

Seven Ultimate Challenges to Humanity in This Century

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Abstract

Thanks to the science policy strategy of the old National Science Foundation (where I worked 1988-2015), I was given truly unique access to the far cutting edge of most of the Science & Technology disciplines which need to be connected much better in order to meet ‘Seven Ultimate Challenges to Humanity in this Century’. This paper summarizes the four (4) greatest “existential threats” -- threats of total species extinction -- facing humanity in the coming century. For balance, it defines three (3) equally important hopes -- grand opportunities which would allow us to overcome those threats and achieve a future better than what most people could imagine. These seven (7) points together comprise the Ultimate Challenges that need greater attention and awareness in order to be successfully met.²

Keywords: existential threats, climate extinction, artificial general intelligence, slaughterbots, cybersecurity, dark matter, human potential.

Before 2009 -- when I served as the “Science Officer” on loan from the National Science Foundation (NSF) to the office of Senator Specter -- I was deeply embedded in mainstream views of public policy, science policy and international relations. But in 2009, the Director of Geosciences of NSF invited many of us to a talk by Professor Peter Ward, whom he introduced to us as *the world’s leading front line scientific expert on what has caused the actual (5-15) mass extinctions of life over the past billion years.*

After Ward’s talk I was overwhelmed by two big questions:

- (1) Are we really as close to the extinction of the human species now as it sounded?
- (2) How could we possibly survive, if half the listeners said, “of course all climate risks are fake” and the other half said, “What I learned is that I am a good person, because I support normal climate policy”?

Who were ready to study, to find out just how serious the risks are, and, more important, what

¹ Paul is a Social scientist and machine learning pioneer, IEEE Neural Network Pioneer Award, for the original development of backpropagation and of adaptive dynamic programming.

² This paper is an overview of the seven challenges Paul opened a discussion to in a presentation on “A Deeper Probe into Integrated Solutions to the Seven Big Challenges to Humanity in this Century”, at the fourth Biological Physics and Meaning Mini Conference on “PERSONAL REVELATION, SPIRITUAL EXPERIENCE & HUMAN POTENTIAL DEVELOPMENT” (September 2024). Available for viewing at: <https://thescienceofpeace.weebly.com/biological-physics--meaning-mini-conferences.html>.

could be done, when, how?

This led to a redirection of my life, to focus, first, on the threat of climate extinction, and eventually, to a list of the seven (7) most ultimate big challenges to humanity, with outcomes hitting us in the coming century (see Figure 1):

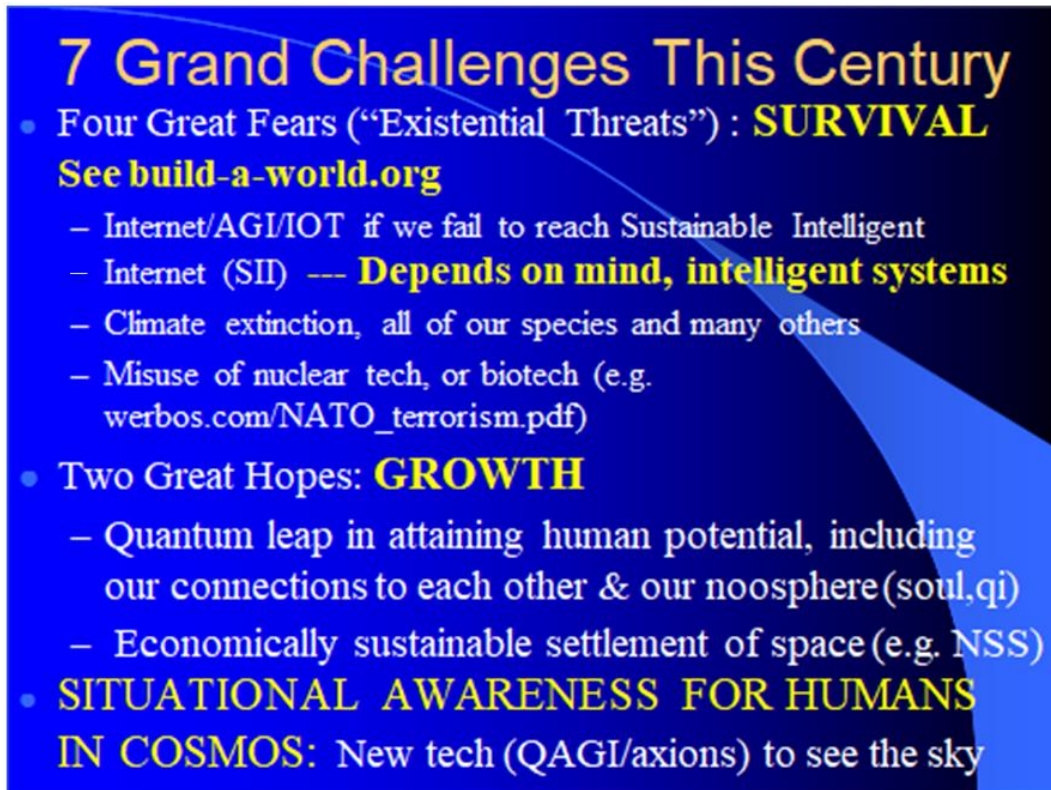


Figure 1. The seven grand challenges to humanity hitting us in this century.

As the information leaked out, Secretary General Guterres and John Kerry (US Climate Chief under Biden) pushed for a new climate office under the Security Council, to address the threat of climate extinction. After the representative of China and Putin announced opposition to ush an effort, the international Millennium Project³ organized a small group of us to try to save the situation, by promoting a US-China deal where a new office would give strong efforts BOTH to preventing climate extinction AND to addressing threats from misuse of AI, which Xi Jin Ping had highlighted in a talk on international cooperation to prevent backdoors in computer hardware and software.

The effort came close to success, but many vested interests still block what is needed in all seven (7) challenges (Werbos, 2017).

The leader of the IEEE Power and Energy Society (PES) asked me to lead a special effort to review the best information available now, both on the climate extinction threat and on the technology

³ See millennium-project.org.

and market design options to reverse that risk, while benefiting the world economy. Some of that information is summarized at the Build-A-World Wiki.⁴

However, a leading patent attorney filed patents pro bono, for a new technology I developed, patented two months ago (Werbos, 2024b), building on new science which required my own personal priority. When this happened, IEEE agreed to transfer the book project to John Mankins, one of the section editors I had chosen for the book.

There is a crucial need for UNESCO to take over the full range of competencies which NSF achieved before 2013-14 (when there were changes which persuaded many of us to retire early) and apply them to all seven (7) challenges (NSF, 2013).

My Millennium Project friend at UNESCO asked me why I switched priority from risk number two (2) to my new risk number one (1). The reason is partly due to my personal comparative advantage, but also to emerging wars and threats of global disintegration related to conflicts in areas, like new currency systems, like the vulnerability of electric power systems, requiring new technology for cybersecurity, and for “seeing the sky” as described in the patent and supporting papers, essential to what Guterres described as the world’s leading need for global security.⁵

These top two (2) risks are closely related to the risks of misuse of nuclear technology (much more serious now than they were at the height of the Cold War) and of new biotechnologies.

Mila Popovic of the Millennium Project community urged me to try to balance out this list of grand challenges, to give play to hope as much as to fear. From hard core systems neuroscience (e.g. the work of James Olds Senior), we understand that healthy creative organisms need a balance of hope and fear, with more hope than fear.

The three great breakthrough hopes on this list are just as important as the fears, and essential to overcoming the fears.

My other paper for this special Journal of Consciousness Exploration and Research issue, on new physics, ‘From the Quantum AGI Revolutions to Realism and Observing the Soul’, begins to point to enormous hopes... hopes which can work only if we work harder to think clearly and mathematically out of the box (Werbos, 2024a), building on Von Neumann and Morgenstern (2007) and Jung (2012), the foundations for work in these new directions (Werbos 2019).

These new developments provide an extension of fundamental work based on the foundations described in (Werbos 2001; NSF, 2007; Werbos & Davis, 2016).

A dialogue is necessary, to sort out the many new connections which our communities can help with. Every one of these challenges desperately needs more help from people able to catch up and

⁴ See build-a-world.org. More details are at ‘discussion_of_DRAFT_Sustech_slides 2022-04-19: <https://drive.google.com/drive/folders/14JNhumdUGzAkoOadlXiR1fqE79WPOLsL?usp=sharing>.

⁵ Secretary-General Urges Security Council to Ensure Transparency, Accountability, Oversight, in First Debate on Artificial Intelligence, United Nations - Meetings Coverage and Press Releases, SG/SM/21880 (18 July 2023): <https://press.un.org/en/2023/sgsm21880.doc.htm>.

connect to the real frontier of at least one of the challenges, while developing more harmony within and between the seven strands.

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