The Subject of Rosi Braidotti

Politics and Concepts

Edited by
Bolette Blaagaard and Iris van der Tuin

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The Future of Scenarios: State Science Fiction

Peter Galison

Abstract

In the heat of the Cold War, military planners began creating quasi-fictional episodes—scenarios—to explore the way nuclear war might begin and escalate, or be blocked. "The Future of Scenarios" sketches this history, from the first apocalyptic war games to the State science fiction that governed nuclear matters, even as the radiological detritus was buried deep underground. "What if" became a mantra of prognostication, when Congress required the Waste Isolation Pilot Plant in New Mexico to imagine scenarios of inadvertent human intrusion—up to 10,000 years in the future.

Keywords

Future, futurology, 10,000 years, State science fiction, scenario, nuclear, Waste Isolation Pilot Plant, Kahn, repository.

The first atomic war left American generals riveted on the possibility of future conflicts. Fresh from World War II, American and British scientists and engineers extended high-tech weapons, building on what they had begun during the conflict: sophisticated radar, electronic warfare, and novel encryption methods, alongside faster and bigger jets. The Nazis had developed their own "miracle weapons," even more sophisticated jets and cruise missiles, not to speak of the ballistic rockets that they had rained down on London, Antwerp, and Liège, killing thousands. Before the peace treaty dried, the Allies and Soviets began snatching up German scientists, engineers and weapons. In quick succession, American military and corporate efforts produced and deployed refined versions of the new war technology.

For the Allies, this massive new weapons complex fundamentally reconfigured the university–industrial–military complex, expanding research under contract to the military. Even the nuclear weapons plants were "GOCO", Government-Owned Company-Operated, an arrangement that survived, in an ever-larger form, into the

twenty-first century. The dawn of the Cold War in 1947 produced a myriad of new studies on the future of warfare—but it was the Korean conflict of 1950–1953 that launched a vast, never-to-be-demobilized armed force. In this state of permanent alert, planning continued unbroken—the Commander of the US Air Force, Henry H. (Happ) Arnold, launched "Project Rand" as a way of forecasting the character of future intercontinental war. The project became a part of Douglas Aircraft and, not long after, a hugely influential, nonprofit think tank. One of the Rand's first reports was "Preliminary Design of an Experimental World-Circling Spaceship."[1] Though its title sounds like science fiction, the preliminary design morphed, over the next ten years, into a major Air Force effort to develop reconnaissance satellites.

Planning documents took many forms—from qualitative proposals to mathematical economic forecasts. But there figured among this new literature of future war, a novel form of literature that came to be known as the *scenario*, located somewhere between a story outline and ever more sophisticated role-playing war games. Developed and popularized by the defense intellectual Herman Kahn (perhaps the most salient model for Stanley Kubrick's Dr Strangelove), the scenario emerged from war gaming to become a staple of the new futurism. Celebrated and reviled for his view that nuclear war was "survivable," Kahn insisted to politicians, civil defense officials, and military leaders that they could, indeed must, think through what might actually happen after thermonuclear war—even if several hundred million people lay dead.[2]

In his 1962 book, *Thinking the Unthinkable,* Kahn outlined what he meant by the novel (or at least newly deployed) concept: "A scenario results from an attempt to describe in more or less detail some hypothetical sequence of events." It could emphasize some "future history" process of armed escalation, of the spread of war, or its contraction. Scenarios could investigate in short, narrative form limited war or, for that matter, the termination of a nuclear exchange. "The scenario is particularly suited to dealing with several aspects of a problem more or less simultaneously [helping us] get a feel for events and the branching points dependent upon critical choices."[3]

The reason scenarios were required in this most destructive of imagined futures was that we, in fact, had little to go on from lived history. Kahn insisted, "Thermonuclear wars are not only unpleasant events they are, fortunately, unexperienced events, and the crises which threaten such wars are almost equally unexperienced." As Kahn saw them, scenarios carried five advantages over other forms of prognostication[4]:

1. Scenarios call certain features of the world to attention and dramatize the possibilities of how these elements of reality may play out, giving military and political leaders a chance to plan for them.
2. Scenarios force the analyst to deal with details and the interactive dynamics that are all too often lost when possible futures are treated purely in abstraction.
3. Scenarios treat the complex interaction of psychological, social, political, and military–political personalities and, as such, capture what a purely mathematical or abstract treatment could not.
4. Scenarios force into view principles and questions that can too easily be ignored in the complex and controversial world.

5. Finally, scenarios allow the planner to think through the alternative outcomes of past real and present crises, such as Suez, Lebanon, or Berlin.

Reasoning could become a kind of role—or game—playing, the construction of a kind of summary story. Kahn conjures, for example, a scenario that could lead the Soviets to launch a pre-emptive thermonuclear attack on the Unites States, based on a "calculated win." But Kahn says there are imponderables—difficulties that might arise as the Kremlin moved toward the decisive flick of the switch. Here is Kahn imagining Premier Nikita Khrushchev's (K) imaginary dialogue with one of his generals (G), as they ponder the fate of the long- and ever-contested Ukrainians:

> G: So you can see that if you press these three hundred buttons there is a good chance of our getting away scot-free, a small chance of our suffering moderate damage, and no chance at all of our suffering as much damage as we suffered in World War II.
>
> K: The Americans are on a fifteen-minute alert. If they have any spies or even if we have a defector we will be destroyed. . . .
>
> G: Don't worry. I know that some Ukrainians are still harboring unjustified grievances against you. There are no Ukrainians in this force . . . every officer is married and has children, and we have told these officers that if they fire early, not only will they be shot but their families will be severely punished. . . .
>
> K: I still don't like it. . . . I will pick up the phone and say "Fire!" The officer will reply, "What did you say?" I will repeat, "Fire!" He will say, "There seems to be a bad connection. I keep hearing the word "Fire." I will say, "if you don't fire I will have you boiled in oil." He will say, "I *heard you* that time. Don't fire! Thank you very much!"[5]

Here we have three features of the nuclear scenario: first, an apocalyptic imaginary surrounding the whole, giving the mini-narrative a frisson of terror; second, a specificity of reference—here manifested through a colloquial dialogue and in the case of Khrushchev; and third, a caricatural sketch of reality, an extension of some element of the world into its asymptotic extreme. Such scenarios extend easily into a role-playing game. The scenario is described and people then act out their parts in a kind of improvisatory theater. Here is an example: "The incident is the explosion of a nuclear weapon at a S[trategic] A[ir] C[ommand] base near Mobile, Alabama, killing 50,000 people. In addition to estimates of destruction and casualties, the President receives the following information: the location of the explosion is consistent with accident or sabotage; there was only a slight likelihood that the explosion was an enemy bomb. . ." And the officers and politicians would be off to the races, imagining how they would respond. Once again—apocalypse, specificity, caricature.[6]

Rewriting history into scenarios became another way to "practice" dealing with the endless crisis of the Cold War. Kahn provided his readers with ten such scenarios ranging from ancient to contemporary times—even Biblical and fictional episodes could be transmuted into scenarios.

1. Armageddon: It could be the final battle between good and evil—presaging the end of the world;
2. Camlann: King Arthur's final battle with Mordred could be presented, Kahn wrote, as a legendary inquiry into the accidental start of major conflict;
3. The European peace from 1871 to 1914: It illustrated how the balance of power could fail in a hugely unlikely way;
4. Pearl Harbor: It could be played out in scenario form to impress again and again the danger and terror of a surprise attack;
5. Munich: This iconic episode of catastrophic appeasement could be rehearsed as an episode;
6. Emil Hácha: The Czech leader could serve as a cautionary tale about the ominous possibility of blackmail as it was Hacha who took the presidency of his partitioned country in 1938, and served under Hitler's occupation of the country;
7. Rotterdam: bombed flat by the Germans early in World War II and formed an object lesson of an object lesson, a demonstration by mass murder of what would happen to the defiant;
8. Berlin: Here the crisis, blockade, and airlift could, by contrast, serve as a model of what it meant *not* to back down in the face of retaliatory threat;
9. Korea: For Kahn and so many of his contemporaries, this was an exemplary instance of a "right war," at the "right time," in the "right place";
10. Reichstag Fire: This can be set as a warning about how a minor incident could be used for major reprisals.[7]

The Berlin Blockade, Armageddon, and the Battle of Camlann form a heady mix, but one that no doubt appeared even more relevant after the nuclear-tipped Cuban missile crisis of October 1962. This, in turn, powered more Kahn scenarios—unintentional, tactical, mutually provocative "what ifs" that spiraled from an East German event to a Cuban standoff.[8] Kahn's scenario building between fact and fiction caught on—and was used by some of the largest corporations in the world. Pierre Wack, at Royal Dutch Shell, was well aware of Kahn's cataclysmic scenarios and began adapting this kind of thinking to the oil production and consumption in the late 1960s and early 1970s. Shell futurists began writing scenarios warning that oil oversupply might well switch to undersupply—putting the Arabian Gulf into a position of unprecedented power as they bolstered their hand by limiting production.[9]

Over the years, Shell expanded its cadre of future writers and came, more and more, to integrate its scenarists' creations into managerial decision making. In 2014, for example, anyone could click through to see a film illustrating two alternative scenarios related to the future of energy, both running to 2050. One is called "Scramble" (the bad, reactive future) and the other, "Blueprints" (the good, prudential future). In the cautionary Scramble, people eventually insist on energy efficiency, and the government "finally take[s] steps," leading to "knee-jerk" legislation with poorly thought-out policy. Construction companies are unable to adapt quickly enough to the newly imposed regulations, and only a paltry 15 percent cut in energy can be effected. Under "Blueprints," the way forward is deliberate and systematic, with 60 percent of

energy produced by renewables. Our world gets a much more dramatic, world-saving 26 percent reduction in energy use.[10]

By the late 1960s, futurists had woven themselves deep into the industrial forecasting world, under contract not just to Shell Oil, but also to many of the world's biggest corporations, to the military, to the National Aeronautics and Space Administration, and to the nuclear war planners. Plans branched far out into the future, a decade, even four or five decades from the mid-1960s, to speculate what the world of conflict and commerce might be like in the year 2000.

But lurking within the nuclear world was another kind of problem. While the United States and Russia were fielding 30,000 or so warheads, while every branch of service clamored for thousands more, production of plutonium became a national priority of the first rank. The Atomic Energy Commission had built huge "canyons" of reinforced cement and steel at the Hanford Reach in Washington State and at the Savannah River Site in South Carolina in which they would dump exposed nuclear fuel rods in vats of boiling nitric acid. Inside reactors, the uranium rods had been bombarded with neutrons—some split nuclei, others joined the uranium nuclei and transformed them into plutonium. Dissolved in acid, the resulting sludge could be chemically treated, and the plutonium extracted to make bombs. The rest of the sludge was a witch's brew of isotopes from across the periodic table, with half-lives ranging from seconds to hundreds of millions of years, with, of course, some residual plutonium as well. What was to be done with all this waste? Plutonium, carcinogenic if breathed, even in microgram quantities, has a half-life of 24,100 years. This waste and other kinds, too, would have to be stored essentially forever.

By 1957, endorsed by the National Academy of Sciences, a scientific, if not a political, consensus was growing that all this weapons waste—not to speak of civilian nuclear power waste—should be buried in a deep, mined repository, preferably in salt that would creep around the interred material, seal it in against outward flow, and encase it for the very long term. After decades of political wrangling and backroom deals, after ferocious politicking, the Department of Energy (DOE) chose a site in southeast New Mexico, about 26 miles from Carlsbad. But before the waste site could open, Congress demanded, and the Environmental Protection Agency (EPA) specified, that the DOE had to have a plan that would keep humans from inadvertently stumbling into the waste. Not surprisingly, the period of warning had to be commensurate with the threat, the way the EPA handled most dangerous material. But unlike the danger from many chemicals that broke down over time, the threat from plutonium and other transuranic waste was to be measured in astonishingly long times. The EPA settled on the period of 10,000 years, long enough to get a jump on the problem, during which the geology should have been fairly stable, and short enough (so to speak) to be commensurate with recorded human history.

So if one wanted to talk to the very far future, the 10,000-year future, whom would one call? The DOE, through its Sandia nuclear weapons laboratory, located on the Kirtland Air Force Base near Albuquerque, New Mexico, pulled in futurists such as Theodore J. Gordon. Gordon had sketched far-future, inter-planetary projects for NASA (and been chief engineer on the upper stage of the Saturn V), had worked for the Rand Corporation on future studies, and used his own company, The Futures

Group, to consult for a wide range of corporations, some of which figured as the largest in the world. He brought in other futurists, and the DOE added others from across the disciplinary map, to imagine what kinds of situations might lead to penetration of the waste site.

Gordon and his "Boston Group"—including the Yale sociologist and futurist Wendell Bell—began writing scenarios of the future in which people, hundreds of generations in the future, would penetrate the site. If they could anticipate the modes of penetration, then perhaps the warning monument people could block those scenarios from coming to pass. The monument makers saw their task as having four imperatives: the monument would have to survive, it would have to be understood, it would need to be recognized as a warning, and the warning would have to be heeded.

Schemes proliferated to increase the odds that the monument would survive—redundancy, burial of small tablets, employment of massive granite monuments with deep markings, to name just a few. So the scenarists concentrated many of their imaginings on scenarios where the monument would survive and was even understood—but it was not believed.

Bell, the sociologist, and chief author of many of the key scenarios, had been a Navy pilot at the tail end of World War II, stationed in the Pacific. Horrified by the brutality of occupation that he witnessed, he turned, after graduate school, to consulting with emerging postcolonial states in the Caribbean and elsewhere as they began to plan their futures. At Yale, during the 1960s, he played an active role in establishing an Afro-American program of study, and in opening the university to women. Bell and Gordon's sympathy for social liberalization did not extend to epistemic challenges to science. They and the other members of their group hunted around for people—in their 1989 present—who, they believed, rejected scientific authority for one reason or another.

Here is how the Waste Isolation Pilot Plant (WIPP) scenarists outlined their task: "What social conditions and individual or group motivation might result in penetration into the WIPP repository. . .? Let all things be considered so that the marker teams can comprehensively devise ways of marking. . . . Thinking the unthinkable is part of our task." The scenarios went back to Kahn. Even their phrase, "thinking the unthinkable" echoed back to nuclear war fighting scenarios—it was, as we have seen, the title of one of Kahn's most discussed books, the very one in which he first popularized the idea of scenario writing. And, again like Kahn, the authors stressed that their musings were perhaps not so far from the currently observable trends and tendencies. "The scenarios, however, may be less unthinkable than they first appear. Each is based on developments for which precursors already exist, from feminist theory and post- (and anti-) positivist beliefs to rudimentary artificial intelligence, computer 'viruses,' and space travel. The references given are genuine and point to such precursors."[11]

The Boston Group's "point scenarios" were not the only ones, nor were such stories the only form of prognostication—there were also quantitative simulations, for example. But, taken together, the Boston team's ten stories, set in the Southwest from Anno Domini 2091 to the 13th millennium, form a kind of overarching sketch of the kind of anxieties troubling the state-sponsored futurists as they surveyed the cultural landscape. Each built on current trends and rocketed them out to a wild asymptotic

limit. Every one (or rather, all but one) ended in the catastrophic release of radiation. And each bore a kind of narrative particularity: "these scenarios are quite detailed. As such they contain specific, imagined events or people. This does not necessarily limit the usefulness of these scenarios. The specificity is useful to give a sense of credibility to the setting."

The writers labeled their first scenario—astonishingly enough the very *first* listed threat—"A Feminist World, 2091." "Men and their violent acts had nearly destroyed human civilization." Women deliberately chose to have more girl children than boys, and the values associated with masculinist thinking, ranging from "abstract and analytic thinking" to "quantification, objectivity, universality, domination, repression and technical manipulation" fell into disrepute. Citing from Roslyn Bologh's *Love or Greatness: Max Weber and Masculine Thinking, a Feminist Inquiry* (1990); Sandra Harding's *The Science Question in Feminism* (1986), and Linda Nicholson's *Feminism/Postmodernism* (1989), the Boston Group imagined, feared, and prophesied that a preference for "emancipatory theorizing, eros nature, particularity, the development of self-consciousness, interpretationism, and ethical decision-making" might trump the older forms of instrumental thought. In the hundred-year future, so the caricature scenario concluded, these trends could be triumphant and a "Feminist Alternative Potash Corporation" might see the markers, understand the markers, and not believe them. "They proceeded to mine for the potash that they believed to be there, inadvertently penetrating a disposal room and releasing radionuclides into the accessible environment."[12]

If feminist epistemologists were the first threat, a second hundred-year danger issued from historians and philosophers of science—joined by other academics—run amok. (You see what a multifaceted nuclear danger this volume of chapters dedicated to Rosi Braidotti really is?) A cult group, known as the Markuhnians (Herbert Marcuse's 1964 *One-Dimensional Man* and Thomas S. Kuhn's 1962 *Structure of Scientific Revolutions*) had lost faith in the claims of "positivist science." Bolstered by founding texts of Paul Feyerabend (*Against Method: Outline of an Anarchistic Theory of Knowledge*, 1975), Imre Lakatos (*The Problem of Inductive Logic*, 1968), and others, the religious movement held fast to the idea that the depiction of reality simply depended "on one's perspective, interests, social position, and prior beliefs and values." Subjectivists and relativists to the core, the Markuhnians "deified their early views of intuition and insight" as ways of knowing the world, and blamed established science for the disastrous consequences of nuclear weapons, irresponsible radiological disposal, nuclear power, and other wasteful, dangerous excesses of big science, including the Superconducting Supercollider. Believing that revelatory scrolls were buried in the area, a cult leader, modeled on James Jones, led a digging expedition that ended, tragically, when a geyser of radioactive salt water burst from the old waste site.[13]

So the scenarios went—apocalypse, specificity, caricature: "Buried Treasure" in which Mexican fortune hunters thought the markers indicated the presence of valuables; "Virus Impairs Computerized People", where robots acted beyond their command authority; a Japanese auto plant in Roswell, New Mexico. In these waking nightmares come together the threats felt in that last year of the Cold War—immigration, feminists, science wars, foreign economies, and out-of-control technology. There was one, and only one, salvational story—Bell wanted it in even if the group's instructions

were to look only at modes of failure. In it, the one and only Hollywood ending, the government had wisely established an amusement park above the waste site so that memory, passed from generation to generation, would remain strong even after rock had crumbled into dust. Instructed by a deliberately created mythical character, Nickey Nuke (modeled on a combination of Mickey Mouse, Smokey the Bear, and Adam and Eve) would forever and successfully warn each generation of children: Do not dig here. Never forget the danger below.

Once, in an interview, Ted Gordon remarked that the scenario, a sketch of a story, was a term borrowed from the movies. Though its etymology takes us back to the fifteenth century, the modern connotation is very much mid-twentieth. There is something cataclysmic about scenarios as they have come to signify. Something in their near-past re-origination in nuclear cataclysm makes them evacuated stories, specific in certain passing ways and yet hollowed-out. Perhaps this is why, in Japan, so many people have found the most powerful depiction of Hiroshima not in the words of writers such as John Hersey, nor in the all-too-vivid still or moving images taken just after 7 August 1945, but in the images of the Japanese graphic novelist and child-witness to Hiroshima, Keiji Nakazawa. Nakazawa's images in his 1972 comic, *I Saw It*, are anything but photorealistic. Instead, they are often black-outlined, sketched figures, with areas of evenly presented color. Understatement is everywhere—in the tiny hand-drawn "8:15am" in the corner of a frame indicating the moment of detonation, and not many frames later, an image of only black.

The modern scenario of the future was born and, in some sense, remained in the shadow of nuclear cataclysm, even as it extended to economic upheavals imagined by Shell or to possible intrusions into nuclear waste dumps in the millennial future. Here was a state science fiction.

I should add one last thing. The Waste Isolation Pilot Plant was designed to start clean, stay clean—for ten millennia—until at least 11,991. But perhaps we need another scenario, or maybe a thousand grubby little ones, that might never make it to the high drama of the apocalyptic.[14] Our condition and the condition of the future are wrapped up together—when it comes to the environment, we are all in this together, as Rosi Braidotti puts it well. Feminists, environmentalists, even (who knows?) historians of science may have found a voice neither dystopian nor utopian as we, collectively, face global environmental issues.

Late on Valentine's Day, 2014, an underground accident propelled transuranic dust out of the salt mine, leaving about fourteen workers outside with a small but measurable dose of plutonium. Sometimes it is hard to come to terms with our world in the here and now, though it is far from the dark pleasures of the infinite future and infinitely exaggerated. But we must.

Notes

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the remarkable study of Kahn, S. Ghamari-Tabrizi, *The Worlds of Herman Kahn: The Intuitive Science of Thermonuclear War*, Cambridge: Harvard University Press, 2005.

3 Kahn, *Thinking about the Unthinkable*, Princeton: Princeton University Press, 1962, p. 143. On earlier forecasting—from economics, see W. A. Friedman, *Fortune Tellers: The Story of America's First Economic Forecasters*, Princeton: Princeton University Press, 2014.

4 Kahn, *Thinking about the Unthinkable*, quotation from p. 143; five features, p. 144.

5 Kahn, *Thinking about the Unthinkable*, p. 152.

6 Ibid., p. 159.

7 Ibid., pp. 172–3.

8 H. Kahn, *On Escalation: Metaphors and Scenarios*, New Brunswick, NJ: Transaction Press, 2010 [original publication Praeger, 1965]), e.g. p. 34ff.

9 P. Wack, "Scenarios: Uncharted Waters Ahead," *Harvard Business Review*, September–October 1985; followed by "Scenarios: Shooting the Rapids," *Harvard Business Review*, November–December 1985. On business scenarios, see also, K. van der Heijden, *Scenarios: The Art of Strategic Conversation*, 2nd edn, West Sussex, UK: John Wiley and Sons, 2005.

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11 S. C. Hora, D. von Winterfeldt and K. M. Trauth, "Expert Judgment on Inadvertent Human Intrusion into the Waste Isolation Pilot Plant," *Sandia Report* SAND-90-3063, 1991, p. C–38.

12 SAND-90, pp. C-39, 40.

13 SAND-90, pp. C-42-44, quotations on pp. C-43, C-44.

14 See S. Saleri with Rigenerazioni, "Interview with Rosi Braidotti: On Nomadism," http://www.euroalter.com/2010/on-nomadism-interview-with-rosi-braidotti/ [accessed 13 March 2014].