8. Becoming a Singularity Policy Scientist

By Yehezkel Dror

I. Purpose

This paper tries to help readers, including students, to make and remake themselves into Singularity policy scientists. I start with three necessary foundations: (a) the Singularity hypothesis, (b) steering human evolution, and (c) humanity-craft composing. To serve the partly didactic aims of this paper, at the end of each foundation, essential readings are presented.

Once the three foundations are laid, we can proceed to eight pondering and behavior recommendations: (1) become multidisciplinary; (2) experience different cultures; (3) integrate research, theory building, and praxis; (4) acquire crisis coping skills; (5) experience revolutions; (6) advance in stages; (7) be somewhat Don Quixote tempered by Sancho Panza; (8) stoic enthusiasm is a must.

Finally, I discuss your duty to check and recheck whether you have the "bent of mind" essential for being a Singularity policy scientist. But, before proceeding with the foundations and recommendations, with illustrations from my personal experiences, the novel concept of "Singularity policy scientist" requires exploration.

II. What is a Singularity Policy Scientist?

In 1967, I published an article on "Policy Analysts: A New Professional Role in Government Service,"[1] which is still widely read and was recently selected as the best article published that year in the *Public Administration Review*, but which I regard as partly outdated.

In particular, it ignores the imperative to cover in the policy analysis of every significant choice possible implications for the future of humankind. In other words, the slogan "what is good for my country," if used at all, has to be reformulated into "what is good for my country, on condition that it is good for the future of humankind."

Using the term "science" in the broad European sense, including the humanities and social studies, the proposed concept of Singularity policy scientist refers to policy scientists who concentrate on steering the future of the human species, which is the ontological core of the Singularity, rather than the technologies that are its tools. An adequate number of Singularity policy scientists is urgently required to help to optimize the use of the growing powers of humanity to influence the evolution of our species. Such a novel scholarly and applied profession is needed all the more because humanity is not prepared to meet the fateful challenges posed by the Singularity;[2] and – most ominous of

[1] *Public Administration Review* 27, no. 3 (September 1967), 197-203.

[2] See Donald N. Michael, *Unprepared Society: Planning for a Precarious Future* (New York: Basic Books, 1968). This short book is more au courant than ever, but I would write "willfully blind" instead of "unprepared."

all – nearly all political leaders and their policy advisors are ignorant about most of the Singularity, and they prefer to ignore it.

To cope with this increasingly dangerous situation, political leadership needs, inter alia, Singularity policy scientists as trusted and influential advisors. But more is at stake. To steer the future of human evolution, as increasingly possible, if subject to overwhelming natural processes, humanity needs elements of a scientific revolution and radically novel policy options. Also required is an effective global regime headed by a new genre of political leaders, up to a kind of Platonic Global Leviathan – supported by a general staff composed of Singularity policy scientists,[3] a knowledgeable epistemic community,[4] and increasingly edified publics.

For all these Singularity policy scientists are essential. Leaving other requirements to two books of mine,[5] this paper focuses on them.

III. Foundations

A. Singularity Hypothesis

Being cautious in discussing the future, I prefer to regard the Singularity as a hypothesis rather than a "fact," with some more or less plausible parts. In my view, the growing power of humanity to shape its evolutionary future constitutes the ontological core nature of the Singularity, in contrast with the tendency to view the technologies that enable doing so as the Singularity.

Given these clarifications and this caveat, there can be no doubt that humanity is increasingly acquiring tools that can and will impact strongly on its future evolution, such as bioengineering, nano engines, molecular transformation technologies, artificial genera and later perhaps superior intelligence, climate change impactors, realistic virtual realities, space exploration breakthroughs, and more. These will change human bodies and minds and the world in which we life. More radical possibilities cannot be excluded, such as the production of spiritual machines[6] and the creation of life in laboratories – shattering prevailing beliefs and ways of life.

Opinions may differ on "transhumanity," "posthumanity," human cloning, and reaching the stars. But there can be no doubt that humanity is not prepared for the Singularity. Therefore, uses of emerging technologies for worse are nearly certain, and transition crises, up to catastrophes, are unavoidable. Furthermore, it is not impossible that

[3] It is impossible to overestimate the importance of such a kind of composite and distributed "brain" for the future of humanity, though political leaders have the last word. The crucial importance of high-quality staff work is demonstrated by the convincing thesis that the fast occupation of France by Germany in World War II was due to the superiority of German staff work. See Ernest May, *Strange Victory: Hitler's Conquest of France* (New York: Hill and Wang, 2001).

[4] On global epistemic communities see Peter M. Haas, *Epistemic Communities, Constructivism, and International Environmental Politics* (New York: Routledge, 2015).

[5] *Avant-Garde Politician: Leaders for a New Epoch* (Washington, DC: Westphalia Press, 2014); *For Rulers: Priming Political Leaders for Saving Humanity from Itself* (Washington, DC: Westphalia Press, 2017).

[6] As discussed in Ray Kurzweil, *The Age of Spiritual Machines: When Computers Exceed Human Intelligence* (New York: Penguin, 2000).

humanity will terminate its existence as a species, by accident or on purpose, with or without procreating another, perhaps superior, species.

Deep understanding of the Singularity hypothesis and what it implies constitutes the bread and butter of a Singularity policy scientist. This sounds simple, but is very demanding, requiring knowledge and understanding of general and human evolution and the fundamentals of Singularity technologies. Also required is familiarity with social sciences as well as current global dynamics.

Acquiring such knowledge requires in most cases doctorate studies, much reading, and plenty of praxis. Harder to define are the scarce mental abilities essential for thinking through the Singularity, composing humanity-craft (a term I coined on the basis of the "statecraft" concept) and instantiating effective action. Therefore, becoming a full-fledged Singularity policy scientist seems to require a special, scarce talent, what I call "bent of mind." I think it depends on congenital potential. The only way to find out if you have it or not is to try and see if you develop a "sense" for the Singularity and related issues, in addition to just "knowledge."

Recommended Reading: Start with Bill Joy "Why the Future Does not Need Us." *Wired* (April 2000), www.wired.com/wired/archive/8.04/joy_pr.html; *Ray Kurzweil, The Singularity Is Near: When Humans Transcend Biology* (New York: Penguin, 2005); a new book by the author will be published in 2019; and, in part more critically, Amnon H. Eden, James H. Moor, Johnny H. Søraker, and Eric Steinhart (eds.), *Singularity Hypotheses: A Scientific and Philosophical Assessment* (Berlin: Springer, 2012).

On human enhancement and related issues, see Max More and Natasha Vita-More, eds. *The Transhumanist Reader: Classical and Contemporary Essays on the Science, Technology, and Philosophy of the Human Future* (Malden, MA: Wiley, 2013).

A good illustration of salient socio-philosophic pondering is Perpaolo Antonello and Paul Gifford, eds. *Can We Survive Our Origins? Readings in René Girard's Theory of Violence and the Sacred* (East Lansing: Michigan State University Press, 2015).

On Singularity technologies the following texts will serve as a beginning: Ray Kurzweil, *How to Create a Mind: The Secret of Human Thought Revealed* (New York: Penguin, 2013); Nick Bostrom, *Superintelligence: Paths, Dangers, Strategies* (Oxford: Oxford University Press, 2016); Eric K. Drexler, *Radical Abundance: How a Revolution in Nanotechnology Will Change Civilization* (New York: Public Affairs, 2013); Markus Schmidt, Alexander Kelle, Agomoni Ganguli-Mitra, and Huib de Vriend, eds., *Synthetic Biology: The Technoscience and Its Societal Consequences* (New York: Springer, 2009).

B. Human Species Evolution

On the basis of comprehending and "feeling in the blood" of the Singularity, a becoming Singularity policy scientist has to understand the evolution of life on earth, and in particular of *Homo sapiens*, within cosmic evolution.

Also crucial is the cultural level based on the substructure of human evolution, including civilizations, languages, beliefs, institutions, and so on. Trying to steer deep levels of

evolution involves changing the cultural level to impact as desired on evolutionary processes. This comprises using the tools increasingly supplied by science and technology, as decided by political and other institutions, as agents of the human species viewed as a composite deliberative agency.

To glance for a moment at the crucial political institutions, they include political philosophies and beliefs, regimes, constitutions, legislative bodies, politicians, instruments of compulsion controlled by political bodies, and so on. As I stated in one of my books “It is absurd to believe than everything is going to change, but [that] politics will and can remain the same.” Radical redesign of politics is essential for coping with the Singularity, including inter alia, as mentioned, establishing a different global regime and upgrading the qualities of senior political leaders. All these are bread and butter for a Singularity policy scientist.

Singularity policy scientists cannot be omniscient, depending therefore on relevant experts as partners in evolution steering efforts. But Singularity policy scientists have to be familiar with critical cultural features, such as human history, political beliefs and institutions, and the cultures of science.

Recommended Reading: Cosmic evolution is presented by Lola Judith Chaisson, *Epic of Evolution: Seven Ages of the Cosmos* (New York: Columbia University Press, 2005); Martin Rees, *Our Cosmic Habitat* (Princeton NJ: Princeton University Press, 2017).

On the theory of evolution, the most imposing book is Stephen Jay Gould, *The Structure of Evolutionary Theory* (Oxford: Oxford University Press, 2002). This is a bulky volume of 1,413 pages in a small font. Luckily an easily readable Kindle edition is available. But, however demanding, this book is obligatory reading and absorbing for a Singularity policy scientist. So is a book casting doubt at the completeness of the Darwinian science of evolution, namely Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature is Almost Certainly False* (Oxford: Oxford University Press, 2012).

Proceeding to human evolution, start with Yuval Noah Harari, *Sapiens: A Brief History of Humankind* (New York: Harper, 2018); and continue with Frederick L. Coolidge and Thomas Wynn, *The Rise of Homo Sapiens: The Evolution of Modern Thinking* (Oxford: Oxford University Press, 2018). Thus, prepared for more advanced texts, study Jeffrey H. Schwartz, ed., *Rethinking Human Evolution* (Cambridge, MA: MIT Press, 2018).

On human culture, not wishing to overload this reading list I limit myself to three books, letting you search for more as may become relevant for your tasks: On human history and its study, read Aviezer Tucker, ed., *A Companion to the Philosophy of History and Historiography* (Hoboken, NJ: Wiley-Blackwell, 2010). On the evolution of governance, read the two volumes by Francis Fukuyama: *The Origins of Political Order: From Prehuman Times to the French Revolution* (New York: Farrar, Straus and Giroux, 2012); *Political Order and Political Decay: From the Industrial Revolution to the Globalization of Democracy* (New York: Farrar, Straus and Giroux, 2015).

If you add to your readings John S. Dryzek, Bonnie Honig, and Anne Phillips, eds., *The Oxford Handbook of Political Theory* (Oxford: Oxford University Press, 2006); Mark Mazower, *Governing the World: The History of an Idea, 1815 to the Present* (New York: Penguin, 2012), you are well equipped to start considering the changes in political institutions required for adequately steering the future evolution of humankind.

Still, your readings are lacking without going into Singularity-caused possible, and in part likely, catastrophes. The literature on this subject is proliferating, so care must be exercised to pick the few serious treatments rather than would-be sensational bestsellers. I recommend Nick Bostrom and Milan M. Ćirković, eds. *Global Catastrophic Risks* (Oxford: Oxford University Press, 2012), as a comprehensive treatment; Jeff Goodell, *The Water Will Come: Rising Seas, Sinking Cities, and the Remaking of the Civilized World* (New York: Little, Brown, 2017) as an example of recommendable writings on particular possible and perhaps likely or even unavoidable catastrophes.

C. Composing Humanity-Craft

In additional to research, theory building, and praxis, the main mission of Singularity policy scientists is composing humanity-craft options and, after critical analysis and choice, helping with implementation subject to steep learning curves.

Therefore, it would be good if I could present reliable recommendations on composing optimality-approximating humanity-craft options. But this is impossible. Because of the diverse processes involved in composing humanity-craft, no structured heurism produces high-quality options; nor do protocols and algorithms. Still, it is possible and useful to explore some approaches and insights that throw light on humanity-craft composing.

To start, please note my use of the term “composing” rather than “planning” and “designing.” Composing humanity-craft involves planning and designing, but much more, such as creativity, imagination, intuition, and if possible some elements of “geniality.” This is why I mentioned earlier that a special bent of mind is essential for becoming a full-fledged Singularity policy scientist.

I am in deep waters, so I will proceed carefully, starting with the extreme example of the genius Indian mathematician Srinivasa Ramanujan. As presented in a fascinating biography:

> a man who grew up praying to stone deities; who for most of his life took counsel from a family goddess, declaring it was she to whom his mathematical insights were owed; whose theorems would, at intellectually backbreaking cost, be proved true—yet leave mathematicians baffled that anyone could divine them in the first place.[7]

Humanity urgently needs geniuses who “know the Singularity” as the Indian mathematician “knew” some mathematical breakthroughs. But, alas, none is on the

[7] Robert Kanigel, *The Man Who Knew Infinity* (London: Little, Brown, 1991), 4. Needless to add but still important to mention in the present context, after intense study of the life and achievements of Srinivasa Ramanujan, the author of the biography does not even try to explain his outstanding genius nature.

horizon. However, there have been half-geniuses in composing national security grand-strategies, such as Herman Kahn and Albert Wohlstetter (with whom I had the privilege to interact a lot professionally and personally at the RAND Corporation). But these two were radically different in background, personality, and thinking modalities, thus falsifying any standard prescription on how to invent-compose breakthrough grand-strategies. The process may in part be more related to composing a poem than applying Bayesian algebra.

I am not moving into mystery, but on the basis of quite some personal experience, I am pretty sure that subconscious processes that are not really understood are critical for being a top-quality Singularity policy scientist. This is the case for two main reasons:

(1) the inherent and unavoidable nature of humanity-craft as bounded or wild "fuzzy gambling," because of the deep uncertainty on and also inconceivability of results of different humanity-craft options in largely unknowable future environments;

(2) a lack of relevant historical experiences, which puts imagination and creativity at the core of composing humanity-craft.

Still, we are not abandoned in completely terra incognita. Useful ideas and methods are available, such as sensitivity testing, value analyses, institutional design techniques, accelerating learning curves, systems thinking, modelling and gaming, theory of games, structured heuristics, application of modal logic, outlook methods moving from guessing to at least guesstimating, estimating critical intervention mass, intuition training, and creativity-stimulating environments. These are useful for composing humanity-craft, but they leave a lot to be desired, and they are no substitute for indispensable bents of mind.

Learning from outstanding teachers, mentors, and colleagues who combine scholarly achievements with much experience, reading relevant literature as illustrated in the recommendations, and accumulating lots of diverse personal experience are necessary for becoming a Singularity policy scientist, and they will help you do so. However, they are not sufficient. To become a full-fledged Singularity policy scientist, you have to be one of the few who possess the already emphasized essential though undefined bent of mind. With it, you may do well without knowing all the available approaches and methods; without it, you can become a good Singularity humanity-craft technician, which is a needed and honorable profession, but not a full-fledged Singularity policy scientist (I impose here a threshold on what is a matter of more or less, but I think there is a clear divide between policy technicians and policy scientists).

Recommended Reading: Moving from the ground floor of basic approaches to the penthouse of brilliance, start with a good introduction to policy analysis, such as William N. Dunn, *Public Policy Analysis: An Integrated Approach* 6th ed. (New York: Routledge, 2017). Moving up a few storeys, proceed to Lawrence Freedman, *Strategy: A History* (Oxford: Oxford University Press, 2015); climbing up a few stairs, read John Lewis Gaddis, *On Grand Strategy* (New York: Penguin, 2018).

Near to the penthouse, read two books by Michael E. Bratman: *Intention, Plans, and Practical Reason* (Cambridge, MA: Harvard University Press,1999); *Shared Agency: A Planning Theory of Acting Together* (Oxford: Oxford University Press, 2014). Another stair up, read Jonathan Dancy and Constantine Sandis, eds. *Philosophy of Action: An Anthology* (Malden, MA: Blackwell, 2015); Anthony O'Hear, ed., *Philosophy of Action* (Cambridge: Cambridge University Press, 2017).

In the penthouse itself, enjoying a vast vista only brilliant policy-composers see, to get a feel for their imitable but inspiring minds, read Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston: MA: Da Capo Press, [1954] 1988); Paul Aligica, *The Essential Herman Kahn: In Defense of Thinking* (Lanham, MD: Lexington Press, 2009); Robert Zarate and Henry D. Sokolski, eds., *Nuclear Heuristics: Selected Writings of Albert and Roberta Wohlstetter* (Carlisle Barracks, PA: Strategic Studies Institute, 2009).

Now go down to the garden, where diverse readings presenting partial approaches to policy composing can be found, such as: Robert E. Goodin, ed., *The Theory of Institutional Design* (Cambridge: Cambridge University Press, 1996); Emiliano Ippoliti, ed., *Heuristic Reasoning* (New York: Springer, 2016); Susan Schneider, *Science Fiction and Philosophy: From Time Travel to Superintelligence* (Malden, MA: Wiley, 2016); Gary Klein, *Seeing What Others Don't: The Remarkable Ways We Gain Insights* (New York: Public Affairs, 2013); Daniel C. Dennett, *Intuition Pumps and Other Tools for Thinking* (New York: Norton, 2014); Donella Meadows and Jorgen Randers, *Limits to Growth: The 30-Year Update* (White River Junction, VT: Chelsea Green, 2004); Donella Meadows, *Thinking in Systems: A Primer* (White River Junction, VT: Chelsea Green, 2008). Finally, more like a cactus with sharp needles, Daniel Ellsberg, *The Doomsday Machine: Confessions of a Nuclear War Planner* (New York: Bloomsbury, 2017).

Unavoidably, you have also to understand the main obstacle to essential Singularity measures, namely nationalism. To do so, you cannot do better than read Gerard Delanty and Krishan Kumar, Eds., *The SAGE Handbook of Nations and Nationalism* (London: Sage), 2006. Then get familiar with the good intentions and some interesting idea, but overall delusions of Cosmopolitanisms, in Gerard Delanty, ed., *The Routledge Handbook of Cosmopolitanism Studies* (New York: Routledge, 2017). Then return to the main challenges you must fact, in Anthony Burke and Rita Parker, eds., *Global Insecurity: Futures of Global Chaos and Governance* (London: Palgrave Macmillan, 2017).

I am still stuck with the fuzzy gambling problematic. It is dealt with it as far as I can in my last two books, and I am not aware of any writings that add much to my approach, however rudimentary. Rather, most of the literature fails to penetrate to the fuzzy gambling nature of nearly all Singularity issues (and many more, pushing them instead into the Procrustean bed of probability theories or the superficiality of baseless scenarios. The newly founded Society for Decision Making Under Deep Uncertainty[8] and its planned publications may make a difference, but we will have to wait and see.

[8] See www.deepuncertainty.org.

As of now, I hesitate to recommend to you any of the books presuming to deal with "random," "chaos," and so on. Instead, I recommend two books on a more philosophical level, which stimulate understanding of the phenomena of chance and its possible interpretations: Duncan Pritchard and Lee John Whittington, eds., *The Philosophy of Luck* (Malden, MA: Wiley Blackwell, 2015); Klaas Landsman and Ellen van Wolde, eds., *The Challenge of Chance: A Multidisciplinary Approach from Science and the Humanities* (New York: Springer, 2018). Even more important and in many respects eye-opening is Matthias Gross and Linsey McGoey, eds., *The Routledge International Handbook of Ignorance Studies* (New York: Routledge, 2015).

Given the discourse on the foundations of a Singularity policy scientist, we can now proceed to eight specific pondering and behavior recommendations. In this part, I mention some illuminating personal experiences without burdening you with more reading recommendations.

IV. Eight Pondering and Behavior Recommendations

1. Become Multidisciplinary

Division between disciplines is unavoidable, but misleading. Complex processes, such as evolution, cannot be validly divided into conventional academic and professional fields. At the very least, you must become familiar with the ways of thinking and main ideas of public policy, social sciences, the theory of evolution, human history, prescriptive philosophy, and science and technology. Diversified university studies leading to a doctorate, if possible, including a good public policy school and lifelong reading are essential. But look around for learning opportunities focusing on the Singularity, such as at the Singularity University and, on space exploration, the Kepler Space Institute.

To achieve interdisciplinarity, you need numeracy, knowledge of basic mathematical concepts and familiarity with classical and modal logic. Knowledge of at least one language in addition to English is also very desirable, because many relevant books and interesting experiences and conferences are not accessible in English. I would recommend Chinese as a top priority, but if this is not practical, then Japanese, French, Spanish, or German will do.

I started reading early, still remembering the popular science journals I enjoyed when I was seven years old. By the age of thirteen, I knew German, English, and Hebrew and I agitated my school friends by falsifying their pet views with quotes from serious literature. This did not make me popular, nor did I get high grades in school subjects I found boring (in contrast to my A+ grades at the Hebrew and Harvard Universities, where I could pick courses as I liked), but I never cared about being popular, and I did not take high school seriously, though it was the best one in Mandatory Palestine.

2. Experience Different Cultures

Humanity is divided into different cultures. Though egocentric tribalism must be overcome, the multiplicity of cultures enriches humankind, stimulates creativity, and provides different life options. It should be preserved despite globalization and a needed upsurge of human solidarity. Therefore, as a policy scientist dealing with all of humankind and its environments, you need acquaintance with main cultures. Readings and short

visits will not do. Needed are years of living and working in at least two different cultures in addition to your own one.

I sought such opportunities to do so and succeeded. Most of my life I lived in Israel, but I spent years in the United States, the UK, Germany, the Netherlands, and South America, I advised the Indian government for altogether three unforgettable months, and I have worked for shorter periods in 45 different countries.

But I should have lived for at least a year each in China and the Republic of South Africa. They invited me to do so, but I managed only short visits. I continue to regret it deeply. You should do better: I urge you to live for at least two years in non-European cultures.

3. Integrate Research, Theory Building and Plenty of Praxis

As is clear to you by now, the policy sciences are very demanding. They require good familiarity with the realities of policy making, a lot of experience in composing policies, and, on the basis of research and praxis, developing sorely lacking theories – to be put to reality tests by praxis. The necessity to integrate research, theory building, and praxis is all the more pronounced in the novel domain of *Homo sapiens* future steering, so you must work hard to synthesize them.

Case studies and projects during your studies are useful, but only partly so. They are too static and lean. The best way to learn integrating research, theory building, and praxis is to work in a good think tank or policy consultancy group, or at least in multi-background teams.

I started early to advise public bodies, such as an overall evaluation of the planning system of the Jerusalem municipality. This job also taught me something of the responsibilities of praxis: a senior municipal planner had a heart attack after I submitted my report, and I was told that my negative comments on his performance, though fully justified, caused the disease.

However, my real postgraduate studies on combining research, theory building, and praxis were in my two years (1968-70) as a senior RAND Corporation staff member, mainly in Santa Monica, but also doing an evaluation study of the RAND New York office, which did not make its heads happy. It was also at RAND that I gave a push to the “policy science” concept first coined by Harold Lasswell, by founding the Policy Sciences Journal.

I not only learned from ongoing RAND projects in which I was involved, but also from close and often friendly family contacts with RAND star thinkers, such as Fred Ikle, Victor Gilinsky, Herman Kahn, Andrew Marshall, Albert and Roberta Wohlstetter, Tom Schelling, James Schlesinger, and more. While being in many respects a novice, I had already published my foundational book *Public Policymaking Reexamined*, and I did make some contributions to RAND work, the public part of which is expressed in my book *Crazy States: A Counterconventional Strategic Problem*.

This book hit a fundamental limitation of the mutually assured destruction (MAD) grand-strategy, developed at RAND and adopted as the basic Cold War security doctrine, namely its dependence on Western-type rationality. No wonder that my ideas were

received by the heads of RAND as “very original but unrealistic.” During later visits at RAND, the second part of the initial evaluation was never repeated.

It is very likely that the crazy states doctrine gestated in my mind thanks to Israeli strategic experiences, which I knew well. Thus, it illustrated my efforts to combine praxis with theory fruitfully. Another example from my two years as Senior Policy and Planning Advisor in the office of the Israeli Minister Defense Shimon Peres (1975-77) was the concept of statecraft as fuzzy gambling, later developed in my conceptualization of all major choices as fuzzy gambles ranging from very bounded to wild and chaotic ones, depending on the depth of uncertainty they faced. I arrived at this idea on the basis of my scholarly interest in chance, but more so thanks to my praxis in Israeli defense planning, which is another example demonstrating the absolute requirement to integrate research (in this case intelligence estimates looked at critically) with theory and praxis.

4. Acquire Crisis Coping Skills

Unavoidably, humanity is moving into major crises caused by Singularity processes, such as mass migration due to climate change, social explosions when robots take over most human jobs, and revolutionary violence when expensive human enhancement technologies create intolerable social differences between a new, ultra-rich caste of those who enjoy a life expectancy of, say, 150 years, and the vast majority of humanity condemned to die before reaching 90. Mass killings by fanatics who synthesize lethal, very contagious viruses in kitchen laboratories are also a distinct possibility, and so on.

Therefore, Singularity policy scientists must be adept in coping with radical and often bloody crises. This includes using such crises as opportunities for instantiating measures needed for steering human evolution that are not feasible without crises imploding the tyranny of the status quo.

Therefore, crisis experiences are essential. At least you should participate in crisis exercises, even if they are quite unrealistic. I realize that this may be difficult. Therefore, you may have to limit yourself to virtual crisis exercises in your mind, perhaps with some peers.

I had an outstanding experience of studying the realities of a real-life major crisis, namely the Second Lebanon War, when I was appointed as a member of the governmental committee of inquiry into its management. Over 18 months, the so-called Winograd Committee interrogated top politicians and military officers and studied nearly all existing written material, parts of it highly classified.

The findings were in part devastating, as fully revealed in the public version of the report. Membership in the committee thus provided me with a very unusual opening to study the realities of a high-level political and military crisis management case. It also provided me with the opportunity to make a real difference to Israeli prime ministerial and cabinet decision processes by pushing successfully for the establishment of the Israeli National Security Staff (which I had proposed years earlier, but I lacked the power to overcome resistance).

Much of what I learned was new to me, despite years of being near to the Israeli corridors of power. In particular it strengthened my conclusion that upgrading the qualities of high-level politicians and augmenting their professional staffs is a must, otherwise it is certain that many critical choices will not only be far below optimum, but often the worst possible ones.

5. Experience Revolutions

A Singularity policy scientist needs more than crisis coping skills. Humankind is cascading through a quantum leap. This wild process cannot be fully understood and adequately steered without a feel for the realities and requirements of revolutions, such as future shock, high risks, total commitment, creative destruction, radical creativity, and, when essential, lethal force.

I was lucky living the Zionist revolution and the Omega experience of founding the Jewish State of Israel, feeling the flows of emotions and sharing the pains and triumphs, while having access to information never published and taking part, however limited, in significant choices and some action.

Such experiences may be beyond your reach, though I think you are likely to experience revolutionary transformations during your lifetime. Pending such events, you should gain virtual experience by intensely studying at least one revolution, such as the founding of the United States, the French Revolution, or the emergence of modern China through a chain of contradictory revolutions.

I know this recommendation does not fit common American ways of thinking, though the United States is based on the revolution against British rule and the Civil War and civil rights revolutions. But deep revolutionary transformations are sure to come and require steering, so I stick with my suggestion.

6. Advance In Stages

The Singularity hypothesis and the very idea of partly steering the future evolution of the human species are far too new, complex, and speculative for you to jump into them without first having gained knowledge and experience as a more mundane policy planner, such as in a large municipality, some government department, etc. Also, it is important for you to work with experienced policy analysts and planners before you proceed on your own.

I was very lucky be starting policy planning at the age of nineteen when serving as a junior staff officer in the Israeli Defense Force General Staff during the War of Independence, and continuing on and off to engage in increasingly higher level defense planning. Not less important were my two years at the RAND Corporation, as well as my six and a half years as founding president of a think tank, namely the Jewish People Policy Institute in Jerusalem.

Still, I did not feel called upon nor qualified to deal with Singularity issues and human species evolution steering until about five years ago. Not only was the field novel, so I hardly knew about it, but I also found it very demanding scientifically, morally, and

professionally, and also somewhat depressing when confronting the tremendous challenges for which humankind is clearly not prepared. Therefore, I recommend that you advance through various study and praxis stages before undertaking the missions of a Singularity policy scientist.

7. Be Somewhat Don Quixote Tempered by Sancho Panza

I cannot put what I try to suggest better than Joe Daron in his lyrics of "Man of LaMancha": "To dream ... the impossible dream ... to run ... where the brave dare not go .... to reach ... the unreachable star...."

To put it into prose, a Singularity policy scientist must be somewhat of an optimistic dreamer, have some crazy ideas, engage in iconoclasm, however unpopular, and from time to time let imagination roam freely in the mind. Meeting fanciful thinkers and selectively reading science fiction may help in doing so, but it is your mind that has to be very imaginative, up to accommodating some phantasy.

The eyes should look up to the stars, but the legs must be on solid ground. A good portion of Sancho Panza is also needed in your mind. When the chips are down, realism is a must.

Living the realization of the fantastical dream of reestablishing a Jewish state in the Promised Land and then dealing with the very real problems of assuring its national security taught me to imagine and to try to realize at least partly surrealistic possibilities, while simultaneously engaging with the morasses of reality.

I am not sure what to suggest to you in the absence of such very unusual opportunities. If I could I would design virtual realities in which you get fitting surrogate experiences.[9] As matters are, I have to leave it to you to find ways to combine some elements of Don Quixote and Sancho Panza in your mind, theories, and praxis.

8. Stoic Enthusiasm is a Must

However much you toil and trouble, you will be very frustrated. This is the fate of all highly committed persons who never fully achieve what they believe in. But this is especially the lot of those who swim against strong currents, including Singularity policy scientists. Most of your humanity-craft recommendations will be strongly opposed, pending mind- and culture-shuttering crises. Thus, you may conclude that some regulation of science and technology, diffusion of their findings and marketing of their products is essential for the safety of the human species. Nearly all will oppose you, including most scientists, nearly all business enterprises, the vast majority of politicians, and large segments of the public. If you think I exaggerate, just study more closely what happens with the relatively mild environmental policy proposals (though in this case most scientists are supportive, and none of their interests and values are being endangered).

[9] For steps in such directions, see William S. Bainbridge, *Star Worlds: Freedom Versus Control in Online Gameworlds* (Ann Arbor: University of Michigan Press, 2016).

And, if you put your trust in crises as hard but useful teachers of humanity, as you often must, in most cases you will again be frustrated. Crises will come, but learning is likely to be wrong – till more and harsher crises give humanity another chance .

The nature of humanity-craft as fuzzy gambling will add to your failures. Your best recommendations may be accepted, with dismal results, and your reputation may be shattered. Therefore, not to end as Don Quixote and worse, you need a lot of stoicism. But to have any achievements you must be enthusiastic about your endeavor. Combining these two traits is hard, and it has unavoidable emotional costs. To cope, you have to build a strong inner citadel in your mind.

I succeeded in doing so. If you are made of the stuff of Singularity policy scientists, so can you.

ESSENTIAL READING: Pierre Hadot, *The Inner Citadel: The Meditations of Marcus Aurelius*, revised ed. (Cambridge, MA: Harvard University Press, 2001).

V. Check and Recheck If You Have a Fitting Bent of Mind

The observation above returns us to the mental requirements of a Singularity policy scientist. As discussed, needed is a special talent, a policy-composing bent of mind. To this I now add “keeping enthusiastic in the face of many failures” and “having a formidable inner citadel.” If you lack them and fail to develop them, becoming a Singularity policy scientist is not for you. There are many other worthwhile life missions. Pick one of them and save yourself useless frustrations, or even much worse – becoming a bad humanity-craft composer, causing much harm.

I am tone deaf, I have no artistic talents, and my social intelligence is fair at best. As a policy scientist, I have made serious errors and suffered from many disappointments, together with experiencing some real and in part exhilarating successes. Now, I am enthusiastic about becoming, however late in my life, a Singularity policy scientist, hoping still to have opportunities to make some contribution, however minor, to human skills in impacting for the better on the future evolution of the specie.

I hope some of the readers of this paper too will be able and willing to make and remake themselves into Singularity policy scientists. Humanity needs you urgently.