USA	4
Brick Mansions	2014	2018	France, Canada	5
The Purge: Anarchy	2014	2023	USA	4
Android Cop	2014	2037	USA	1-4
Die Gstettensaga: The Rise of Echsenfriedl	2014	unspecified	Austria	1-4
Vychislitel/Calculator/Titanium	2014	3014	Russia	1-4
Mad Max Fury Road	2015	unspecified	Australia, USA	3
The Martian	2015	2035	USA, UK	1
Hunger Games: Mockingjay 2	2015	unspecified	USA	4
Divergent Series: Insurgent	2015	unspecified	USA	4
Maze Runner: Scorch Trials	2015	unspecified	USA	4
Star Trek Beyond	2016	2263	USA	1
Divergent Series: Allegiant	2016	unspecified	USA	4
The Purge: Election Year	2016	2040	USA	4
Blade Runner 2049	2017	2049	USA	1
Valerian and the City of a Thousand Planets	2017	2800 approx.	France	1
Ghost in the Shell	2017	2029	USA	1
Downsizing	2017	unspecified	USA	2
Alien Covenant	2017	2104	UK, USA	6
War for the Planet of the Apes	2017	2028	USA	6
Geostorm	2017	2023	USA	2
Pacific Rim Uprising	2018	2035	USA	2
Ready Player One	2018	2045	USA	1
Maze Runner: Death Cure	2018	unspecified	USA	4
Isle of Dogs	2018	2038	USA, Germany	5
A Quiet Place	2018	2021	USA	6
Mortal Engines	2018	3100s	New Zealand, USA	1-3

(*continued on next page*)

Table 1 (*continued*)

Name	Year of production	Year of setting	Country of production	Archetype[a]
Alita	2019	2563	USA	1
IO	2019	unspecified	USA	3
Wondering Earth	2019	2075	China	2

[a] 1 indicates *Growth & Decay*, 2 indicates *Threats & New Hopes,* 3 indicates *Wasteworlds,* 4 indicates *The Powers that Be,* 5 indicates *Disarray,* 6 indicates *Inversion.*

organization, protagonist(s)' characteristics and growth, villain(s), technology, finale, aliens, value system, and *way to the future.* We chose these dimensions abductively: starting from the five dimensions of the STEEP[12] acronym, and then later expanding them with additional dimensions that we considered necessary to capture the full complexity of the futures portrayed in films, looking at both the settings and subjects experiencing the settings. This required several rounds of iterative validation and revision of previously written transcripts. We performed this task with the help of three research assistants, who were instructed to transcribe the films according to the twelve-dimensions framework above.

The identification of archetypal images of the futures (the second non-sequential step) consisted in interpreting the emerging configurations of the twelve said dimensions in each film and constantly comparing films in order to find mutually exclusive, recurring, and consistent patterns representing different macroscopic futures of mankind. Following grounded theory guidelines, we let archetypal images emerge from the films. This analysis uncovered six recurring archetypal patterns which we named: *Growth & Decay, Threats & New Hopes, Wasteworlds*, *The Powers that Be, Disarray,* and *Inversion,* according to their underlying themes. The archetypes are elaborated in detail in the following section. The majority of films portrayed one of these archetypal images, while some films presented a combination of two or more (see Table 1). We carried out this task with the help of our research assistants, and settled disagreements in interpreting the different archetypal images and in assigning films to archetypes during a weekly meeting scheduled for the whole duration of the research. Descriptive statistics of the six archetypal images are displayed in Table 2. This table shows that the time horizons of the archetypes are all in the long-term future,[13] where societal transformations are more likely to occur, with a low range of 50 years (*Threats & New Hopes*) and a high range of 329 years (*Growth & Decay*).

3.4. Theoretical sampling & theoretical saturation

The films were chosen from the population using theoretical sampling. Following constructivist grounded theory (Charmaz, 2014), we used theoretical sampling throughout the project to find new films that would likely confirm and deepen the archetypes already emerged. However, we also followed postpositivist grounded theory (Strauss & Corbin, 1998) as well as abductive logic (Timmermans & Tavory, 2012), using theoretical sampling to search for "negatives", i.e. new films that substantially differed from those already watched/analyzed and that would point to new archetypes. We used online films' descriptions to facilitate this identification process. We carried out theoretical sampling until theoretical saturation was reached, that is, until we couldn't find new archetypes and the ones already emerged were elaborated in rich detail.

4. Findings: the six archetypes

This section describes the six archetypal images of the future emerged from the data separately and in more detail, discusses their differences and commonalities, compares them with previously developed sets of archetypal scenarios already available to foresight practitioners, and explains how they can be used in foresight practice. The six archetypes are illustrated graphically on Fig. 1.

4.1. Growth & Decay

This archetype involves the continuation of the current capitalistic status quo, which grows even more rampantly. Corporations reigns unalloyed, potentially extending their power to policing, urban security, the management of public infrastructures, and law enforcement. Governmental power is absent or sidelined. Current technologies also grow steadily, pushed by monetary gains and controlled by corporations.

Hints of societal collapse or decay are found in the society. Decay can manifest in various forms, from abject life conditions and patent disparities to mismanagement of urban hygiene and bleakness of the atmospheric environment, or in a combination of these elements. Decay can also manifest in the decadence of common values, or in the conflict between values between different groups of individuals/factions. For example, leadership can be evil, primarily profit seeking and dominative, while subordinates are subjugated.

This archetype is represented by the cyberpunk genre in cinema, although it is also portrayed in films that do not entirely fit into this genre. Notable examples in cinema include:

[12] STEEP stands for *Social, Technological, Economic, Environmental,* and *Political* (Chermack, 2011; Hines & Bishop, 2015).
[13] 50 years is considered the longest time horizon of alternatives futures inquiry (Bezold, 2009a, 2009b; Dator, 2009).

Table 2
Descriptive statistics of the sample of films for each image of the future.

Archetype[a]	No. of films in the sample	% of the whole sample	Avg. year of production	Avg. year of setting	Time horizon
Growth & Decay	40	29%	2003	2332	329
Threats & New Hopes	16	11%	2009	2059	50
Wasteworlds	13	9%	2000	2176	176
The Powers that Be	30	21%	2006	2124	118
Disarray	7	5%	2009	2105	96
Inversion	15	11%	1997	2324[b]	327
Mix	19	14%	2001	2199	198

[a] 1 indicates *Growth & Decay*, 2 indicates *Threats & New Hopes,* 3 indicates *Wasteworlds,* 4 indicates *The Powers that Be,* 5 indicates *Disarray,* 6 indicates *Inversion.*
[b] This average excludes the outlier *The Time Machine* (Parks, Valdes, Wells, & Verbinski, 2002).

- M*etropolis* (Pommer & Lang, 1927), where the master of the city prioritizes the efficiency of the machines supplying urban energy while overlooking the wellbeing of workers.
- *Blade Runner* (Deeley & Scott, 1982), where the police force retires, i.e. kills, bioengineered humans called replicants, while ignoring that they are sentient beings capable of having emotions.
- *Avatar* (Cameron, Landau, & Cameron, 2009), where a military organization from earth endangers a peaceful community of aliens for resource exploitation.
- *Ready Player One* (De Line, Macosko Krieger, Spielberg, Farah, & Spielberg, 2018), where a technology corporation tries to win a virtual reality game unethically in order to establish itself as a monopoly.

4.2. Threats & New Hopes

In this archetype, no significant change affects mankind, and human life conditions are very similar to the present. However, an imminent catastrophic or apocalyptic event or phenomenon threats mankind's existence. This impending occurrence can take various forms, including environmental disasters, man-made destructions, or aliens' invasion.

National and supranational governmental bodies or military organizations collaborate to devise a global plan of rescue, while the private sector is less relevant. Individuals sacrifice their personal wealth, affections and even their lives for the common good in order to save the world as humanity is united to fight a common enemy.

This archetype is represented by the disaster genre in cinema, although it is also portrayed in films that do not entirely fit into this genre. Notable examples in cinema include:

- *2012* (Kloser, Gordon, Franco, & Emmerich, 2009), where the threat is an upcoming shift of earth's poles.
- *Pacific Rim* (del Toro, Tull, Jashni, Parent, & del Toro, 2013), where the threat is the attacks of gigantic extraterrestrial creatures emerging from within the earth' core.
- *Transcendence* (Kosove et al., 2014), where the threat is the rise to power of a man-generated superintelligence.
- *Interstellar* (Thomas, Nolan, Obst, & Nolan, 2014), where the threat is global blight.
- *Downsizing* (Johnson, Payne, Taylor, & Payne, 2017), where the threat is climate change.
- *Wondering Earth* (Ge'er & Gwo, 2019), where the threat is the transformation of the sun into a red giant.

4.3. Wasteworlds

In this archetype, a catastrophic event or phenomenon has already occurred, bringing about substantial transformations on a global scale. The atmospheric environment is often perniciously hit, forcing humans to adapt to drastic life conditions.

Often times, on the backdrop of severe resources' scarcity, human civilization has regressed to sustenance level. The market economy has given way to more rudimentary economic systems, such as barter or the use of water, oil, or sand as currencies. Few survivors live in scattered tribal communities, struggling for life and often exploited by gangs of outlaws. Tyrannical local leaders often subjugate these defenseless communities, expropriating their resources. Individuals fight against each other for survival. Other times, humans abandon earth altogether due to unliveable environmental conditions, this being a variation of the archetype, albeit with the same initial premises.

This archetype is represented by the post-apocalyptic genre in cinema. Notable examples in cinema include:

- *Mad Max* (Kennedy & Miller, 1979), where the globe is transformed into a barren desertic wasteland.
- *Waterworld* (Costner, Davis, Gordon, Gordon, & Reynolds, 1995), where major part of the globe is covered by water after the melting of polar ice caps.
- *The Postman* (Costner, Tisch, Wilson, & Costner, 1997), where all communication ties between cities in North America have been cut after a war.
- *WALL-E* (Morris & Stanton, 2008), where the globe has transformed into a giant wasteland, and humans abandon earth.

4.4. The Powers that Be

In this archetype, a catastrophic event or phenomenon, often man-made, has already occurred. Although this has left a scar on the human species to the point that population is often significantly reduced, mankind resumes its path to progress quickly thereafter. However, strict totalitarian or dictatorial powers emerge from this checkered past, ostensibly to carefully prevent the occurrence of other man-made devastating events or phenomena in the future. Technology is advanced, but centralized in the hands of governmental

Fig. 1. Six scenario archetypes, illustrations*.
* The illustrations display the content of the six scenario archetypes graphically as emerged from the science fiction films, emphasizing each archetype's dominant dimension(s) (Table 3). The illustration of *Growth & Decay* shows an economically and technologically advanced urban space with a deteriorated atmospheric environment. The illustration of *Threats & New Hopes* shows the metaphorical depiction of earth under the threat of an imminent danger, where the hero's icon represents the reaction of mankind to that threat. The illustration of *Wasteworlds* shows a destroyed, barren atmospheric environment. The illustration of *The Powers that Be* shows a population under the control of a restrictive regime. The illustration of *Disarray* shows a society in a state of belligerent disorder. The illustration of *Inversion* shows a metaphorical depiction of a room turned upside down.

bodies and used as an instrument of control. Running parallel to technical progress, citizens' rights, happiness, freedom, and emotions are limited from above. Individuals attempt to emancipate, to rebel against existing regimes, or to uproot them.

This archetype is represented by the dystopia genre in cinema. Notable examples in cinema include:

- *Aeon Flux* (Hurd, Gale, Lucchesi, Goodman, & Kusama, 2005), where a city is tightly controlled by a congress of scientists after a pathogen has killed 99 % of the human population.
- *Hunger Games* (Jacobson, Kilik, & Ross, 2012), where a central city subjugates twelve suburban districts by forcing young recruits to participate in a deadly reality show.
- *Divergent* (Wick, Fisher, Shahbazian, & Burger, 2014), where the society is forcefully divided in factions based on an aptitude test.
- *The Giver* (Silver, Bridges, Koenigsberg, & Noyce, 2014), where individuals' feelings and emotions are suppressed by compulsory daily injections and knowledge is illegal.
- *The Maze Runner* (Goldsmith-Vein, Godfrey, Bowen, Stollman, & Ball, 2014), where young recruits are exploited inhumanely by the government as experimental subjects to find a cure to a disease.

4.5. Disarray

In this archetype, although in absence of apparent transformational changes in the economy or atmospheric environment, mankind faces structural endogenous problems. The globe is plagued by any of the following: endemic crime, social unrest and disorder, widespread poverty, ignorance, infertility, violent confrontation and war, famines, or pandemics; or by a combination of these. Although the private sector is still present, military and policing organizations, either official or non-official, have a more central role in this future. Individual endeavors zero in on restoring or maintaining justice, order, or protection of citizens.

This archetype is also represented by the dystopia genre in cinema. Notable examples in cinema include:

- *Idiocracy* (Judge, Koplovitz, Nelson, & Judge, 2006), where citizens have fallen into a state of abject stupidity and a new president has to restore prosperity.
- *Dredd* (Garland, Macdonald, Reich, & Travis, 2012), where crime is widespread and a special squad is in charge of keeping order and executing criminals.
- *Children of Men* (Shor et al., 2006), where all women are infertile and a saviour escorts the last pregnant woman on earth to safety.

4.6. Inversion

In this archetype, the role of mankind is turned upside down, as it is outpaced or subjugated by a superior civilization, agent, or organism. Human beings no longer dominate the planet. Often times, they are instead dominated by creatures of higher physical prowess, of which they become preys. Alien species invading the planet or the entire galaxy is an example, either monstrous or anthropomorphic in appearance. However, this superior entity could also manifest itself in more subtle manners, such as an ostensible creator or supervisor with whom mankind ought not interfere.

This archetype is represented by the aliens' genre in cinema, although it is also portrayed in films that do not entirely fit into this genre. Notable examples in cinema include:

- *A Quiet Place* (Bay, Form, Fuller, & Krasinski, 2018), where humanity is decimated by hypersensitive extraterrestrial creatures.
- *After Earth* (Pinkett, Pinkett Smith, Smith, Lassiter, & Shyamalan, 2013), where humans are forced to abandon earth due to a dangerous extraterrestrial species.
- *Planet of the Apes* (Jacobs & Schaffner, 1968), where apes acquire human intelligence and treat humans as animals.
- *Alien: Covenant* (Giler et al., 2017), where an evil robot plans to impregnate humans with the semen of a physically superior alien species.

4.7. The six archetypes compared

Each of the six archetypes emerged from the data portrays conditions of crises in the external environment. This is the one thing they have in common, and which naturally follows from the choice of using science fiction films set in the future as a source of data to discover transformational images of the futures. However, the six archetypes also represent sufficiently mutually exclusive images. The major differences between them are shown on Table 3, where they are compared across the five dimensions of the STEEP acronym. We have identified dominant dimensions for each archetype: the most salient aspect(s) of each image of the future (shown in bold on the table).

In *Growth & Decay*, the first archetype, a dominant dimension is the economy, which is rampant. The interests and powers of corporations prevail and supersede those of governments. This is in sharp contrast with the second archetype, *Threats & New Hopes*, and with the fourth archetype, *The Powers that Be*. In these latter two archetypes, the situation is reversed, as the dominant dimension is politics (governance). Here, governments are in control of the economy and the corporate world enjoys much less leeway of action, but with the qualification that in *Threats & New Hopes,* the government is trusted by citizens and works for their well-being; while in *The Powers that Be*, the government subjugates them.

Growth & Decay also has a second dominant dimension, technology, as economic progress in this future brings about extremely

Table 3
The six archetypes compared across the five STEEP dimensions[a].

	Growth & Decay	Threats & New hopes	Wasteworlds	The Powers that Be	Disarray	Inversion
Society	Decadent	Preoccupied	**Tribal**	Controlled	**Insurgent**	
Technology	**Advanced**	Mobilized	Regressed	Centralized	Sidelined	
Economy	**Capitalistic**	Sidelined	Of barter	Controlled	Sidelined	**Transformed** due to new agent
Environment	Deteriorated	Threatened	**Destroyed**	Sidelined	Sidelined	
Politics	Sidelined	**Entrusted**	Tyrannical	**Totalitarian/Dictatorial**	Military	

[a] The dominant dimension for each archetype is in bold.

advanced technological artifacts permeating the whole society. Here, technology is controlled by corporations. This is again in contrast with other archetypes. In *Threats & New Hopes,* technological advancement is comparable to present times, or more advanced, but technology is in the hands of governmental bodies and used as an instrument to save humanity against threats. Similarly, in *The Powers that Be,* technology is advanced and centralized, but used as an instrument of oppression.

The (atmospheric) environment is a salient dimension across most of the six archetypes, as it exacerbates or brings about transformational social conditions. It is a dominant dimension in the third archetype, *Wasteworlds*, where it is destroyed and forces humans to adapt accordingly, but is also an important aspect in *Growth & Decay*, where it is neglected by corporate malpractice and absent governmental rules, and thus deteriorates; and in *Threats & New Hopes*, where it is often threatened. It is less salient in other archetypes.

A second dominant dimension in *Wasteworlds* is society which, now completely transformed, either shapes into tribes of survivors in the midst of technological regression and the erosion of a market economy, or into communities that abandoned earth. Society is also a dominant dimension in the fifth archetype, *Disarray*, whereby social unrest is rife and displayed prominently in its conflict with military power, while other aspects are sidelined. Society also undergirds other archetypes. It displays decadence of values or behaviors in *Growth & Decay*, it is concerned and preoccupied about an imminent threat in *Threats & New Hopes*, and tightly controlled in *The Powers that Be*, where it often brings about unrest.

Finally, in the sixth archetype, *Inversion*, humanity faces a challenge that substantially transforms every aspect of human civilization in an unexpected transformational manner, i.e. a new agent that inverts the balance of powers of human beings vis-a-vis the external environment, which is portrayed with the advent of a superior civilization in cinema.

4.8. Similarities and differences between the six archetypes framework and previously developed scenario archetypes frameworks

Three of the archetypes that this research has uncovered overlap with and confirm previous research. Specifically, similar variants of *Disarray* and *The Powers that Be* were identified by Morita et al. (2001) as subgroups of the Pessimistic Scenarios group and called *Chaos* and *Conservative,* respectively; and by Raskin et al. (2002) as subgroups of the *Barbarization* scenario called *Breakdown* and *Fortress World,* respectively. *Disarray* can also be found in Dator's early writings as "We are entering a new Dark Ages" (Dator, 1978: 321) and was identified by Boschetti et al. (2016) and called *Social Crisis*, along with a similar variant of *Growth & Decay*, called *Power and Economic Inequality*. However, the remaining three archetypes that this research has uncovered, i.e. *Threats & New Hopes, Wasteworlds,* and *Inversion*, are new. Additionally, the above mentioned literature (Boschetti et al., 2016; Morita et al., 2001; Raskin et al., 2002) did not specify how archetypes are to be used in foresight practice as frameworks to create domain-specific scenarios. Therefore, in what follows, we compare the six archetypes, as a framework, with previously developed scenario archetypes frameworks in more detail. Specifically, we consider the differences between the six archetypes framework and Dator's four archetypes framework (Dator, 1998, 2009, 2012, 2014, 2017, 2020; Dator et al., 2015) and its adaptations (Bezold, 2009a, 2009b; Hines & Bishop, 2020) and with Shell's major scenario plots (Schwartz, 1996).

As for the differences with Dator's framework, first, *Growth & Decay* is more nuanced, and, we believe, more tied to the reality of the status quo than *Continued Growth*. *Continued Growth*, also referred to as *Best Estimate/Best Guess* or *Official Future* by Bezold (2009a, 2009b) and as *Baseline* by Hines and Bishop (2020) is a future of abundance where all layers of society have the common objective to build a vibrant economy and make it grow (Dator, 2009, 2017). This implies either the continuation of the present in a business-as-usual fashion or the extrapolation of the current trajectory into the future (Dator et al., 2015). Therefore, although recent interpretations of this archetype have shown that it should involve decadence and challenges along with growth (e.g. Dator et al., 2015; Fergnani, 2019), in its original formulation, this archetype does not mention nor elaborates on the idea that economic and technological progress can imply losses in other aspects of society. *Growth & Decay*, on the other hand, deliberately acknowledges the importance of envisioning, on the background of economic and technological advancement, a society where growth does not materialize at all levels or brings about endemic problems. Indeed, given the often counter-intuitive outcome of driving forces of change, it is important to analyze the conflict between opposing phenomena (Inayatullah, 2003), and retain these contested dynamics in scenario narratives, as these are what gives rise to plausible scenarios that effectively mirror reality in the future (Fergnani, 2020a, 2020b). Thus, in light of increasing global inequalities and polarization of access to resources, *Growth & Decay* is more connected with the reality of the current status quo projected into the future. *Growth & Decay* is also closer than *Continued Growth* to what Jim Dator described as a major characteristic of scenario archetypes: that they should include both positive and negative elements (Dator, 2009).

Second, the six archetypes framework we present has two different variations of Dator's *Collapse* archetype: *Wasteworlds* and *Disarray*. The first is a relatively more extreme *Collapse* archetype, representing the aftermath of a transformational event or phenomenon that pushes civilization to its limits. The second portrays the collapsing process in the making. This differentiation allows

greater sophistication of futures thinking when one envisions possible collapses, or links the two (more on this below).

Third, the six archetypes are all transformational in nature, albeit in different ways, a characteristic that was only apparent in one archetype in Dator's framework: *Transformation.* Indeed, *Threats & New Hopes, Wasteworlds, The Powers that Be, Disarray,* and *Inversion* all present transformative events or phenomena, either upcoming (*Threats & New Hopes),* already occurred (*Wasteworlds,* and *The Powers that Be)* or in progress (*Disarray,* and *Inversion*). Among these, the archetype *Inversion* deliberately represents the most transformational of all. This archetype deliberately envisions a foreign or external agent inverting the supremacy of human beings vis-à-vis the external environment. This is in part similar to Dator's *Transformation*, that envisioned a metamorphosis, either spiritual or technological, of mankind, but also introduces a new element that responds well to the intuition that future Homo Sapiens might not be at the center of the ecosystem (Dator et al., 2015). This more nuanced treatment of transformation is, we believe, more suited to the current reality, which is increasingly presenting us with unexpected events and phenomena, forcing us to think the unthinkable more systematically.

As for the differences with Schwartz's major plots, first, *Winners and Losers* presents an archetype of resources' scarcity mindset leading organizations to zero-sum games (Schwartz, 1996). The six archetypes provide a more nuanced framework as they force us to think of several ways this could happen. Indeed, *Wasteworlds, The Powers that Be, Disarray,* and *Inversion* all involve zero sum games, albeit due to different reasons. The same can be said for *Challenge and Response*, which involves imbalances in the environment and forces organizations to adapt (Schwartz, 1996). Indeed, the six archetypes all involve critical disruptive shocks, even more pronounced than *Challenge and Response,* albeit in different forms. Finally, *Evolution* is an archetype of incremental change (Schwartz, 1996). We believe that this archetype is less suited to imagine the futures in times of quick and sudden changes than the more transformational archetypes we propose.

In sum, the six archetypes, considered as a framework to facilitate futures thinking, is in part novel and all in all more transformational than previously developed scenario archetypes frameworks. As such, the six archetypes framework is particularly appropriate to imagine situations of crises in the environment, and well suited to the necessity of organizations to think of ways to adapt to them, a process which we explain in more detail in the next section.

4.9. Using the six archetypes framework in foresight practice

Scenario archetypes are advantageous for their straightforwardness of application. Indeed, Dator's four archetypes have been documented to be quick to apply (Serra Del Pino, 1998). A good scenario archetypes framework allows a team of scenario planners to take advantage of years of condensed experience, quickly converge on a small and parsimonious set of scenarios, and apply it to the focal issue of concern (Boschetti et al., 2016). Without losing on parsimoniousness and straightforwardness of application, the six archetypes framework adds to previous scholarship by specifically addressing organizations' requirement to create disruptive scenarios of crises in the external environment and adapt to them, thus growing prepared to critical, disruptive futures. Although it has been suggested that it might be difficult to test current strategies using "too far gone scenarios" (Hunt et al., 2012: p. 758), in view of the increased frequency of critical, disruptive events and phenomena in the external environment, we contend that this is a fundamental task of foresight practice, and that we should deliberately attempt to stretch the boundaries of imagination, both in scenario development as well as wind tunneling processes. Indeed, it has been suggested that the most promising organizations in times of consistent critical conditions in the external environment are not those growing fast (unicorns), but those able to consistently withstand crises (camels) (Westreich, 2020). The six scenario archetypes framework presents an effort in this direction as it deliberately encourages foresight practitioners to think the unthinkable more systematically, thereby also addressing the limitations of scenario techniques in challenging human thought about the future (Curry & Hodgson, 2020; Rotmans et al., 2000; Wright et al., 2013). Specifically, the six archetypes framework can be fruitfully used in organizational foresight practice in three related and sequential ways: a) using archetypes as predetermined images of the future to create domain-specific scenarios, b) using the resulting scenarios to test organizational strategies, and c) looking for inflection points between the archetypes.

a) *Using archetypes as predetermined images of the future to create domain-specific scenarios:* this involves building stress-point scenarios of the external environment deductively using the archetypes we provided according to specific contexts. As the six archetypes present crisis situations of the external environment with different combinations of transformational conditions, the resulting scenarios lay the groundwork to fruitfully test and improve the future resilience of current organizations. A foresight exercise using the six archetypes as predetermined images of the future to create scenarios can follow the simplified step-by-step procedure below:

- Step 1: Determine all major driving forces and emerging issues in the external environment and identify those with higher impact and uncertainty with respect to the focal issue of examination via horizon scanning/environmental scanning procedures.
- Step 2: For each of the six archetypes, build a scenario narrative by answering the question "how would the combination of the chosen driving forces and emerging issues behave under this archetypal image of the future?". This task, called "Deductive forecasting" in Dator's original framework, implies specifying different values of each driving force according to each archetype (Dator et al., 2015) as well as the role of present institutions in them (Dator, 1998). In other words, the outcomes of the set of issues, events and driving forces have to be interpreted so that they are leading to the archetype under examination (Hines & Bishop, 2020). If this task is carried out in workshop settings, participants should be provided with a brief description of each archetype, which is showed in Table 4, along with the key characteristics of each archetype across the five STEEP dimensions (Table 3). Notable examples in cinema can also help unfamiliar participants to relate with the archetypes. Differently from Dator's four archetypes framework, which requires to substantiate every image of the future with examples from literature (Bengston, Dator, Dockry, & Yee, 2016), the six archetypes framework does not have this requirement. This is because the six archetypes are deliberately more

transformational. In fact, finding references about the archetypes in past literature defeats the purpose of imagining unthinkable transformational scenarios.

- Step 3: Check that the narratives are mutually exclusive and that they respond to the STEEP configuration provided in Table 3.

In the above foresight exercise, the predetermined archetypes should be used in a metaphorical rather than literal manner. For instance, the archetype *Wasteworlds* should spur us to think of human adaptation to extreme conditions of the atmospheric environment and resource scarcity, rather than of complete apocalypse. The archetype *Inversion* should spur us to think of conditions where human beings are forced to substantially reinvent their lives as a consequence of a new species or agent, rather than of conditions of aliens' attack. The key questions guiding this foresight exercise are provided for each archetype in Table 4.

Additionally, the archetypes should provide the scaffolding of complex scenarios without pre-imposing judgmental evaluation on any particular future. Indeed, archetypes are not either positive or negative, as they can be interpreted in both ways and should include both positive and negative aspects (Dator, 2009). For instance, it has been suggested that even the *Collapse* archetype can lead to new beginnings (Bengston et al., 2016; Dator et al., 2015) i.e. opportunities to restore civilization. Similarly, *Discipline* may include authoritarianism, but not necessarily so (Dator et al., 2015). The same can be applied to the six archetypes framework, where crisis situations can be interpreted as the starting points of transformational societal configurations.

b) *Using the resulting scenarios to test organizational strategies*: this involves projecting an organization's potential role in the scenarios, stress current strategies for robustness in times of crises, and devise new ones. Indeed, the six archetypes framework is based upon the intuitive logics scenario planning assumption that scenarios of the external environment, in large part outside of the control of the organization, are to be built to facilitate testing of current organizational strategies (Chermack, 2011; Schwartz, 1996). The emphasis is therefore on building "outward" scenarios, rather than "inward" scenarios of the organization itself, so that they can be used as instrument to test current strategies:

- Step 4: Test current organizational strategies under the stress-point critical conditions of each scenario narrative using wind tunneling (Ramos, 2017; Rudd, Hajkowicz, Nepal, Boughen, & Reeson, 2015; UK Government, 2009, 2017). This involves answering the question: "would the current organizational strategy(s) be still successful under this scenario narrative?" for each scenario.
- Step 5: Identify the set of strategies to be retained, those in need of modification, and those to be disposed of until a new strategic direction is clear (van der Heijden, 1996). This strategic direction should be robust under all critical stress points conditions presented by the six archetypes.

c) *Looking for inflection points between the archetypes.* This involves determining what potential conditions would make it possible to transition from one archetype to another. Indeed, in futures and foresight much attention is paid to creating scenarios, while much less work is done on the intersection between scenarios. Consequently, although the importance of identifying inflection points between scenario archetypes has been acknowledged (Foresight University, 2020), very little guidance is available on how to do so. The six archetypes we present are particularly conducive to this aspect of foresight work as they are linked by one common element: critical conditions. Critical stress-point events and phenomena run on the background of the six archetypes and, with changes in their root causes, can determine the manifestation of one archetype rather than another, linking them together. For example, *Growth & Decay* can lead to *Wasteworlds*, as excessive neglection of the atmospheric environment might cause its annihilation. But *Wasteworlds* can also be caused by the inability to put off the threat presented by *Threats & New Hopes*, which would have devastating effects on the atmospheric environment and human societies globally. In turn, should this be prevented or successfully conquered, *Threats & New Hopes* might eventually lead to excessive governmental control to prevent another similar threat in the

Table 4
Using archetypes in foresight practices, key facts.

Archetype	Archetype description	Key questions to ask while building a scenario using this archetype
Growth & Decay	Continuation of the current economic and technological trajectory, but also of current problems. Decadence of values and behaviors is found along with growth.	Under what conditions would the economy and technology advance while bringing about more problems? With what consequences?
Threats & New Hopes	An exogenous or endogenous incoming threat significantly challenges the status quo globally, and forces mankind to build new resilience capabilities. Government responses are preeminent.	Under what conditions would the only concern of mankind be fighting a threat? With what consequences?
Wasteworlds	A catastrophic event or phenomenon transforms the atmospheric environment. Mankind has to adapt accordingly and may regress due to scarcity of resources.	Under what conditions would the atmospheric environment transform and resources be scarce? With what consequences?
The Powers that Be	Governmental regimes significantly decrease the agency of organizations and individuals globally. Individuals attempt to rise up against the system.	Under what conditions would governments initiate mass surveillance? With what consequences?
Disarray	The world enters a state of disorder due to e.g. widespread wars, famines, epidemics, ignorance or social unrest.	Under what condition would wars, famines, epidemics, ignorance or social unrest occur systematically? With what consequences?
Inversion	A newly emerged agent inverts human beings' sovereignty over the globe, bringing a new and unexpected power balance between human beings and the external environment.	Under what conditions would human beings be forced to reinvent their lives as a consequence of a new species or agent? With what consequences?

future, ushering into *The Powers that Be*. *Growth & Decay*, *Threats & New Hopes,* and *The Powers that Be* might also eventually lead to the social disorder of the *Disarray* archetype, albeit for different reasons. *Disarray*'s excessive social disorder might also lead to *Wasteworlds*, whereby unrest stalls the economy and brings scarcity and technological regression. These are some of the most logically plausible linkages between the archetypes. The foresight practitioner is encouraged to think of others. A foresight exercise to identify the inflection points between the six archetypes can follow the simplified step-by-step procedure below:

- Step 6: Identify the major events or phenomena that could constitute inflection points between the scenario narratives. This can be facilitated by using a map of linkages between the archetypes to visualize possible connection between them.
- Step 7: Determine how organizational capabilities may be configured to quickly change and adapt should these inflection points occur, in line with the strategic direction developed in Step 5 above.

5. Case study

This section presents a case study of the practical application of the six archetypes framework as predetermined archetypal images of the future, followed by a discussion. The case study involves the use of the archetypes to imagine possible future scenarios of work globally as well as locally in South Bend (Indiana, USA) and nearby areas. The case study was part of a project that the first author was involved in in spring 2020 as a Visiting Associate of Policy and Practice with The Pulte Institute of Global Development, University of Notre Dame. The global driving forces of changes used to build the scenarios were identified with independent environmental scanning research. The local driving forces were identified via semi-structured interviews of a snowball sample of local grasstop leaders, academics, social workers, practitioners, and innovators in South Bend.[14] The interviews revealed that the major concerns in preparing the local workforce for the future were about future skillset and education, and about the future of local manufacturing -in great part constituted by discretionary vehicles production- which fuels major part of the local economy. Therefore, these concerns were used to frame the focus of the scenarios. The scenarios were constructed starting from the identified driving forces of change and according to the procedure outlined in Section 4.9 above. Specifically, the combined outcome of the driving forces was interpreted differently in each scenario archetype according to the corresponding image of the future, and using the dominant dimensions of each archetypes (Table 3) as reference points and the questions on Table 4 as a prompt to think of specific manifestations of those dimensions. With reference to the right column of Table 4, the behaviors of the driving forces were interpreted as *conditions* for the scenario archetypes to manifest, both globally and locally; and their outcomes were interpreted as *consequences* for local stakeholders. In this case study, the stakeholders with interest in the creation of scenarios were local organizations. Therefore, in line with the method's assumptions and aim to test organizational strategies in the crises situations portrayed by the six archetypes, the scenarios had to be sufficiently descriptive of the external environment in South Bend as well as broad enough so that stakeholders could project their potential role in them. Potential developments of the Covid-19 pandemic were also woven into the narratives. The scenarios have a 15 years' time horizon (2035).

5.1. *Growth & Decay*

Globally. The coronavirus is conquered thanks to a vaccine manufactured by a Chinese multinational and distributed globally in late 2021. Chinese conglomerates are increasingly powerful, with shares in all major corporations globally. The world returns to a new normal. Private investment in automation technologies is boosted in the early 2020s. After the experience of extended lockdowns, the conviction that much of workplace practices can be carried out remotely is widespread. Menial jobs are increasingly automated all over developed nations, which causes spikes in unemployment, depression, domestic violence and suicides.

Locally. The tasks carried out by retail sale persons, food preparation and servicing workers, and nurses are completely automated. This contributes to a wave of unemployment locally. However, the University of Notre Dame launches a program, *Rebound,* in collaboration with a consortium of private firms to offer compulsory remote re-trainings in data analytics and reinstate the laid-off workforce into the economy of the city. With the steady increase of online deliveries via driverless vehicles, the demand for automated transportation technicians, practitioners, and analysts increases, and Rebound manages to reinstate 55 % of the laid-off workforce into that industry by the end of 2027. A side effect of this is that reinstated employees are underpaid, which fuels discontent and job dissatisfaction. Additionally, large part of the younger population remains unemployed, as many younger professional reject reinstatement offers from the Rebound program, which they see as clashing with their freedom of choice. A community of online gamblers and collaborative video makers is emerging in the early 2030s, and indigence remains widespread.

With a steady increase of discretionary consumption and sales of vehicles during the pandemic, heavy manufacturing plants in the region have new disposable investment and new plants are created. The South Bend and Elkhart regions become new hubs for industrial development in vehicle automation, and after the 2029 partnership with Daimler, production of driverless trucks begins at

[14] The subjects were asked two questions: 1) *What are the major local driving forces affecting the future of work in South Bend and nearby areas?* and 2) *If you had a crystal ball and you were allowed to ask about the future of work in South Bend, what would you want to know?*. The first question was meant to identify local driving forces of change, the second question was meant to identify focal issues of concern within the domain of the futures of work. The results of the interviews were analyzed with grounded theory procedures (Charmaz, 2014) in search for common themes (clusters). The clusters identified with this procedure consisted of seven groups of similar sources of change in the local environment: *changes in skills; cultural forces and cultural conflict; changes in values among younger workers; increase in connectivity and the gig/freelance economy; the rise of AI and automation; the erosion of stakeholder capitalism;* and *the increasing support for entrepreneurs*.

scale in 2031. Boats and vehicles manufacturing applies algorithms to fetch raw materials and optimize costs. With the self-driving cars mass market opened to consumers in 2027, entrepreneurial ventures on apps and add-ons for vehicles' software are incentivized by a local consortium of investors, and are more likely to receive seed funding. New degrees in management of automation are generated at Mendoza school of business in collaboration with data analytics firms, which provide insights on the skills sought by local employers that are most lacking. However, graduates of several other majors are left unemployed. This feeds into the creation of an underclass of videogame addicts eking a living online via the gig economy.

5.2. Threats & New Hopes

Globally. The pandemic is recurring throughout the Western world with several waves into 2021 and 2022, similarly to the seasonal flu. The newly elected presidential administration collaborates with Apple to institutionalize and distribute compulsory electronic face shields all over the nation free of charge. The global economic outlook is positive as new and unprecedented industries start to emerge, spurred by prolonged remote work arrangements, including hologram technologies, sanitary clothing, and electronic face shields production. Keeping the pandemic at bay via prevention becomes part of policy arrangements and common individuals' daily routines, who slowly adapt to living with the virus. Preoccupation gives way to resilience.

Locally. South Bend manufacturers refocus their production on new industries. Manufacturing skillsets previously used to produce vehicles' windows come in handy in the production of electronic face shields and related technologies. Thanks to seed funding from the local government, a new local start-up, *Exoglass*, takes advantage of the widespread usage of electronic face shields by prototyping an augmented reality software to enhance shields' functions. Its headquarters employ 7000 individuals and bring great wealth to the city of South Bend. Sensitized to the importance of preparing for repeated crises in the business/economic environment, in 2025 the government of the city of South Bend partners up with University of Notre Dame to create a new set of interdisciplinary degrees for younger generations in order to withstand upcoming crises. Among the many newly generated degrees in the following years are: bachelor of complexity science, bachelor of crisis prevention and control, bachelor of foresight and epidemiology, along with new masters' degrees in corporate foresight and business & epidemiology.

5.3. Wasteworlds

Globally. The coronavirus mutates and is not conquered. It becomes more lethal and widespread. Serial bouts of lockdown globally turn the sluggish world economy into a prolonged recession without significant improvements throughout the 2020s. A new administrative task force is in charge of disease prevention and control at the national level. However, while scientists recommend making sure that the population practices social distancing and doesn't commute excessively, the presidential administration ignores these warnings, and as several individuals lose their jobs and face adverse economic conditions, they still commute illegally to stores outside of their neighborhood for daily needs. This leads to a new wave of infections and deaths. In turn, global concerns over the economic recession lead to the downplay of warnings of the sudden dangers of climate change, bringing about irreparably erratic weather conditions.

Locally. South Bend is not immune to the global wave of pandemic, recession and severe environmental conditions that plagues the globe. As typhoons appear for the first time in the region, many lose their houses, and squatting in rundown properties is common. The local government incentivizes new industries that distribute food and essentials. Many manufacturing plants are shut down. Those left turn to the production of sanitary products, weapons, and processed food. Fresh produce is scarce and difficult to find. As the population consumes large amounts of processed food, general health conditions of citizens deteriorate, overwhelming the local healthcare system even further. The extremely adverse weather and the pandemic lead education to a stall. As students can't afford their tuition any longer, a new tuition allowance scheme is sanctioned, allowing students to finish their degrees online with lower expenditures from universities. A great majority of academic research shifts to Covid-19. As the cost of investing in automation is too high, the demand of menial jobs increases, and students with a background in business analytics and digital systems have to fall back on menial labor, working for the few essential industries still prosperous, such as food processing and healthcare.

5.4. The Powers that Be

Globally. The sluggish global economic situation lasts until the mid-2020's as global lockdowns are extended over the second and third waves of the coronavirus pandemic. Governments make tracking apps compulsory, initially with the purpose of contact tracing. These apps are built into every smartphone. However, amidst the economic downturn, these apps turn into instruments to impose monetary fines to individuals who do not comply with orders of social distancing. As the world experiences recurring waves of the pandemic, compulsory tracking apps are not lifted, and the fear over strictures to social life is palpable in the media. In the late 2020s, the global economy slowly emerges from the doldrums as new holographic technologies are marketed and 5 G infrastructure is increasingly widespread which, combined, allow most of labor to be executed remotely. However, this also allows governments to extend the reach of their surveillance. The demand for holographic managers increases. Business analytics evolves up to a point that strategic decision making is automated.

Locally. By the late 2020s, the economy has recovered, and some local manufacturers in South Bend adapt to holographic technologies, implementing it in their production lines as modelling technique and in showrooms as a form of rendering. Against the backdrop of necessary social distancing, recreational vehicles' sales increase moderately but steadily over the years. The government levies hefty taxes on products and services to fund contact tracing and surveillance programs. Strategic decisions are completely

entrusted to business analytics, and marketing is automated with minimal decision making. However, this raises the question of whether local governments are overlooking self-running firms in order to channel profits to their advantage. Business analytics expertise is obsolete in the workforce, but highly sought after in academia, where researchers are payed highly to design more optimal algorithms. A new cluster of research in business optimization technologies at the University of Notre Dame achieves global recognition, and new research centers in this domain are established. New PhD degrees on ethical AI optimization and policy automation are generated. However, the government levies hefty taxes from the proceedings of academic research and vetoes academic output. Tracking systems are part of daily life, often used to fine employees not complying with social distancing measures, allegedly for not respecting social responsibility. A group of students at the University of Notre Dame turn into activists denouncing the use of AI as an instrument of control, and promoting the importance of ethical AI. Their gatherings are squelched with violence by the local police.

5.5. Disarray

Globally. The coronavirus ends its course earlier than several estimates in early 2021, leaving the United States as the worst-hit country globally. The Trump administration's hostile public reprobation of China as a culprit during the global pandemic lead to rising diplomatic tensions, fueling a wave of xenophobia. Trade routes are significantly altered, and a one-upmanship race via cyberwarfare escalates, until the White House internal communication system is hacked in winter 2024, suffering a devastating data loss. The attack is attributed to the new Chinese administration, given its close ties with Huawei. Several countries along the Belt and Road Initiative decide to side with China and bilateral trade between the United States and most of countries in Eurasia significantly decreases, leading to a local recession in the late 2020s and spelling the end of USA's global hegemony.

Locally. Due to the significant shortage of raw materials, local manufacturing, food production facilities, healthcare, and retail face a significant increase in wholesale prices, leading to panic and unrest. This stirs up further massive riots led by those who were against USA foreign policy measures against China before it led to the spike in prices. To counter this, the government of South Bend, among several other towns in Indiana and nearby states, launches initiatives to incentivize local farming, sourcing seeds from South America and educating citizens on self-sustained farming via online training. The profession of counter-espionage officer becomes a common ambition of generation Alpha. As the public sector and the United States Armed Forces absorb the great majority of the young workforce to feed the escalating cyber war with China, the most sought after professions are conflict intelligence experts, public safety experts, and counter espionage specialists. As most of younger professionals, of both genders, move away from South Bend, prices of properties decrease significantly. In 2031, the government of South Bend invests in three major luxury nursing home plans, attempting to revive the local economy and repositioning the region as a idyllic retirement location in the North East.

5.6. Inversion

Globally. Lockdowns following the global pandemic force individuals to rethink the human role in adversely impacting the planetary ecosystem. Following the publication of the IPCC climate change projections in 2023, which include narratives and videos about the future of the earth ecosystem, as well as the widespread viral hashtag #nature2.0, a new global sentiment for consciousness and spirituality arises. A new system of values, heavily promoted by celebrities on social media, voices the importance of taking care of nature. By 2027, the meat substitutes industry and artificial meat industry reach a market capitalization of almost 60 billion USD, absorbing a new wave of investments. Once the coronavirus abates, individuals are willing to pay a premium for outdoor activities. Shared workspaces shift to the open. University lectures are now organized outdoor. The excessive use of technologies is stigmatized. New research shows the adverse effects of online video conferences on health, and individuals shift back to phone calls, believing these are more intimate and polite. Video conferences becomes disrespectful.

Locally. Local manufacturing sees a halt in the production of discretionary vehicles. In the midst of more prudent spending behaviors among generation Z and generation Alpha, individuals' disposable incomes are mostly spent on outdoor activities, spiritual enrichment, and health products. The University of Notre Dame sets up a series of new laboratories in plant-based food science research, food substitutes research, and wellbeing and spiritualty. Some manufactures divest from heavy manufacturing and pivot to biomedical engineering, in collaboration with the Eck Institute of Global Health. Many others, unable to adapt, file for bankruptcy. Students are required to attend internships in firms' research and development laboratories as part of their degrees. Artificial intelligence is still used in business analytics and digital marketing, but as the workforce steers away from office work, it remains a niche area where skills are in high demand and low supply. Given the wider ideological environment and the stigma on the excessive reliance on machines, few decide to pursue such a career.

5.7. Case study discussion

In the case study above, the *Growth & Decay* scenario is a future of economic progress as well as widespread unemployment and domestic decadence. This presents elements of progress along with problems. Technology is advanced. Corporate power increases, whereas governmental power is sidelined. These features are in line with the corresponding archetype,

In the *Threats & New Hopes* scenario, recurring waves of the Covid-19 pandemic are the "threat" to which individuals and organizations have to adapt. The government takes up the major role of collaborating with local firms to develop new industrial clusters, and with the educational system to introduce new interdisciplinary educational programs. This entrusted role is the distinctive feature of the corresponding archetype.

The *Wasteworlds* scenario briefly narrates how the intensification and mismanagement of the Covid-19 pandemic slowly leads

human societies to collapse, engendering a world that is shy of post-apocalyptic. Mismanagement of the pandemic at a governmental level leads to economic depression and resources scarcity. Life conditions regress. Technological advancements stall. Downplaying climate change causes it to intensify. Locally, only two industrial sectors are spared, and manufacturers are forced to pivot in order to survive. These extreme conditions are indeed the main features of the corresponding archetype.

In *The Powers that Be* scenario, the economy recovers slowly, and governments exploit their renewed technological control, initially designed to contain the pandemic, as an instrument of oppression, thus permeating and controlling each layer of society. Activists rise up in vain against the regime. Adverse governmental agency is indeed the main feature of the corresponding archetype.

The *Disarray* scenario attempts to convey conflict and social disorder, as dictated by the corresponding archetype. Following diplomatic disputes during the pandemic, tensions between China and USA escalate, leading to a halt of trade routes and an increase in wholesale prices locally, which leads to riots. Widespread cyberwarfare drives a new demand for skills related to espionage.

In *Inversion*, a global shift in values leads to a rethinking regarding the role of nature, and to the acknowledgment of the lesser importance of mankind in the earth's ecosystem. Nature is portrayed with a new role, a previously ignored agent, to which mankind realizes it has to adapt, in line with the corresponding archetype. This swift ideological change, however, also causes widespread bankruptcy among local manufacturers who are not able to adapt.

When drafting scenario narratives in this case study, we attempted to pay attention to three related issues, which also constitute the major challenges of this method. First, the archetypes are to be skillfully adapted to a particular context. Indeed, although each archetype presents conditions for mankind at large, their distinct features have to be used to imagine how such conditions would manifest at a local level that is relatable to, and usable by, the stakeholders with interest in the scenarios. In the case study we presented, these stakeholders were organizations in South Bend. Therefore, examples of local manifestations of each archetype in South Bend had to be provided. This was possible by imagining how education and manufacturing (the key issues of concerns uncovered in the interviews carried out locally) would change given the conditions dictated by each archetype. This adaptation is a challenge. Indeed, it requires striking a balance between the global manifestation of scenario archetypes according to the domain under investigation and their local manifestation by providing specific examples. In this manner, the resulting scenario narratives are broad enough to allow wind tunneling, but narrow enough to connect with readers. This challenge can be in part addressed by using the key questions for each archetype (Table 4) as prompts to drive a discussion on how conditions and consequences would manifest at a local level.

Secondly, scenario narratives should feature both positive and negative elements (Dator, 2009), which is to make them more akin to reality because, as Gibson (1999) famously quipped, "the future is not evenly distributed". This task is also a challenge as it is easier to provide descriptions of outcomes of phenomena, and more difficult to explain the contested space from which those outcomes originate. This challenge can in part be addressed by objectively counting the number of positive and negative events/phenomena featured in each scenario narrative, and by iteratively adding elements to the narratives where the two significantly differ.

A final important issue, and challenge, in using this method is that one has to strike a balance between the transformational nature of the scenario archetypes and plausibility. Indeed, the archetypes originate from a dataset that is originally designed to stretch one's thinking as a form of critique and entertainment, but not to be applied in foresight practice, despite its value for it. This challenge can in part be addressed by using the archetypes metaphorically, not literally, as noted in Section 4.9 above, and by iterating the narratives' creation process multiple times.

6. Conclusion

We have proposed a new scenario archetypes framework, which we generated by investigating archetypal images of the future in a sample of 140 science fiction films set in the future using grounded theory. Six archetypes emerged from the data. The archetypes involve critical, disruptive conditions in the external environment. The archetypes in part overlap with and confirm previous research, and in part are novel. We explain how the six archetypes, as a framework for foresight practice, is more transformational and nuanced than previously developed scenario archetypes frameworks and, we believe, particularly suited to the current requirement of foresight practice to think the unthinkable more systematically when creating domain-specific scenarios.

A caveat to the usefulness of this method is that, as any other scenario planning method, it is not meant to make organizations and individuals only prepared to the scenarios it produces, that is, to six and only those six situations of crisis, but rather to be a process by which a mindset of preparedness to future crises is developed, no matter whether these are envisioned in the specific scenarios originating from the six archetypes.

However, this research is only the first step of a far-reaching agenda, which we cannot possibly tackle for limits of space and time in this article. For the interested researcher, this agenda should involve three related directions. First, we do hope that this research will spur futures and foresight researchers and practitioners to explore more closely science fiction artifacts set in the future in a rigorous and systematic manner. Other archetypal images of the future, or a more sophisticated treatment of the ones we presented, might be uncovered via subsequent thorough investigations of images of the future in other sources of data that we didn't consider, including science fiction novels, comics and TV series. Such research should be undertaken soon. This could also serve us as triangulation to confirm or disprove the six archetypes we found. In fact, the archetypes *Disarray* and *Inversion* are portrayed by a minority of films in our sample, and certainly require more investigation using different data sources. Indeed, although we found six mutually exclusive archetypes, which seems to be the highest number of scenarios that experts have recommended to be effective in a scenario planning exercise (Amer, Daim, & Jetter, 2013; Bezold, 2010; Durance & Godet, 2010); and although the way we used theoretical sampling has likely enhanced the chances to find all images of the future portrayed in science fiction cinema, which suggests that the method is comprehensiveness to make organizations prepared to crises, it has to be noted that the data source we investigated represents crisis

over other domains of human society. Although this is fruitful for the purpose of the current research - i.e. uncovering more transformational archetypal images of the future than those already proposed - it makes further research on this topic with other data sources even more urgent.

Secondly, the case study we reported was primarily aimed at explaining the process of adaptation of the archetypes when creating contextualized, domain-specific scenarios. Due to limits of space, we didn't report the process, explained above, of testing organizational strategies against the six scenario archetypes, nor the identification of inflection points. Compiling case studies on these latter two aspects of the six archetypes framework is a great opportunity for further research.

Third, the usefulness of the six archetypes framework has to be validated with rigorous assessment. This could be achieved by measuring outcome variables, such as change of mental models, strategic decisions, preparedness, hope towards the future, confidence in navigating unpredictable environments, etc., before and after a foresight intervention using the six archetypes framework as "treatment" to create scenarios in an organization or community. The effect of the treatment could then be assessed by simple T-tests. This method should also be compared with other scenario methods in its efficacy to bring about those outcome variables. This could be achieved with an experimental study design, where the six archetypes framework "treatment' would be administered to a group of individuals, and other scenario methods "treatments" would be administered to other groups of individuals. The between-groups difference in outcome variables could then be measured to ascertain which method works best to increase those variables.

Finally, this research is not without limitations. Contemporary cinema has been noted to be dominated by western productions, of which Hollywood is preeminent (Hurley, 2008). As a large part of our sample comprises North American films, one could note that this research is biased towards less diversity. However, with the choice of using grounded theory as a research methodology, which involves theoretical sampling, we were able to actively choose films in the sample to achieve greater diversity in archetypal images of the future. This means that when an image was repeated in films several times, we actively looked for "negatives", that is, films that appeared to fall outside our categorization in different cinema genres, countries, and time spans. Thus, the research design in part mitigated this concern. Additionally, the fact that the images primarily originate from the West doesn't detract from the main objective of the research, i.e. to provide novel and transformational archetypal images of the future for foresight practice, which we believe the six archetypes do successfully. Anyhow, this limitation should also spur further research to investigate images of the future in non-Western science fiction with an equally rigorous and systematic approach.

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