Table S1: Table detailing the four case study projects used in this analysis in terms of project descriptions, project process, project outcome(s), and limitations

Project name	Seeds of Good Anthropocenes	Museums of the Future Now	AKWA	Radical Ocean Futures
Project description	The Seeds of Good Anthropocenes project recognises that dramatic social changes must be coupled to technological progress in order to create a future that meets widely held aspirations for equitable human development without undermining the capacity of ecosystems to support future human well-being. However, the scientific community has produced very few visions of more desirable, just, and sustainable future outcomes for society and nature, or how to achieve them. This project aims to fill this gap using a seeds-based scenario approach that responds to the need to avoid creating purely dystopian, utopian or business-as-usual futures, and the need to imagine futures that are at once truly novel trajectories and future developments, as well as concrete enough to inspire practical action. It also aims to create a scenario approach that is better at imagining emergent change.	Originally developed during a Creative Futures project that was concerned with the complexities of food production, The Museums of the Future Now are an evolving series of speculative artworks and workshops designed to engage people in an exploration of the environmental, social and economic factors that are combined to create the complex challenges that we face as a society. The Museum is based on the idea that complex socio-economic systems can only adapt properly through social learning and memory. The realisation of any one of these futures would require a shift in culture - the way we communicate about the world and how we see ourselves in it. The Museums are both a method and an event. They have been carefully designed to be accessible, inclusive and totally respectful of different points of view and are co-curated with subject domain experts, creating small 'collections' that define the theme for each Museum.	The AKWA project started in 2011 in Madrid (Spain) by the artistic collective CACTUS when the privatization of water in Madrid was at stake. AKWA is a root of the word water (*agua* in Spanish) in prehistoric Indo-European languages, which is the main theme of the play. It was a co-creative process aimed to imagine a fictional future world in which usable water has become very limited and mainly controlled by a few corporations. After a year and a half of experimentation, the work of envisioning such a future was merged into a 90 minutes play. AKWA is set in Spain in 2026, ten years after the last drop of water came out of the tap, with the international launch of the documentary "AKWA" by a production company. Through aesthetics scenes, music and video sketches, the play explores how a community might experience life and remember (or not) a world in which water was freely available and publicly owned. It introduces different stakeholders involved in the conflict, e.g., an activist, the senior manager of the H2Q (the	Radical Ocean Futures is a science fiction prototyping approach to imagining the future oceans. It operates on the assumption that new narratives are needed in order to help move policy towards being able to secure a more sustainable future for the world's marine fisheries and oceans and that these imagined futures can help guide efforts to transform towards more sustainable oceans. The project blends art and science and merges scientific fact with creative speculation. Scientific scenarios, in their attempts to engage people and drive action towards transformation must contend with the fact that people are surrounded by compelling narratives. A drily written, unimaginative, and rigid scenario cannot hope to connect to people even if the knowledge the scenarios contain is critical to the planet's future. The purpose of this project is to explore tools that can help us to think creatively and imaginatively about our future oceans and assess how unexpected changes, along with human responses to those changes, may

			company in charge of the whole distribution of a water substitute) or the famous Goti, the last drop of water in the Earth.	play out in a complex world that is, at its heart, surprising.
Project process	The team is collecting existing examples of good practice, innovations and experiments ("seeds") that show potential to grow or spread, and to use these data to understand what people want (key characteristics, underlying values) from positive futures. "Seeds" are existing initiatives that are not widespread or well-known. They can be social initiatives, new technologies, economic tools, or social-ecological projects, or organisations, movements or new ways of acting that someone believes are making a substantial contribution towards creating a future that is just, prosperous, and sustainable. The project is experimenting with a range of scenario creation methods using seeds in a number of user contexts, for different purposes (analysis, learning, stimulating innovation and action). The commonality among these methods is that they use the combination of different, often contrasting seeds and other scenario elements to create	Using narratives to tease out the differences between different worlds, the Museum experience is triggered by an unexplained event: the appearance of a mysterious object in a Museum. In small groups participants, including researchers, artists and practitioners, are asked to create a narrative around this mysterious object, which has been created by artists in line with the topic of the scenario process (e.g. food, climate). Participants received information on where and when the object was initially found and a driver of change from which to begin their narrative. Participants are asked to talk from the future about a previous future (e.g. they are talking in 2100 about 2050 for instance). The exercise assumes that there are an infinite number of possible futures that coexist in the conditions of today and we need to speculate to release them. Participants speculate the provenance of the object and the process of telling the story about such object encourages them to explore possible futures. The	By incorporating the theatrical techniques of Boal´s Theatre of the Oppressed as well as dance, music and even experiencing how to live for three days without water, the creation of AKWA was a complex process of envisioning a fictional world without usable water. This process aimed to understand the complex dynamics on water-related issues, making water scarcity something personal by imagining and experiencing how a future without water could be on a day-to-day basis. The process of creation of AKWA included periods of reflection, external feedback and adaptation, as the project evolved in a nonlinear practice. It was built under the principles of believing in creativity, trusting the collective process and embracing all kind of ideas. Additionally, sharing the leadership, by working with a role-changing dynamic, is another of the signatures of CACTUS methodology, aimed to foster co-learning and embrace diversity. Through the personal experiences of the actors, audiences are able to	The narrative scenarios developed as part of the Radical Ocean Futures project employ the Science Fiction Prototyping' method developed by Brian David Johnson in his role as a futurist at the Intel Corporation. Science Fiction Prototypes are short fictional works that are based on scientific fact and crafted to start a conversation about the implications of technology. Each of the four narrative scenarios or 'science fiction' prototypes of the future ocean were built from a robust foundation of scientific and related subject-area knowledge, including: 1) Technological frontiers 2) Marine ecology, ocean and fisheries science 3) The global fishing and seafood industry 4) Marine management, governance and socio-economic shifts. The Radical Ocean Futures project goes beyond the creation of narratives. Each narrative is supported by both a visual and a musical interpretation to allow multiple entry points and stimulate

	novel, yet concrete futures. To put this into practice, the team convened a diverse set of people from across southern Africa to take part in a creative participatory scenario process. Participants included artists, social entrepreneurs, researchers and policymakers who were taken through a three days visioning process that was more science fiction than science. The scenario process was designed to maximise difference from the present, building from a method developed by the Mānoa School of foresight, and called the "Mānoa mash-up method". Over three days, the four groups underwent a facilitated process whereby each group built a desirable vision for southern Africa that was set in the far future, but based on positive initiatives that exist now, but are marginal.	Museum thus uses storytelling to tease out the differences between worlds and worldviews. The stories are detailed with an unexpected internal consistency and they contribute to a growing portfolio of imaginary futures. The use of a tangible object allows participants to openly and creatively explore fears and desires related to the future. The identification of a space, a time and a main driver guide the participants in order to focus the initial discussion. However, the combination of these elements is not decided by the facilitators. In fact, as in a game, participants are inventing the storyboard starting by the elements they randomly picked from a menu. When the groups finish their activity, they share their narratives in the Museum.	emotionally connect with the issue, as well as participate in finding creative solutions by interacting with the actors at the end of the performance. These interactions with the audiences have varied according to the needs of the community and the kind of space available. During the first performances the audience was invited to take part at the end by asking questions and discussing the characters' different perspectives on water concerns. This allowed members of the public, for example, to ask the politician character questions about the privatization of water in the city and, to some extent, rehearse a real-life topical issue. In later performances, to improve the engagement with the audiences, a "talking tables" style of interaction was introduced at the end of the performance whereby participants could move between different topic tables and discuss different water-related issues. Additionally, concerns around water changed from its privatization to water pollution from fracking, an emergent international concern relevant in many Spanish areas. From its launch in 2012, AKWA has targeted several audiences: as a part of workshops, trainings and meetings for ecologists and social NGOs; and for general audiences, not necessarily interested in environmental issues, in city	the imagination, these supporting elements were created in order to engage diverse publics in the future of oceans and create an emotional connection to marine fisheries and oceans, which often seem very abstract and detached from people's everyday lives and to which people have difficulty relating. In this project, the choice to collaborate with a world-renowned conceptual artist and illustrator and a scientist singer-songwriter was done in order to try to cut through cultural white noise and offer an entry point for policymakers and others to pay attention, be moved and engage with the important set of questions around how to transform to more sustainable human use of the oceans.

			cultural festivals or rural settings.	
Project outcomes	The stories that emerged were as diverse as the people who were gathered for the process. The four narratives that emerged were: Rhiz(H)ome, Radical Translocal, Post Exodus and Demos 42 Ubuntunse. Unlike most other scenario planning exercises, this process was not specifically designed to come up with four distinct storylines that each fit neatly into one quadrant along two axes of divergence; the emphasis was rather on allowing for emergence and creativity, whilst anchoring the storylines in the Seeds initiatives. Commonalities between the scenarios included "decentralization and a strong citizenry", "connectedness and empathy", "post-consumerism", "eco-centric values." However, while the scenarios shared some common themes, divergent viewpoints and risks also evolved in the four storylines. For example, one of the scenarios, Post Exodus, had a time of great conflict and collapse built into its storyline, which ultimately lead to the exodus of the elite from the	The final outcome is a series of speculative narrative of futures that may be the starting point for further discussion among the stakeholders about desirability and plausibility of certain futures. The Museums use a systems approach, looking for emergent patterns in the stories that 'visitors' tell each other about how they think about the future. The patterns are useful in different ways: first, they help shed more light on how we understand the present; second, they can provide a platform for meaningful dialogue (knowledge exchange) between different publics and the experts who curated a particular collection; and third, they facilitate more holistic appraisals of policy options by providing deeper insight into socio-political issues, concerns and aspirations. In such a project, sustainability is treated as an emergent property of processes of discussion and negotiation about what kind of world we want to live in. Art and artefacts are analysed in this case as attractive and useful tools to engage wider sections of society, as well as to invite feelings and	First, this project has demonstrated how theatre can be a means for audiences to evolve from consumers of art to individuals who can embrace art to question and discuss their social and ecological environments. Second, AKWA is able to target a variety of audiences, including those who are not usually engaged in environmental issues, but are simply interested in the play as a source of entertainment. In rural contexts, for example, AKWA was a community event and source of intrigue that drew a mixed audience of all ages, professions and perspectives. Third, this play is able to bring water-related issues to the stage in ways that all kinds of audiences can relate and respond to and be used as a starting point to trigger discussion. It enables people to reflect on their own situations, to look critically at the world in which they live and the factors that influence their lives, to seek possible solutions. Finally, audiences' active involvement during the presentations, their continued suggestions for improving the play, and the multiple calls for AKWA –such that it is still being presented in different settings- has	At the heart of the project are four short 'Radical Ocean Futures.' These are distinct, scientifically grounded, science-fiction narratives of the future oceans. Each narrative is supported by both a visual and a musical interpretation to allow multiple entry points to the science of the future ocean and to stimulate the imagination. Since the initiation of the project there have been a number of specific, interrelated and ongoing outcomes of the project, which illustrate how this imaginative approach has been able to engage people in understanding human-environment relationships across a series of complex futures which blend utopian and dystopian elements. A European Union Member of Parliament has engaged with the project and is using the images and the narratives as a way to provoke engage other policymakers and young people engaged in environmental politics to think differently and more imaginatively about the future oceans and what is at stake. The physical versions of the Ocean Futures Artwork were

	planet. The groups dealt with this challenge in different ways, but it was generally agreed that the inclusion of artists in the groups helped to unleash the creative thinking of the other groups in overcoming challenges and taking advantage of opportunities extant in their futures.	reflections about the future from the public. Thus, the exploration through the artistic object helps to move from thinking to freely exploring the emotions and the symbolism inspired by the characteristics of the object. The exploration of desires, inspirations, fears, and anxieties varies among the groups, making possible new emergent patterns for the future.	demonstrated the usefulness of theatre techniques to the social-environmental organizations and their target audiences.	exhibited in the delegates entrance to the General Assembly during the first ever United Nations Oceans conference. This included an opportunity to discuss the future oceans with the President of the U.N general assembly and a number of national delegates directly working on oceans policy at the international level. The images garnered a lot of attention and provided an entry point as delegates spent time viewing the images and then began asking questions. This provided an opportunity to connect to the narratives and the science behind them.
Limitations	One of the biggest limiting factors was getting a diversely representative set of participants, as this was limited by the networks of the organisers. Being limited to a small group of specifically chosen individuals limits the ability of the process to impact broader society directly. There is also a less direct link to policy-making as the emphasis of the workshop was to pilot a new creative method for scenario development rather than to come up with specific policy outcomes.	This process is also limited in its inclusivity to those willing to partake in such an exercise. Capturing the implications of the event for those not at the event is also a limiting factors, especially when trying to make them relevant to policy makers.	The one-off nature of a performance makes it difficult to identify specific outcomes and/or its transformative potential, for example, whether the discussion groups formed after the play will work together to address the problems that they identified. Also, although these performances foster inclusion of diverse knowledge and values systems, they risk having a bias towards engaging only the most active participants. Thus, this kind of embodied methodology may have some difficulties in engaging with audiences expecting a passive role or a traditional way of communicating ideas.	This project was not at all participatory and therefore the scenarios created are not representative of the diverse group of stakeholders invested in the future of the oceans. The generation of the scenarios were also limited by the subjectivities, positionality and inherent biases of the authorship team. Another challenge is that, for as many people who are engaged by a science fiction approach to the future oceans, others may consider science fiction to be too disconnected from everyday reality and therefore they may not connect with the scenarios. Finally, it may be that people engage with

				the images and the music and the storytelling but not with the scientific core of the scenarios therefore meaning that the project does not in fact achieve its stated aims.
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