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Collective Scenarios: speculative improvisations for the Anthropocene

Abstract:

The article discusses the potential of speculative and improvisational modes of rehearsing collective futures in the context of the interlinked crises associated with the Anthropocene, among these climate change. The article draws on insights from a series of research, arts and public engagement projects where collaborative scenario-making was explored as a way of opening up civic space in the face of the high levels of uncertainty, global risks and collective action problems associated with climate futures and societal transformations. Scenarios are proposed as rehearsal spaces for more collective modes of responding to the prospect of uncertain futures. The article introduces the conceptual innovation of speculative improvisations, binding together strands from anticipation and futures studies, speculative research, speculative design thinking and participatory action on and engagement in urban futures. The article suggests that thinking and practicing the future otherwise involves considering responses and responsibilities in the present day as well as reconfiguring ways of imagining the future. The article considers the possibilities for speculative improvisations and develops the idea of collective scenarios as the anticipatory framework – or rehearsal – that can support a more vibrant and imaginative sense of how societies can be prepared for uncertain futures.

Key words:

collective scenarios / climate futures / storytelling / speculative improvisations / rehearsal spaces / anticipatory framework

Highlights:

considers the purpose of scenarios as rehearsal spaces for responding to climate futures

discusses scenario-making as a framework for collaborative and speculative improvisations in troubled times

introduces a novel conceptualisation of scenarios of climate change as speculative improvisations

explores how speculative, improvisational and reflexive approaches can refresh climate scenarios and allow more open and energetic engagement in climate futures

considers the idea of collective scenarios as the anticipatory framework – or rehearsal – for the societal transformations augured by the Anthropocene

Collective Scenarios: speculative improvisations for the Anthropocene

1. Introduction: Is this a rehearsal?

'It is as though the intervention of the virus could serve as a dress rehearsal for the next crisis, the one in which the reorientation of living conditions is going to be posed as a challenge to all of us, as will all the details of daily existence that we will have to learn to sort out carefully. I am advancing the hypothesis, as have many others, that the health crisis prepares, induces, incites us to prepare for climate change. This hypothesis still needs to be tested' (Latour, 2020).

Anthropogenic climate change places particular demands on the future – an anticipated future that humanity is expected to prepare for, and increasingly, shape. Scenarios are a common method of getting a better grip on the future – of *rehearsing the future* – particularly when that future is considered to be in crisis or malfunctioning. Indeed, thinking and navigating in scenario mode has become an indispensable means to hypothesize upon, imagine and prepare for futures in the Anthropocene. The Anthropocene is itself a scenario, understood as story or speculative proposition, in multiple ways. It is an account of humanity's role in destabilizing Earth systems and shunting the Earth into a new geological epoch; one that has 'no analogue' in Earth history (Crutzen & Steffen, 2003). It is a thought experiment that details a fictional excursion into a post-human future to find evidence of human-induced geological unconformity (Zalasiewicz, 2009), and envisages a disaster of human making *that will have been* (Colebrook, 2014). In some ways, the unfolding disaster is itself the narrative: written on the Earth in a script of tsunamis, wildfires, nuclear traces, toxic oceans, species extinctions and disruptions, ecological collapse, glacier melt and sea-level rise (Tyszczuk, 2018). It is a story that summons an existential crisis and upends all predictability. Yet at the same time it conjures the 'speculative promise' of authoritarian technofixes for climate change, among them geoengineering and negative emissions technologies (Van Hemert, 2017; Beck & Mahony 2017). The Anthropocene is a planetary alarm, a cautionary tale and a call for action. It designates the climatic future as catastrophic, out of control, already here. In what sense is the Anthropocene a time of rehearsal? Are the current crises accompanying an unruly climate, including migrations and displacements, infrastructure disintegration, flooded cities, arid landscapes, insurrectionary politics and global pandemics – but harbingers of even more cataclysmic anthropogenic disasters to come? Is this yet another round of warnings calling for reorganized living conditions and rapid, transformational changes in society? Or perhaps an opening to new ways of imagining humanity's role and responsibilities within an unstable planetary *what next?* If climate change equals everything change, what if climate scenarios offered a way of *rehearsing the future otherwise?*

Scenarios are generally understood to be stories of change and make sense of an unknown future by asking *what if?* They are among futuring practices that can serve to 'bring imagined futures into the present' (Andersson, 2018). In terms of climate futures, scenarios are deployed in risk management, insurance and financial forecasting, in speculative extractive industries and their shifts to prospecting for renewable energy sources, and in climate modelling, including the science-policy interface of climate science, most notably the United Nations Framework Convention for Climate

Change (UNFCCC) processes. Scenarios are key to contingency and adaptation planning for urban futures; in speculative design practices that try to anticipate post-growth or eco future lifestyles, and in the catastrophic (for the most part) imaginings of climate fiction. Scenarios (especially the worst-case ones) have also informed the rush of 'wake-up' and 'panic' calls of 'climate emergency' that demand immediate climate justice and climate action.

Scenarios inhabit the culture in diverse forms and are 'defined in various, contested ways, involving a wide range of methodologies and philosophies' (Rickards et al. 2014), giving rise to questions concerning reconciling of divergent paths in theory and practice (Spaniol & Rowland, 2018a). An attempt to create a shared, synthesized definition of scenarios in futures studies describes them as 'future oriented, about the external context, a narrative description, plausibly possible, a systematized set, and comparatively different' (Spaniol & Rowland, 2018b; Chermack, 2019). In contemporary scenario planning, scenarios are defined as 'a small set of stories of future contextual conditions linked with the present, made for someone and fulfilling an explicit purpose' (Ramirez & Selin, 2014). As 'anticipatory practices', scenarios are enrolled in various ways of calculating, imagining and performing futures, in often disputed modes of 'pre-emption, prefiguration, and preparedness' (Anderson, 2010). Scenarios thus contribute to processes through which the present is transformed, intervened in and ultimately governed or managed, usually with the promise of an optimised future (Adams et al. 2009; Anderson, 2010; Granjou et al., 2017). In terms of climate change futures, scenarios work can bring scientific accounts into the same space as difficult politics, ethical deliberations and different knowledges in approaches to 'anticipatory governance' for climate-impacted futures (Muiderman et al., 2020). Scenario methods are understood as a means to engage heterogeneous stakeholder groups to inform policies for adaptation (Cairns et al. 2013). They can develop 'futures literacy' in order to make sense of 'emergent complexity' and improve 'prospects for resilience' (Miller 2011; 2018). Scenarios are variously: posited as 'learning machines' and understood as heuristic tools for climate policy strategies (Berkhout et al, 2002); explored as narrative processes for portrayals of energy futures (Raven, 2017; Smith, 2017), or reference points in the re-imagining of cities and landscapes (Chiles, 2005). Moreover, the technologies of forecasting and intervening in the future have developed in tandem with the forms of politics and practices of environmental anticipation and speculation of widely diverging interests. Therefore, paying attention to the history of scenarios reveals that, 'the future could always have been otherwise' (Granjou et al., 2017).

In this article, scenarios are understood as speculative, narrative and plural practices of anticipation, or futures in the making. However, in positing scenarios as a way of *rehearsing the future otherwise*, the discussion attends also to the dramaturgical dimensions and origins of the term. This helps to draw attention to the neglected potential for the practice of scenarios to create conditions for rehearsal that is both speculative and improvised. Scenarios of climate change are considered as the 'rehearsal space' for climate futures, capable of taking account of a multidimensional, multidisciplinary and collective undertaking of social transformation in uncertain times (Tyszczyk &

Smith, 2018). The proposed scenario practice does not promise predictable or disciplined outcomes, nor is it expected or intended to drive all participants towards a shared collective imagination of the future. Rather than simply performing climate futures, it encourages, among other things, approaching uncertain and diverse knowledges of the future with care, and honing particular qualities of *paying attention to the future in the present*. It is recognised that there is a creative exchange in play between this understanding of ‘rehearsal space’ and the ‘possibility space’ of attention to futures (Miller, 2006). This experimental practice proposes to reclaim the territory of scenarios and speculation from pre-emptive techniques and practices that aim to capture the climatic future in advance, or ‘stop the future happening’ (Wilkie et al. 2017). It is wary of ‘anticipatory regimes’ that demand interventions to ‘optimize the future’ or deploy the ‘colonizing, coercing or recycling of affective orientations in the name of the future’ (Adams et al., 2009). Similarly it cautions against the scripting of futures through predictive or possibilistic technologies, and hierarchical and authorial processes. Rather it explores scenarios as a creative practice and anticipatory framework that can negotiate meanings, share diverse knowledges, engage publics and sustain relations of trust. It is an approach that is perhaps more attuned to demands to de-colonise the future, and de-colonise the Anthropocene (Whyte, 2017; Yusoff, 2019). Put another way, this approach to scenarios is about *storytelling for troubled times* (Facer 2019; Haraway 2016).

The proposition at the core of this article is that society needs rehearsal spaces to work out how to respond to the uncertain and disruptive futures that the Anthropocene anticipates, and the inevitable, yet unknown, societal transformations that will be both generated and required. Rehearsal is a mode of anticipation, a way of coming to terms with the future in the present. The concept of rehearsal is one that has long been associated with scenarios and scenario planning in times of crisis. Cold War civil defence preparedness was inherently theatrical in its embodied practices and methodologies (Svendsen, 2017; Davis, 2007). The proving grounds, emergency scenarios and survival exercises were part of an elaborate system of risk management that involved the construction of ‘nuclear fictions’ as ‘rehearsals for the end of the world’ (Tyszczyk, 2018, 15). The present is a context of renewed fears of the world-as-we-know-it ending, along with concern over the lack of preparedness and appropriate governance in the face of interlinked crises. There have been multiple declarations of climate emergency, and increasing emphasis that ‘this is not a drill’ (Farrell et al. 2019). It is worth noting that there are both limitations and underlying communications and political risks embedded in this emergency idiom (Hulme, 2019a; Anderson et al. 2020). Not least this is a question about cultural stamina: ‘Are we now in the real emergency? Were previous alarm calls just rehearsals?’ (Smith, 2019). Furthermore what kinds of politics does a ‘state of emergency’ serve to permit – and erase?

The way a society imagines its future matters, and *who gets to do the imagining matters*. Scenarios are proposed here as a way of *rehearsing the future* in conditions of planetary turmoil and unsettlement. In this febrile period scenario making has recovered a sense of being an urgent practice and the notion of rehearsal for a change of state has gained further intensity of purpose. Are

we rehearsing to adapt to climate crisis, manage disaster or to avoid it? The framing of the question invites an 'all of the above' response. The context of interlinked crises and multiple possible responses helps to emphasise why the radical uncertainties inherent in climate change futures make civic improvisation, rehearsal and experiment all the more important. The rehearsal spaces of climate change deliberation and action can take many forms and span more formal decision-making and radically open participatory forms of 'democratic conversation', including collaborative scenario making (Rickards et al. 2014; Cairns et al., 2013). These ideas have moved off the page, as is evidenced by the growing number of, and depth of investment (of all kinds) in citizens' assemblies that foster societal resilience (for example the Climate Assembly UK, 2020). These pre-figurative political practices seek to work out a future in conversations, through consensus or dissent, but they nevertheless tend to be (more, or less) directed and curated.

The *Collective Scenarios* project has investigated scenarios as alternative 'rehearsal spaces' for climate futures by drawing on modes of speculative research and improvisatory practice. It is interested in opening up of the possibilities for experience, but where the outcomes are unpredictable, involving thus a kind of speculative practice around climate change futures that is 'crucial to political agency, democratic pluralism and innovation' and where 'political agency is only disclosed *collectively*' (Diprose, 2017, 41; 44, emphasis in original). The project has explored ways of addressing climate futures and collective agency based on the speculative dimensions and participatory capacities of *rehearsal as improvisation*. The project seeks to bring into dialogue both recent perspectives on climate change scenarios, and speculative and participatory practices. In doing so it assays the capacity of improvisational modes of scenario making to explore the possibilities and limits of civic interventions and societal transformations, at the same time avoiding the logics of pre-emption or persuasion. The ambition is therefore to expand both the scope of anticipation and the rehearsal of possible futures with respect to climate change. The aim has been to explore forms of collaborative scenario-making that allow for more open ended and unruly processes. What makes these rehearsal spaces different from other ways of practicing for climate futures is the experimental mode of rehearsal developed, that of *speculative improvisations*.

The article offers a glimpse into the exploratory research journey of the *Collective Scenarios* project, understood as an iterative process. It is recounted here not as a method of inquiry, but rather as a collage of interactions between thinking and practice – a to-ing and fro-ing – exploring different transdisciplinary perspectives on scenarios, across a number of initiatives, over time. Despite the iterative nature there are four discernible areas in the development of the work: 1. The theoretical and historical study of climate scenarios, including the origins of scenarios techniques, methods and practices, that have influenced how scenarios are enrolled in thinking climate futures; 2. Co-produced action research with diverse participants (academic, business, policy, arts and everyday communities) on energy transitions and climate futures – centred on the agency and experience of those considered non-experts in climate science; 3. Creative practice-based research and art projects on speculative climate futures in turbulent times; and, 4. Engaging with broader theoretical and conceptual interpretations seeking the emergent patterns revealed by these research practices. Moving between these areas has meant adjusting the work according to the evolving research and

emergent realities of the *Collective Scenarios* project. It is not an accident that the research process itself has been one of rehearsal and improvisation.

This article charts the exploration of scenarios for climate futures as rehearsals and as speculative improvisations. Section 2. **Climate scenarios: storytelling in troubled times** discusses the research context of scenarios of climate change. It draws upon the history of scenarios in order to introduce how notions of 'storytelling' and 'rehearsal' are key conceptual and practical aspects of scenarios. Section 3. **Towards Speculative Improvisations** indicates the potential of thinking of scenarios as rehearsal spaces for speculative improvisations, by placing them in the wider context of speculative and participatory design practices and futures studies. Section 4. **Collective Scenarios** outlines some of the experimental projects that have informed the research, where a scenario mode, conceptually understood as 'rehearsal' was tested. Section 5. **Improvising for the Unforeseen** discusses further some of the conceptual and theoretical underpinnings of the specific mode of scenario making as the generation of speculative improvisations. In conclusion, section 6. **Rehearsing Climate Futures** argues for the potential of collective scenarios as a means of rehearsing for the uncertain and unsettling conditions of the Anthropocene.

2. Climate Scenarios: storytelling in troubled times

'So, 'he said, 'what do you and your ministry know about the future, then.'

'We can only model scenarios,' she said. 'We track what has happened, and graph trajectories in things we can measure, and then we postulate that the things we can measure will either stay the same, or grow, or shrink' (Kim Stanley Robinson, *The Ministry for the Future*, 2020; p.96).

Scenario thinking is central to climate change research and policy. Anticipatory scenario-modelling underpins UN Framework Convention on Climate Change (UNFCCC) processes including the Intergovernmental Panel on Climate Change (IPCC) assessment approach, but also other forms of speculation on environmental futures including futures derivatives, insurance, speculative trading and catastrophe bonds (Smith, 2017). Climate futures scenarios include climate models and forecasts, energy demand prognostics, resource-management games, online policy tools, as well as contingency planning and adaptation projects for urban resilience (Smith, 2017; Rickards et al, 2014). According to the IPCC, 'a scenario is a coherent, internally consistent, and plausible description of a possible future state of the world (IPCC, 2007;145). It has also stated that its scenarios, 'tend towards normative, economics-focused descriptions of the future' (IPCC, 2014; 422). Through an extrapolation of existing trends, the IPCC has worked through scenarios of up to 6 degrees of global warming by 2100: a world where most of the planetary surface is uninhabitable, the oceans have stratified and mass species extinctions have taken place (2018). The trajectories of climate change worst-case scenarios are advancing ever faster across the decades of the IPCC's cautious predictions. The latest IPCC report (2021), assessing the state of climate change and efforts to mitigate it and adapt to it, presents the urgency of cutting global greenhouse gas (GHG)

emissions and the irreversible consequences of failing to do so. The report uses outputs from the latest generation of global climate models and integrated assessment models (IAMs), underpinned by narratives of future socio-economic development or Shared Socio-economic Pathways (SSPs). In all five of the report's scenarios, Earth will unavoidably reach or exceed the critical threshold of 1.5 degrees average warming set by the 2015 Paris Agreement, by 2040, regardless of cuts in GHG emissions. In the worst-case scenario the world faces a catastrophic 4.4 degrees average temperature rise and sea level rise of 1.88 metres by 2100. In the most ambitious scenario, net zero emissions would see warming stabilise and fall to 1.4 degrees by 2100. The report notes that the biggest uncertainty in all climate-change projections is how humans will act. Even so, some changes, such as ocean acidification, ice sheet disintegration and sea level rise, are now considered irreversible, across centuries and millenia, regardless of what humans do next.

In anticipating multiple states of 'planetary crisis', climate foresight, strategy, policy and politics, are all thrown into disarray. Responses to climate crisis are not contingent on ever more precise scientific predictions or projections, made with bigger datasets and more complex simulations. Rather the challenges to innovating and implementing climate policies are always social, cultural, and political. The 2015 Paris Agreement's aspirational target of limiting global warming to an average 1.5 degrees rise, gave impetus to both the imagining of a range of future worlds and to the search for diverse governance frameworks that can cope with transformative and uncertain climate futures (eg. Tyszczuk & Smith, 2018; Vervoort & Gupta, 2018). A challenge for future climate scenarios has been to appropriately represent the inherent uncertainties and complexities not only of climate change but also of societal changes and the scope for possible actions. However, alongside a focus on extending methods to provide plausible or decision-relevant scenarios, the application of scenarios in climate policy areas has been almost entirely reliant on physical modelling and economics, resulting in a strong emphasis upon numerical objectivity and technical authority. This has failed to acknowledge that scenarios are fundamentally subjective assessments, and tends to promote them as privileged knowledge of the future. This misrepresentation of the core features of scenario-making has been exacerbated by the shifting language surrounding scenarios in the IPCC reports. They have moved from being termed 'predictions' to 'projections' to 'forecasts', and more recently presented as 'pathways' (Hulme, 2019b; Tyszczuk, 2019a). It has also obscured the ways in which scenarios end up reproducing already privileged ways of knowing and speaking for the environment (natural sciences) and societies (economics). There is concern that future climate scenarios continue to serve as 'coercive devices' (Hulme, 2019b) or 'trojan horses' (Knutti, 2018) to further particular controversial agendas, such as geoengineering fixes, or incite behavioural change, or furnish the 'delaying tactics' of the fossil fuel industry (Carton, 2020). The IPCC is an institution that was created to provide aggregate climate knowledge for the UNFCCC, and mediates between climate science, governance and policy. As such, it is inescapably and permanently embroiled in the 'politics of anticipation' and thus drawn into 'making futures not just forecasting them' (Granjou et al, 2017; Beck & Mahony 2018a; 2018b). The IPCC has indicated the worst-case scenarios of climate impacts and upheavals and disruptions to societies, including extreme heat, drought and flood events across

the globe. The IPCC's recent modelling of emission reduction pathways to include negative emissions technologies however, represents a shift towards a 'new politics of anticipation, wherein potentially contestable choices for climate futures are woven into the technical elaboration of alternative pathways' (Beck & Mahony, 2017, p.312). In other words, these scenarios or pathways 'perform certain futures as seemingly legitimate, necessary and desirable', and in doing so they defer any 'political inconvenience' of reaching those futures to future generations (Carton, 2020).

Such instrumental and performative application of scenarios obscures their potential as provocations to 'imagine the world otherwise'. In recognition of the limited ability of climate science scenarios to grapple with the 'out-of-the-ordinary', or unexpected events and consequences of climate change, including societal and political upheavals, there have been recent calls for scenario-crafting to include more qualitative and subjective 'off-model analyses' (McCollum et al, 2020). Despite these arguments climate research has tended to neglect the cultural practices and humanistic disciplines that lie at the root of scenario-making. Hence the improvisational and reflexive intentions and qualities inherent in the origins of scenarios as practices of storytelling, are lost. The term 'scenario' can be traced from early improvisational theatre and via Hollywood screenwriters to strategic planning techniques during the Cold War, and from there to present-day horizon-scanning in business and foresight industries as well as UNFCCC processes (Tyszczyk, 2018; 2019a; Andersson, 2018; Granjou et al., 2017). Indeed, notions of 'storytelling' and 'rehearsal' have been key conceptual and practical aspects of scenarios throughout their history. The meteorologist Herman Flohn is credited with the first use of 'scenario' in a scientific paper in the journal *Climatic Change* in 1977. Flohn's scenario drew explicitly on the dramaturgical meaning of the term and was presented in three acts to explore 'some possibilities of near-future climatic evolution' in order to pose questions about energy futures (Flohn, 1977; Hulme, 2019b). With the growing dominance of global climate models in climate scenario production, however, this example and its recognition of the subjective and synthetic qualities of climate scenarios has been largely forgotten.

The original dramaturgical use of the Italian word *scenario* is associated with 16th century *commedia dell' arte*, a form of sixteenth century Italian street theatre. Rather than a finished script or narrative, the scenario indicated the skeletal synopsis or rough outline of a play, fleshed out by the actors *all' improvviso* – in improvisation – during performances (Andrews, 2008). In 20th century Hollywood, the term 'scenarios' referred to screenplays, and in the 1960s was borrowed to describe the strategic planning techniques for nuclear war, developed by Herman Kahn with the RAND corporation (Spaniol & Rowland, 2018b). Kahn's scenarios combined imaginative storytelling with game theory, nuclear war strategy and systems theory, and involved writing multiple histories of the future – the 'Future-Now' (Ghamari-Tabrizi, 2005). In Kahn's terms, the multiple storylines in the scenarios generated through his techniques allowed for 'thinking the unthinkable', as forecasting life beyond a nuclear apocalypse was considered impossible (1961; 1962). Kahn honed his anticipatory methods at the Hudson Institute, the conservative think tank, and, with Anthony J. Wiener, produced *The Year 2000: A Framework for Speculation* (1967), establishing the scientific, political and commercial use

of scenario techniques and the emerging practices of futurology. Scenarios were defined therein as a 'hypothetical sequence of events leading to a possible future' (1967 p.6). The synthetic storytelling inherent in scenarios was prized for being open to both 'bizarre crises' – in Kahn's terms (1986) – and to alternative futures. In the early 1970s, drawing on its own 'Year 2000' studies, Shell developed its method of scenario planning that was rooted in the creation of multiple possible future scenarios that were designed to help the company anticipate and adapt to future shocks and turbulence (Wack, 1985). Shell's scenarios did not predict the events of the 1973 OPEC crisis, but as their scenarios suggesting a potential shift of power in oil resources had been made public prior to the crisis unfolding, the company appeared to have anticipated it (Schwartz, 1988; p. 7). Scenario planning emerged in a world dominated by the uncertainties of looming environmental catastrophe, and the 'global unravelling of the future' (Andersson, 2018). In this context, Shell's scenarios were considered a way of 'rehearsing the future' through a simulated journey into a future that had already been made (de Geus, 1997; p. 67). Moreover, 'the most important element of the scenario ... was that it was always generated as a multiplicity, as one of several possible outcomes – never as a prediction or forecast but as a suite of conjectured possibilities' (Williams, 2016, p. 522). In the scenario planning techniques established by Kahn, the endless iteration of multiple storylines fanning out from the present held open the possibility – hopeful, yet threatening – that one of them *might just turn out to be true*.

Scenario methods underpinned the Club of Rome's *Limits to Growth* report (Meadows et al., 1972) published in time for the first UN Conference on the Environment, held in Stockholm. The so-called 'doomsday report' – with its alarming portends stretching to 2100 – brought to prominence the use of computer simulation using system dynamics feedback-based 'world-models' as a mainstay of policy-making, in spite of their scary predictions and shaky prognostics. The World Dynamics approach to scenarios in *Limits to Growth* helped to establish a conception of the Earth as limited, bounded and fragile. Moreover, this has served to underpin the catastrophic outlook associated with environmentalism, as well as the idea that environmental crises were, at their core, a management problem. Following this worst-case scenario convention, 'planetary boundaries' – a 'collateral concept' to the Anthropocene (Castree, 2014) – establishes the precautionary limits for maintenance of critical Earth system processes and warns of the consequences of imperiling 'the safe operating space for humanity' (Rockström et al., 2009). The processes of the IPCC and the UNFCCC continue to lean heavily on scenarios, rooted in Earth System science and climate models, to present a range of future climate risks, vulnerabilities and responses (Edwards, 2010). However, it bears remembering that the scenarios and the varied futures they present, are always shaped by the intentions and assumptions of the scenario-makers.

Tracing the history of scenarios has been part of a broader effort to understand the authoritative status of scenarios within formal climate change research and policy processes, their ubiquity in narratives that underpin our economic and political systems, their role in pre-emptive, algorithmically determined techniques of managing future risks as well as their grip on the cultural imaginary of climate futures. In a world depicted in terms of catastrophe and limits, scenarios enrol all kinds of

calculative and speculative knowledges to envisage future possibilities 'ahead of time' (Amoore, 2013). There is a widely held conviction that the potential of climate scenarios lies in their capacity to invite imagination of future possibilities. However, the dominant use of scenario techniques in climate policy and research has tended to focus on linear trajectories to the future, the creation of 'plausible', 'predictive' and 'desirable', or even persuasive, storylines and ideally, a route to a manageable tweaking of 'business as usual'. The tendency for scenario planning, when considered as rehearsal of future climates, has been to attempt to eliminate the surprising, or to safeguard against undesirable futures. This occurs in spite of persistent claims that the scenarios embrace ambiguity, complexity and uncertainty. The use of climate scenario approaches is understood here in the context of 'cultures of prediction', based on computer modelling and simulation, which have pervaded 'not only contemporary scientific practice but the wider cultural politics of environmental change' (Heymann et al, 2017; p. 15). Predictive practices have had enormous cultural and political import in 20th and 21st century decision-making processes from 'the planning of infrastructure to stock trading and weather prediction' (ibid; pp. 6-7). To acknowledge this is to interrogate the kinds of speculation deployed in financial markets, commerce, the military, and in resource extraction (Smith, 2017). Hence a mode of thought that is considered culpable for the current contemporary socio-economic and environmental crises, or put simply – what got us into this mess in the first place – finds itself put to work to 'find a fix to climate change'. As Granjou et al note, '[c]ommand over futures, imaginary, political and geophysical, appears more closely aligned to command over pyrotechnical capital than we might wish' (2017). In similar vein Hulme problematises the authority given to (scientific) predictive knowledges of the climatic future, instead asserting that the future possesses an unfolding logic beyond human comprehension (2017).

It is important to acknowledge the *fictional* nature of climate scenarios – from models to forecasts to narratives– as futures co-created through the predictive practices of climate science. These are 'fabrications of the future'– coalescing 'socio-technical imaginaries' and 'collective futures' (Jasanoff and Kim 2015). In other words, scenarios are stories, and hold the potential for collective sense-making. In environmental science research there have been recent innovations in opening up the imaginative practices of climate futures thinking and decision-making to more collaborative and interdisciplinary working based on collective storytelling. These have included iterative multi-method approaches to scenario generation, incorporating, for example 'tales' and 'storylines' (eg. Hazeleger et al. 2015; Dessai et al. 2018; Shepherd et al., 2018). In the social sciences, the concept of 'storyworld' has been explored as a way of bringing climate modelling and shared socio-economic pathways (SSPs) into dialogue with literary fiction (Nikoleris et al. 2017). In a similar vein, a 'scenario world-making' framework explores pluralistic scenario practices beyond the limitations of probability and plausibility-based approaches, recognising the need to 'move away from attempts to reduce uncertainty, and instead embrace it through diverse, contrasting futures' (Vervoort et al., 2015). A 'transformative spaces' approach, for example, combines futures scenarios and participatory methods for 'co-creating novel futures together in a world defined by complexity, diversity, and uncertainty', with those, 'whose voices are often marginalized in environmental scenario processes'

(Pereira et al. 2018). If climate scenario work is understood not as a way of predicting or managing or even grasping the future but rather as a *speculative and experimental storytelling practice*, it has the potential to reflect rather than deny the complexities of climate change relations and uncertainties. These are understood as an 'unruly mix' of diverse knowledges, multiple framings, entanglements of human and non-human agencies, contested and shifting responsibilities and unsettling vulnerabilities (Tyszczuk & Smith, 2018). This article suggests that the opportunity and challenge presented by scenarios is to draw on this speculative storytelling practice to create a rehearsal space for climate futures, in order to invite more collaborative, multidimensional, multicultural and reflexive conversations indicative of more 'open-ended way(s) of thinking about futures' (Bai et al, 2016).

The *Collective Scenarios* project is interested in exploring alternative ways of *rehearsing the future* in conditions of climate disruption. In particular, it has drawn on the speculative and performative dimensions of improvisational practice inherent in the early modern use of scenarios, associated with the *commedia dell' arte*. This early theatre practice dispensed with a full written script such that performances were constructed around the *scenario*, a framework or narrative structure for improvisation. Rather than simply privileging spontaneity, the improvised performances relied on the collective skills, experience and capacities of the actors. Moreover, without the performance, or rehearsed improvisation, scenarios remained only as impoverished and partial narratives. Such use of scenarios – as prompts to rehearsed improvisations– left room for the surprising and the unanticipated. Imperfections and disruptions were hence fundamental to the performances, and the vagaries of trial and error allowed for responses to the complexities and unpredictability of everyday life. Above all perhaps, this practice embeds within it the capacity to change the story, including its ending.

The aim of the *Collective Scenarios* project has been to expand the scope for the rehearsal of climate futures, and to explore the potential of scenarios as the anticipatory framework for more collective, improvised and speculative responses to the dramatic transformations that the Anthropocene augurs. If the Anthropocene scenario is a catch-all account of the myriad perils associated with the present day and their trajectories into the future, it is also a speculative proposition that recognises a planetary future in the making. It veers between warnings of environmental apocalypse and abrupt openings to new ecological and social possibilities. At the same time it is entangled with a historical juncture that questions the global predominance of Western knowledge claims and diagnoses of planetary predicament. It is a story that has foregrounded some people, made others invisible, delivering an account of an already dystopian present, or alternatively a *déjà vu* experience of climate changes as a spur for indigenizing futures (Whyte, 2017). Moreover, '[t]o be included in the "we" of the Anthropocene is to be silenced by a claim to universalism that fails to notice its subjugations' (Yusoff, 2019, p.12). A contested term in a disrupted space and time, the Anthropocene is nevertheless a malleable proposition: it invites the possibility of 'planetary social thought' and 'incitements for thinking ... across a range of timescales, fields of vision and trajectories' (Clark & Szerszynski, 2021; p.3). It is a troubled story about inhabiting a disaster of human-making, adjusting to its shocks, and shifting away from a worst-case

future (Tyszczyk, 2018). The challenge is to find a way, in Haraway's terms, of both 'changing the story' and of 'staying with the trouble' (2016).

Current conditions of global crisis and planetary instability demand a different imaginative stance in terms of rehearsing climatic futures, coupled with a disposition that is more humble with respect to the radical uncertainty and increased sense of jeopardy characteristic of life in the Anthropocene. We may need to be 'climate improvisers' (Hulme, 2017). For, even if the Anthropocene is conceived as a mega-disaster scenario, 'the disaster is a moment that calls for an audacious response. If it is not to be a prelude to despair, the disaster must be an incitement to risk-taking, improvisation and experiment' (Clark, 2014; p. 22). The Anthropocene disaster scenario calls for the kinds of improvised adjustments and accommodations that recognize dynamic Earth systems as always eluding human efforts to control, stabilize or secure them. The Anthropocene scenario calls urgently for alternative ways of imagining, anticipating and responding to crises and catastrophes. It demands that human societies learn to live more skillfully, more provisionally and more responsibly with the increasingly unruly elements of a disastrously anthropogenic world (Tyszczyk, 2018). The proposition is thus to reclaim the cultural territory of scenarios as a shared rehearsal space for the kinds of speculative thought and improvised action that might be required in turbulent and troubled times. It is in the core of the nature of rehearsal as a practice that it inevitably represents a body of *speculative improvisations*. Rehearsal, linked to improvisation, within the context of the kind of climate scenario practice outlined here, is about exploring the skills and capacities that can leave us better equipped to both approach and respond to uncertain futures.

3. Towards Speculative Improvisations

These are 'times of urgencies that need stories' (Haraway, 2016; p.37). Scenarios are generally understood as speculative and plural stories, and can be collected under the broader category of 'narratives of futurity' including 'product prototypes, political manifestos, investment portfolio growth forecasts, nation-state (or corporate) budget plans, technology brand ad spots, science fiction stories, science fiction movies, computerised predictive system-models, New Year's resolutions, and many other narrative forms'. Moreover, 'all of these forms involve *speculative and subjective depictions of possibilities yet to be realised*' (Raven & Elahi, 2015: 50 – 51; emphasis in original). In turn, they invite 'speculative and performative intervention into narratives of environmental politics and sociotechnical transition' (Raven & Stripple, 2021). Attempts to think futures however, in terms of planetary multiplicity, encounters the potential of multiple interacting stories. Whyte's account of Indigenous '[e]xperiences of spiraling time' includes, 'narratives of cyclicity, reversal, dream-like scenarios, simultaneity, counter-factuality, irregular rhythms, ironic un-cyclicity, slipstream, parodies of linear pragmatism, eternity' (2018: 229). The potential of scenarios as a mode of storytelling for a troubled present that addresses diverse past, present and future transformations and temporizations thus resonates with Haraway's 'worlding' entanglements of 'SF' and 'speculative fabulation' as a 'patterning of possible worlds and possible times' (2016). The speculative fabulation

of scenario-making is understood here in its collaborative potential for storytelling within the possibility space of the future – a space that is the spur for rehearsed improvisation. The context for thinking what kind of rehearsal space might be possible is informed by speculative and improvisational approaches in speculative design thinking, participatory urban design and futures studies. Reconceptualising scenarios as *speculative improvisations* redirects the focus from the narrative or descriptive content of scenarios and instead draws on the dramaturgical dimensions and the activity of speculative, collaborative and improvised storytelling inherent in scenarios. This challenges current scenario-thinking within a climate solutions frame positing instead a more collective and inclusive improvisation of 'what ifs', relevant to reconsideration and reconfiguration of societal futures in the context of climate change.

Modes of speculative fiction, narrative, or fabulation have informed the expanding fields of speculative and critical design, design interactions and design fiction, which are concerned with 'how the world could be', rather than 'how the world is' and with 'social fiction' rather than 'science fiction' (Dunne & Raby, 2008; 2013; Auger, 2013). Speculative design has been defined as 'a practice of creating imaginative projections of alternate presents and possible futures using design representations and objects' (DiSalvo, 2012: 109). A speculative design approach usually involves the creation of an artefact or setting intended as a portal to an imagined future world, supported by an iterative process of scenario-making as speculative storytelling which aims to test and validate the imagined world. Where, for example, 'The "What if" approach of speculative fiction is a design method to configure new and largely uncharted kinds of living on a damaged planet' (Ghosn and Jazairy, 2018), p. 21). However, critiques of speculative design are concerned that it tends to focus on envisioning consumable technofutures without looking beyond, or challenging existing cultural conditions, socio-economical and political structures (Tonkinwise, 2015). Whether or not the intention with speculative fictions is to create fantasy, hoax, or wishful thinking, this nevertheless reveals the need for ethical discussions around speculative design that avoids the trap of its reduction to simply a means to envisage dystopian technofutures or produce 'futuristic gizmos' (Prado & Oliveira, 2015).

The field of participatory design and civic engagement concerned with urban futures has also been informed by speculative approaches, understood as situated, relational and embodied modes of inquiry (Lury & Wakeford, 2012; DiSalvo, 2016; Doucet & Frichot, 2018; Elzenbaumer, 2018). For example speculative practice is understood as a 'what-if' catalyst for re-imagining forms of citizen participation that resist pre-defining or subjecting differences to the notion of consensus (Michael, 2012; Wilkie et al, 2015; Wilkie et al. 2017). Tironi develops a mode of participatory urban design based on the possibilities of 'speculative prototyping' a mode of inquiry and exploratory knowledge, in which 'spaces of friction and counter-participation' are generated, tested and supported (2018). This alternative way of addressing urban participation is proposed in the context of the dominant 'technocratic solutionism' in the rhetoric of smart urbanism and seeks to go beyond the 'exceptionalism of expert knowledge', and is instead based on the speculative and participatory possibilities of generating scenarios of civic intervention and reimagining urban life (Tironi, 2018;

Tironi & Valderamma 2018). Tironi draws on Michael (2012), who proposes that the force of speculative prototyping, does not simply lie in its capacity to test and probe situations, but also in its potential to operationalize the conduct of the 'idiot' or a 'slowing down' evoked by Stengers' cosmopolitical encounters (Stengers, 2005, 2010; Tironi, 2018; Tironi & Hermansen 2018). The provocation to 'slow down' is not about an indifference to urgency, but rather about learning '*the art of paying attention*' as a necessary aspect of the care required in precaution and risk-taking (Stengers, 2015; 62). Indeed 'speculating with care' in participatory design practice is about an attentiveness to lived experience, a careful investment in possibilities and an activation of civic agency (Elzenbaumer, 2018).

Speculative improvisations are about speculating with care. Indeed care and attentiveness to the situation are at the root of improvisational practice in theatre and the arts. Improvisation has tended to be associated with the experience of creating something unplanned, on the spot and ad hoc, out of materials immediately to hand, and is commonly associated with notions of spontaneity in performance in theatre, music and creative practices (Jencks & Silver, 2013; Johnstone, 1987; 1999; Sawyer, 2000). In some accounts of dramaturgical practice all acting is considered improvisatory, in others, improvisation is equated with values of immediacy and intuition or as a form of practice that resists commodification (Born et al., 2017; Svendsen, 2017). A core improvisational technique in theatre proceeds as a game of consequences with improvisers responding to each other, with 'Yes, and...' or the more speculative trade-off, 'If... then...'. Improvisation is the shared craft of actors' or improvisers' rather than the author's or director's. Moreover, it involves 'the exercise of care, judgment and dexterity' [...] where the practitioner has continually to make adjustment to keep on course, in response to a sensitive monitoring of the conditions of the task as it unfolds' (Ingold and Hallam, 2007; p. 13). Improvised performance, and its possibility of endless reconfigurations, is thus the result of a collective, social and generative process, what Sawyer terms 'collaborative emergence', that relies on careful listening, shared structures and experience (2000). These ideas of improvisation as the exercise of care and attentiveness to the situation born of experience, have informed socially, and environmentally engaged practices, emancipatory movements and anticipation and futures studies. For example, improvisation practice is linked to efforts to secure civil rights, which require, 'people to hone their capacities to act in the world' (Fischlin et al. 2013; p. xi). Improvisational theory has informed socio-spatial projects and practices as 'spaces of rehearsal' for 'prototyping the social' in post-conflict situations (Morrow et al. 2020). In terms of prefigurative politics, when conceived rather as 'prefigurative improvisation', this, 'typically proceeds through an intensive commitment to improvising with available ideas, materials, spaces, and bodies, and affective states' (Jeffrey & Dyson, 2020). In the field of futures studies, anticipation and scenario thinking, ideas of improvisation are of increasing importance to work on futures literacy with a focus on making sense of 'emergent complexity' (Miller, 2018; 2011), and theories of organizational and strategic foresight (Tsoukas & Shepherd, 2004), where, for example, improvisation 'alters foresight's time horizon' through an attention to the present (Cunha, 2004; p. 139), or is defined as 'real-time foresight', that can 'seize the moment' in dynamic and turbulent markets (Cunha et al., 2012).

Combining scenario methods has informed the development of a 'scenario improvisation' approach involving iterative co-design of scenario narratives with diverse stakeholders (Cairns et al., 2016). Improvisation has also shaped practices of 'pre-enactment' and 'prehearsal' in arts-based participatory approaches to experiential futures where it 'provides insights into intuitive and habitual responses to a situation, as well as the thrill of being able to shape the evolution of the situation through direct experience' (Kuzmanovic & Gaffney, 2017). These varied approaches acknowledge the creative convergence of anticipation and action in improvisation, that can support ways of developing future preparedness, honing capacities, making sense of turbulent times and inhabiting uncertainty.

In dialogue with the speculative and improvisational approaches outlined above, an engagement with scenarios as rehearsal cautions against the scripting or counter-scripting operations of speculative design, scenario-making and prototyping which are driven by experts, designers or researchers generating scenarios that corroborate expectations, build consensus or involve pre-emptive curatorial and authorial processes. Instead, scenarios are considered as an anticipatory framework that can make room for working with a multiplicity of perspectives, generating multiple improvised what ifs – and thus accommodating cultural shifts and futures that are as yet unknown and uncertain. Within this rehearsal space, speculative improvisations are about generating imaginative and collective stories in conditions where there is 'no script'. Indeed, the key characteristics of improvised rehearsal are the possibilities for performative variations, collaborative 'action' rather than authorship, the distributed and shared crafting, and the exercise of care through relational alteration, together contributing to a cosmopolitics of anticipatory performance. Speculative improvisations are rather precautionary fabulations and are experiments in *paying attention* to the discordant realities and disruptive conditions emerging from an anthropocenic, climate-changed world.

4. Collective Scenarios

The *Collective Scenarios* project has set out to explore how speculative, improvisational and reflexive approaches can refresh climate scenarios and allow for more open and energetic engagements in climate futures. This is understood as a mode of speculative research and practice rather than a method. In recognizing the cultural origins of scenarios in the theatre the project has considered the potential of scenarios as *rehearsal* – a framework for imagination and action. The project draws on insights from several research and public engagement projects across a five year period, which involved experimental scenario workshops: the AHRC *Stories of Change* project (2014–2018), working with communities on energy transitions and transformations (Smith et al, 2017); the *Culture and Climate Change: Scenarios* project (2016 – 2017) which initiated a climate research network and an arts-science networked residency (Tyszczyk et al. (Eds.), 2019); and theatre-based projects on climate futures, which evolved from the *Culture and Climate Change: Scenarios* residency (Svendsen, 2019). This section describes some of the processes of collective and improvised experiments into possible climate futures that at same time have cultivated more speculative forms of research. Taken together they are characterised as *speculative improvisations*.

The scenario-making involved a research practice grounded in participatory commitments to knowledge production or co-production, that has engaged a broad range of participants including researchers and publics as co-researchers, and has adapted to given circumstances and context, acknowledging the specific particularities and lived experiences of place and people involved (Smith et al., 2017; Smith & Tyszczuk (Eds.), 2018; Tyszczuk et al. (Eds.), 2019; Tyszczuk & Smith, 2019). It is important to note that each of the scenario workshops, taking place across the different projects, was therefore contingent on the emergent conditions of each context, its histories and constraints, and that the projects' varied 'rehearsal spaces' generated experiments in improvisation that cannot be reproduced. The approach in these projects has thus been resistant to discussions of methodology that tend to fixing or defining an approach but has rather focused on exploring and generating different modes of practice, oriented towards luring different experiences, that might amplify imagination of and catalyse responses to alternative futures. The scenario interventions produced through collective processes were conceived therefore as a framework for dynamic storying and rehearsal. They were co-created as prompts to existing practices and emergent enactments, opening up a speculative relation that 'affirms the possible, that actively resists the plausible and the probable targeted by approaches that claim to be neutral' (Stengers, 2010: 57).

The different projects are outlined here in terms of some of the provisional frameworks devised as an invitation to practices of scenario-making that attempted to open up possibilities for as yet-unimagined futures. The scenario approaches were underpinned by a series of questions: What is the cultural significance and potential of climate change scenarios? What thinking and practices can inform the scenario mode in addressing future transformations? What is the potential of collective scenario making in the future? How are conditions created that allow for collective rather than individualised speculations on climate futures? How are speculations nurtured and enabled beyond the rehearsal space? What if it was possible to rehearse the future otherwise? The scenario workshops tested a framework for improvisation open to alteration and revision in each new context through the interventions of different participants. The framework tended to comprise: 1. A story synopsis, based on the particular context, current events, informed by news of the day, or borrowed from pre-existing *commedia dell' arte*, Shell or IPCC 'scenarios', and /or created in storytelling workshops 2. Props that were makeshift, relying on what was to hand, contents of pockets, what could be borrowed, or observed (eg. museum artefacts), re-usable maps, waste-paper or cardboard, or other convenient materials for modification, storying and prototyping (eg. Lego, plasticine, found objects) 3. Characters and roles that were either existing or devised by participants through improvisational exercises 4. A timeframe for iterative ongoing exploration in speculation by improvisation, ranging from hours to days to weeks to years. For all those involved in the scenario workshops, conceived as 'speculative adventures' oriented to a world in the making, this was also a task understood as impossible 'without a risky relation to an environment that has the power to complicate this adventure, or even to doom it to failure' (Stengers, 2011; p. 18). The scenario workshops required time, before, during and after, time to prepare, time to take care and pay

attention, time to act and take risks, time to learn. Moreover, this aligns with an understanding of improvisation as the iterative 'exercise of care' that unfolds over time.

The *Stories of Change* project set out to support more dynamic public and policy conversations about energy, and also to experiment with ways of working through areas of concern about energy system transformations. At its core were an exploration of climate futures embedded in the Climate Change Act of 2008, stretching to 2050, and emergency timeframes given impetus by the 2015 Paris Agreement. Scenario-based storytelling was considered as both speculative and transformative and 'like prototyping, a way of working out what to do next' (Smith & Tyszczuk (Eds.) 2018, p. 103). The scenario-making interventions drew on participatory design approaches to urban futures and were further developed during the series of speculative energy futures games and scenario workshops at the core of the project, for example, 'One Great Workshop', 'Energy Lab', 'Utopia Works', 'Factory of the Future' and 'Model London' (Smith et al. 2017; Smith & Tyszczuk (Eds.), 2018). For example, with 'Utopia Works' in 2016, we recreated a factory or 'works' of speculative energy futures at the Silk Mill, the world's first factory, now part of Derby Museums (Smith & Tyszczuk (Eds.), 2018, pp. 204 –211). The project's previous scenario-making activities had already established the multi-temporal and multi-scalar energy landscape, creating energy futures maps of the Derwent Valley region and energy strategies with the different factories that were partners in the project (eg. 'Energy Lab'; 'Factory of the Future'). 'Utopia Works' had fifty or so 'workers' – an invited and purposeful mix of participants: museum professionals and volunteers, artists, students, academics, community energy campaigners, and employers, apprentices and employees from the region's industries. The timeframe was guided by Thomas More's script for making good use of time in *Utopia*: a six-hour working day and inclusion of 'some congenial activity' (1516). Arrival at the factory included an introduction to a group of co-workers, the factory rules and regulations, a timetable for movement between the different zones, such as the works canteen, printing and prototyping workshops. At each location, the workers engaged with a set of tasks, working through makeshift models, drawings, sketches and stories using a combination of found materials and drawing on past experiences. The day provoked a range of improvisations: performances on the past and future of factory artefacts, tools and machines, alongside fast-paced energy pamphlet and energy system prototype production, prompted by conversations on labour, resources and capacities, with the factory bell organising movement between workstations.

The collaborative and improvised activities practiced in the varied scenario workshops across the *Stories* project as a whole were powerful invitations for imagining collective energy futures and the possibilities and consequences of decarbonisation. They forged more nuanced understandings of energy and climate in space and time that brought together past, present and future humans and non-humans in complex assemblages. They acknowledged the dramatic and contested changes around energy systems that had happened in the past, for example identifying the industrial revolution as originally water-powered and as the 'low-carbon energy revolution', and connecting them to anticipations of, and propositions for, the future, for example community-owned nuclear

power plants, new conflicts over energy rights, reconfiguring of employment laws and policies for equitable development and the nurturing of ecological, social and political 'refugia'. The improvised events were not designed to generate solutions but to encourage possibilities, capture ideas, reveal values, surface frictions and test commitments to change. This necessarily included thinking through taking responsibility for the future, or caring for the by-products of unmanageable risks as well as the social consequences of change. The improvisations generated in collective scenario making allowed for transformative, social, intellectual, and affective engagements with possible and alternative futures in relation to energy systems transformations.

Culture and Climate Change: Scenarios had two overlapping strands: an interdisciplinary network of climate researchers and a networked arts-climate science residency programme, modelled on the distributed nature of climate research. The research and creative work took place within a collective undertaking that, 'we are all climate researchers', thus acknowledging diverse perspectives on climate change and unsettling assumptions about climate expertise (Tyszczyk, 2019b: 43–45). The challenge was to provoke new thinking on climate scenarios in the aftermath of the Paris Agreement. The project thus invited collaborative scenario-making as 'collective improvisations' (Tyszczyk & Smith, 2017; Tyszczyk, 2019b). This referred to both the origins of scenarios in improvised street theatre (Tyszczyk & Smith, 2017), as well as 'collective experimentation' with respect to climate change (Gabrys & Yusoff, 2012). In 'the world-wide lab', Latour observes, 'we are all engaged in a set of collective experiments' in the 'confusing atmosphere of a whole culture' (Latour, 2003). Moreover, the predictive knowledge of climate research has set the terms for running a worldwide sociocultural experiment of emissions reductions to counter the 'large-scale experiment' of earth systems alterations activated by human activity (Hulme & Mahony, 2010). The project tested the idea of scenarios as 'collective improvisations' through a series of workshops and interactions with climate researchers. At the same time these collaborative activities nourished the development of creative work on 'future scenarios' by artists on the residency programme, across different media and in different public settings. This included immersive sound installation about acoustic pollution in deep seas and its impacts on cetaceans – *The Space Below* (2020) and film on the entanglements between international politics, resource exploitation and territorial ambitions – *Common Heritage* (2019), (Critchley, 2019); interactive documentary from field-based research in Lao (PDR), Bangladesh, Uganda, the United States and the UK, engaging with local expertise and indigenous knowledges about existing climatic disruptions – *Future Scenarios* (Dobrowolska & Ormond-Skeaping, 2019) and theatrical performance and installation on the economic and social consequences of climate changed futures – *We Know Not What We May Be* and *Factory of the Future* (Svendsen, 2019).

An introductory workshop took place at the Polar Museum Cambridge to investigate the idea of scenarios as a framework for rehearsing climate futures. An initial scenario was provided, 'The Tooth Puller', borrowed from Flaminio Scala's 1611 rare compendium of extant scenarios (Andrews, 2008); props included the text and deliberations of the Paris Agreement, as well as artefacts from the

Museum which had their own narratives, for example a Narwhal tusk or an Inuit hunting jacket; the roles were those of the actual, different climate researchers, participants in the workshop from different disciplines spanning arts and humanities, journalism, social sciences, physical sciences and economics; the scenario-making took place across a day of investigations and conversations, storytelling and impromptu performances. Other scenario workshops across the duration of the project involved the setting up of a similar skeletal framework: stories or scenarios were taken from news reports on climate change or crafted during the workshop, props were borrowed from what was to hand, roles were real or invented, responding to chance interventions, and speculative improvisations were encouraged over different timeframes. One of the artists on the residency, dramaturg and theatre-maker, Svendsen commented, 'In the context of climate change, imagining future scenarios within this framework allows a concretisation of ideas that brings us much closer to how it might feel *to act*. As rehearsal (rather than performance), scenario-building allows us to work out how changed conditions might affect us, and *who we might be* under those conditions. It also opens a space for imagining the effects not only of climate change but also the proposed mitigation or adaptation strategies' (Svendsen, 2019, emphasis in original). This scenario practice drew attention to different capacities and knowledges of adaptation in different parts of the world, including indigenous knowledges, along with differing conceptions of vulnerability and liveable futures. At the same time, locally contingent issues were considered the ground for relation to wider, international and global debates and decision making processes around climate change. The aim was for the rehearsal to open up the political and ethical space around climate change knowledges, rather than mobilising particular kinds of responses to it (Tyszczuk & Smith, 2017).

We Know Not What We May Be (WKNWWMB) and *Factory of the Future* were interactive and immersive installations by Metis, with creative director Svendsen and multiple collaborators, developed in part during the *Culture and Climate Change: Scenarios* residency. 'We know what we are but know not what we may be', Ophelia's words from Shakespeare's *Hamlet*, set the tone and motivation for *WKNWWM*, a week-long theatre installation at the Barbican, London in 2018: 'to work out who we might be in an alternative future' – one which had averted runaway climate change and created a more just society. The installation was structured around a series of spatialised timeframes in which participants, audience members, invited researchers and actors together generated different scenarios: the 2020s, 'a parallel near present' or 'factory of the future'; the 2040s, a period of 'commitment' or 'trial' for the new normal; and from there, the experimental 'collaboratory', which imagined how alternative futures might play out, or rather, created 'imagined spaces for rehearsing futures that do not involve the end of the world' (Svendsen 2019, p. 52). Scenarios were considered here 'a tacit invitation to imagine the change as already having happened, and to make the leap, imaginatively, into considering what it might be like to live under those conditions' (ibid. p. 50). A multiplicity of improvised performance modes – in interlocking and overlapping timescales from seven-minute performances to open ended conversations to elements produced over the full five days of installation, including an ad-hoc radio show, building of city models and accumulation of debris – explored different future conditions: 'there was never one single future at stake – no single

best possibility, and no prediction about how it might all turn out' (ibid. p. 51). The *Factory of the Future* was presented as an evolving installation at DOGA during the Oslo Architecture Triennale in 2019, whose theme was: *Enough: the Architecture of Degrowth*. Across the duration of the Triennale, it developed several of the scenario elements of *WKNWWMB* through a series of mapping workshops and improvised storytelling in different locations with local communities and a wide range of participants including artists, actors, planners, economists, architects and geographers. A multi-screen installation captured the stories generated in the workshops, in which the actors described the everyday lives of a multiplicity of characters in London and Oslo in a transformed future. The future cities had undergone radical economic and social change transitioning from fossil fuel dependency, to a new state where ecological flourishing was the primary goal for human (inter)activity (Svendsen 2019). The stories were about encountering the remnants of the high carbon culture and fossil-fuelled infrastructure of the early 21st century, and reflected on current and obsolete practices as well as the consequences and disruptions of energy transition. What was important was the shared sense of citizenship and collaborative expertise that emerged in response to a changing world, within the improvised storytelling. The imagined cities and citizens were unfinished stories, inviting further processes of imagining, narrating, crafting and improvising the future. Most importantly, the interactive installations and improvised performances were about *paying attention* to the emotional and affective aspects of practicing alternative futures. More than simply visions of future civic life, the improvisations led to the invention of provisional words, actions, objects, practices, moods, gestures and protocols that through rehearsal made the imagined worlds tangible. This creative dimension of improvisation, and the capacity to enact practices at odds with prior experience – things never said or done before – can help forge new modes of citizenship – or *who we might be* as future citizens in a transformed and disrupted world.

The challenge with these varied projects was to create conditions for *rehearsing the future otherwise*, not just during the events or workshops but also beyond the projects' immediate timeframes. The dominant use of scenario techniques in seeking to understand environmental transformations has tended to focus on envisaging plausible or preferable trajectories to climate-changed futures with seemingly viable, readily visualised storylines. Recourse to the dramaturgical dimensions of scenarios provided insights into the potential of scenarios as prompts to and support for the practice of *rehearsed improvisation* – a way of enabling processes of sense-making and meaning-making within the social contexts of climatic futures. This scenario practice involved not only imagination of what it would be like to inhabit and negotiate a different future but also working through the consequences of and responsibilities for transformed worlds. It included recognition of how social situations and climatic futures are 'performed' and how existing performative imaginations are not only enacted but have the capacity to be transformed. It thus acknowledged the shape-shifting, or mutability of situations. Thinking of scenarios rather as a framework for speculative improvisations allows the future to be both open *and* practiced. The ambition of these experiments in collective scenario-making was not to identify more plausible, probable or even more desirable accounts or visions of the future. Instead, the collaborative and improvised future imaginings, not only better

respected some of the characteristics of climate change, including its radical uncertainties, but offered insights into possible responses, responsibilities and actions. This calls up an improvisatory ethics, oriented to alternative habitable futures and necessarily rooted in collective and experimental endeavours. Scenarios understood as speculative improvisations can do much to inform futures yet to be made and they point to the need for practitioners –or *climate improvisers* – who have learned what embracing the messiness of the world demands. Put another way: these scenario practices are ‘rehearsals for change’. This is doubly so because the scenarios themselves change in the processes of their performative enactment, exchange, sharing and reflexive review.

This approach of speculative improvisations has resisted the scripting of situations – the spaces of rehearsal were rather experimental sites for the forging of provisional relationships that collectively tested, enacted and enabled imagination of alternative worlds. This mode of rehearsal preserves the potential for a plurality of engagement, making room for competing interpretations of future worlds. The collective scenarios thus invoke a provisionally constructed world – *a world in the making*, emerging from a distributed network of relations. They offer insights into how to think of future imaginings not as predictions, trajectories or projects, but as unfolding stories that have the capacity to be both transformative and transformed. It is important to acknowledge that the imaginative possibilities and adaptive strategies for future environments created now – in the space or impasse of the Anthropocene – are ongoing experiments, which are both precarious and provisional. For in conditions of radical uncertainty actions and responses need to be considered as experimentation rather than reliable solutions. *Collective scenarios* are thus not be about trying to pre-determine a future, but about providing a *rehearsal space* to explore the uncertainties and propositions concerning a future that is unknowable.

5. Discussion: Improvising for the unforeseen

As for speculation, I indeed take the word as related to a way of thinking which challenges business-as-usual explanatory frameworks. I take it, that is, as a mode of thought which endeavors to activate what might be possible against the safety of probability. Speculation comes from Latin – speculators were spies, or scouts, or guards on a watchtower – not a contemplative activity but one of the lookout, of resisting reassuring appearances, not in order to go “beyond appearances,” or to escape illusion, but because such appearances rely on the confidence that what has mattered will go on mattering in the same way, which is what makes probability calculus possible (Savransky & Stengers, 2018).

The Anthropocene speculative proposition has ushered in a reconsideration of speculative futures, in multitemporal, multiscalar and multispecies dimensions and a convergence of multiple fields of inquiry in the manner of ‘speculative fabulation’ (Haraway 2016), ‘speculative gestures’ (Debaise and Stengers, 2015), ‘speculative ethics’ (Puig de la Bellacasa, 2015), ‘speculative geophysics’ (Clark, 2012) and ‘speculative planetology’ (Clark & Szerszynski, 2021). The proposal here has been to reframe scenarios work as performative and speculative ‘rehearsal’. This discussion explores further the novel imaginative and conceptual stance with respect to scenarios for troubled climatic futures, that of *speculative improvisations*. The aim has been to develop more collective and improvisational

responses to climate futures as a way of working through the 'tension between the assumed predictability of the climatic future and the necessary openness and malleability of the social future' (Hulme, 2010). It is also about 'telling stories that matter', that have agency, and that might make a difference (Tyszczyk, 2018, Doucet & Frichot, 2018).

The research practice has been informed by speculative research and pragmatist philosophy (Stengers 2005, 2011, 2015; Wilkie et al, 2017, Haraway, 2016), and has drawn on improvisational theory and approaches in theatre and creative practices (eg. Born et al, 2017; Svendsen, 2017; Hallam and Ingold, 2007). This hybrid approach resonates with recent debates in social and cultural research and practice challenging the assumptions underlying current responses to global environmental change issues and seeking new paradigms for transformational social change (O'Brien, 2016). It advocates exploratory, risky, open ended, processual, curious, responsive and relational approaches, or 'meeting the universe halfway' (Barad, 2007). Speculation is understood here in relation to an improvisatory ethics, which, 'avoids consensus and pre-determined certainty and opens itself up to stopping processes, transforming ontological uncertainty and ambiguity into a resource' (cf. Tironi 2018; Wilkie et al., 2017). The interest here has been with how speculative thought and practices contribute to, and are active within, a world that is always 'in the making' (James [1907] 2011). Or as Whitehead put it, 'the business of speculation is to make thought creative of the future' (1958: 82). Savransky proposes that, 'speculation can be conceived as a wager on an unfinished present', but in the manner of an experiment, 'whose success is never guaranteed' (Savransky, 2017 p.26). Moreover, to speculate is to establish a rapport with futures yet to come, whereby thinking in the present and futures become responsive to each other (Savransky, 2017). It is this rapport with possible futures that can be approached through thinking in terms of speculative improvisations – an entangling of speculation and improvisation inherent in conditions of rehearsal. This draws on ideas of rehearsed improvisation, beyond its association with spontaneity, adaptive capacities or responsiveness in performance, and explores its relation to the speculative, to sense-making and to *paying attention* in conditions of precarity and uncertainty.

The word improvisation, has at its root the Latin word *improvisus*, meaning 'unforeseen' or 'unexpected' and is linked to *provisus*, the past participle of *providere*—'make preparation for' (OED). The intellectual history of the idea of improvisation goes back to Aristotle's exploration of *phronesis* – meaning ethical judgment or practical wisdom – as distinct from *techne*, the more rule-governed mode of practical reasoning. '*Phronesis* is reason at home in the anarchy of complex systems—reason that shows itself in timeliness, improvisation, and a gift for nuance rather than in the rigorous duplication of results' (Bruns, 2002, p. 48). In terms of futures, ideas of *phronesis* have informed scenario analysis grounded in 'phronetic social inquiry' with a view to 'making scenario interventions matter' (Cairns & Wright, 2018). Practical wisdom has a role to play, in 'situations of irreducible uncertainty', when taking responsibility for futures (Arnaldi et al., 2020). *Phronesis* is understood as the embodied, open-ended exercise of engaged judgment (Nussbaum, 1999), concerned with a 'landscape of possibilities' (Shotter & Tsoukas, 2014). *Phronesis* is the agility to respond to 'unforeseen' or unanticipated situations (Tyszczyk, 2011). Moreover, this bears close relation to what

is meant by 'speculating', in the sense of unravelling the unforeseen and intriguing dimensions of reality. Nussbaum notes that for both Aristotle and the American pragmatist William James, 'the metaphor of theatrical improvisation ... is a favorite... image for the activity of practical wisdom' (1990; p. 94). She continues, 'the salient difference between acting from a script and improvising is that one has to be not less but far *more* keenly attentive to what is given by the other actors and by the situation (ibid. emphasis in original). In such an activity, there are no set rules; practical wisdom, 'uses rules only as summaries and guides; it must itself be flexible, ready for surprise, prepared to see, resourceful at improvisation' (Nussbaum, 2001; p. 305). *Phronesis* is understood here as a practice of improvisatory ethics that lends itself to situations without precedent, where there is 'no script for action' (Tyszczyk, 2019). Moreover, the practice of *phronesis* is always caught up in the specificity of human lives, in relationships and attachments that are always at risk and open to vulnerabilities and disruptions; it is a wisdom that is characterized by improvisation and a 'refined perception of the contingencies of a particular situation' (Nussbaum, 2001; p. 318). Nussbaum further observes that perhaps this can be done, 'only in a form that itself implies that life contains significant surprises, that our task as agents, is to live as good characters in a good story do, caring about what happens, resourcefully confronting each new thing' (1990, p. 304). In other words, such careful attention to the present and possible futures, requires recourse to storytelling. In turn, the storytelling incites the improvisatory and speculative dimensions of rehearsal, inviting both *paying attention* and working out *what next*, in conditions of uncertainty.

The practice of speculative and improvisational storytelling is thus akin to the 'lure of possibilities' (Wilkie et al 2017). A 'lure' for feeling *the world that might be*, is what Whitehead calls a 'proposition'. (Whitehead, 1978:184; Stengers, 2011). Propositions concern the narrative potential in the capacity to encounter possibility or feel otherwise, and are further described as 'tales that perhaps might be told about particular actualities' (256). Scenarios, therefore, understood as propositions, can mediate between potentiality and actuality. Likewise, speculative improvisations concerning uncertain climate futures are not directions or procedures for acting. Rather they can prompt an intensity of shared experience, which recognises that things could be otherwise, promotes an ethics of responsibility, explores alternative possibilities, and affirms what matters in the here and now. Through an entangling of speculation and improvisation, speculative improvisations indicate an exchange between the performative and speculative characterised as 'rehearsal'. The approach is performative in so far as it is intended to 'prompt' emergent situations that can problematise existing practices, and it is speculative in that it opens up the prospective. The rehearsal is both an acting in, and a looking out for, the world. This approach to rehearsing or improvising climate futures leaves room for the troubled, unscripted, surprising, marginalised, unanticipated and contested. Speculative improvisations take place in the diegetic and mimetic space of civic rehearsal, with full acknowledgement however, that this is not a space that offers solutions and reassurances about the future. Instead, rehearsal is understood as a way of practicing the skills, capacities, responses and relations that a range of conflicting possibilities and alternative futures might require in times of urgency and precarity. In other words, this is about *improvising for the unforeseen*.

6. Conclusion: Rehearsing climate futures

'We have a desperate need for other stories, not fairy tales in which everything is possible for the pure of heart, courageous souls, or the reuniting of goodwills, but stories recounting how situations can be transformed when thinking they can be, achieved together by those who undergo them' (Stengers, 2015, 132).

The *Collective Scenarios* project is concerned with the transformative potential of the tales we tell, 'in catastrophic times' and how those stories are made in collaboration, *achieved together*, in spaces of civic rehearsal, and in modes of speculative improvisation. These rehearsals are considered to contribute to the crafting of a 'problematic togetherness', that Stengers associated with the challenges of cosmopolitics (2002: 248). Across the research, arts and public engagement dimensions of the project, scenarios have been explored as a provisional and anticipatory framework for rehearsing the climatic and societal transformations augured by the Anthropocene and, at the same time, for reconfiguring imagination of the future. This way of working with scenarios as rehearsal (that is, both speculative and performative), is simultaneously technical, systemic, situated, cultural and enacted. Climate change does not have solutions; nor are there any reliable guides for how to act or strategies for the times ahead; predictability is moot, while chaotic impacts and disruptions are inevitable. Responses need to be not just technological, but social and political, and require innovations in how we imagine futures, organise just societies, value things and relate to others. All of this needs to be learnt again, at appropriate pace and scale. The project has explored the potential of scenarios as a prompt for *rehearsal*—or *speculative improvisations*—in order to work through issues around climate change as well as responses and responsibilities, and make the shifting capacities, skills, emotions and actions of climate improvisers matter. Speculative improvisations are generated in troubled times, in situated space, with porous sociabilities and dynamic relations. They are nourished by the stories and experiences generated by diverse participants. No version is authoritative and the stories are never finished. They engage with contingency, difference and uncertainty rather than trying to produce certainty or corral the future by restricting it to something desirable, plausible and manageable.

Scenario-making in modes of speculative improvisation has recognised both the diversity and contested nature of climate change knowledges. It has generated stories that put complex accountabilities, unruly temporalities and open-ended futures in play. These were indicative of a way of responding creatively to change that can cope with past and present disturbances and disagreements and the multiple and contested agencies of a dynamic planet. However, speculative improvisations were not simply a strategy for addressing a given complex reality or for transforming it under a predefined imperative. Instead they worked to evoke a field of as yet unknown possibilities about living with a changing climate. This mode of rehearsing climate futures made space for people, entities and visions that had been forgotten, ignored or undervalued to be recognized, promoting a commitment to the unexpected and recalcitrant. It generated possible scenarios of intervention that relied on a thinking-and doing-together over multiple scales and in multiple temporalities. Imagining possible futures is an activity of trial and error of to-ing and fro-ing, of constant revision and

improvisation, of learning and re-learning. In other words, learning to improvise inevitably involves rehearsal of improvisation. The generosity of thinking-and-doing-together in speculative improvisation involves a 'relay', a 'back and forth' (Stengers, 2011): 'in passion and action, detachment and attachment, this is what I call cultivating response-ability – the capacity to respond – that is also collective knowing and doing, an ecology of practices' (Haraway 2016).

Collective scenarios have been considered here as the anticipatory framework through which climate research that is future-oriented, multidisciplinary, reflexive, collaborative, in public and with publics is both conducted and enabled. The collective scenario-making promoted spaces of collaborative research and rehearsal. It sought to provide a supportive setting for diverse participants in the research practice that listened to varied perspectives, allowed for plural, divergent responses to climate change issues and encouraged emergent practices of civic – social, political, emotional, cultural and infrastructural – transformation. It is in this sense that rehearsal of climate futures through speculative improvisations can attend to 'matters of care' (Puig de la Bellacasa, 2017). Whereby improvisation is practiced as the 'exercise of care' (Ingold and Hallam 2007), and where care is understood as a relational and affective activity with the capacities to create new worlds – an 'ethico-affective everyday practical *doing* that engages with the inescapable troubles of interdependent existences' (Puig de la Bellacasa, 2012, p. 199, emphasis in the original). It is about honing our acumen for collective and just responses in the disjointed and disrupted times of the Anthropocene. In increasingly precarious conditions, this is also about ensuring that incitements of hope and wonder, as well as acts of humility, hospitality and generosity are included among the improvised adjustments and collective practices that grapple with changing and turbulent planetary futures (Clark & Szerszynski, 2021; 185 –186). Scenarios, when considered as making room for anticipatory, improvised performance or rehearsal of climate futures, invite *paying attention* to the habitable thresholds of a dynamic and altered Earth.

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