

**“For A Man-Machine Peaceful Coexistence in the Digital Era”
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Humanity has faced conflicts between individuals and nations, but a far greater threat now looms: The conflict between men and machines. With AI’s rise, our very existence is at stake.

With profound humility and gratitude, I begin this talk, reflecting on the immense honor of receiving the Dr. Nagai Memorial Peace Award 2024. This recognition acknowledges my contributions to mitigating the Fukushima nuclear disaster, with a steadfast commitment to protecting lives and the environment from the effects of radiation. This recognition, inspired by the life and legacy of Dr. Takashi Nagai—a pioneer in blending science, ethics, and humanity—resonates profoundly with the theme of Man-Machine Peaceful Coexistence. This honor also serves as a poignant reminder of the dual legacy of nuclear technology—its devastating use in the atomic bomb and its potential to foster peace through responsible scientific advancement and compassionate leadership.

Just as Dr. Nagai dedicated himself to improving medical care for the victims of the atomic bombings while championing peace, our pursuit of harmony between humans and machines must be rooted in ethical principles, mutual respect, and a shared vision for a brighter future.

This topic—man-machine coexistence—is not just theoretical but deeply practical, reflecting the challenges and opportunities we face in building a world where technological progress serves the greater good. Whether in the context of nuclear safety, artificial intelligence, or medical innovation, the principles of collaboration, adaptability, and ethics are indispensable to ensuring that humanity and technology evolve together in ways that uphold our shared values and foster global peace.

In an age defined by the confluence of human ingenuity and technological advancement, humanity finds itself at a crossroads: a chance to harmonize its relationship with machines or risk discord that threatens societal cohesion. The aspiration for Man-Machine Peaceful Coexistence emphasizes a vision where human and machine capabilities

are not merely compatible but deeply intertwined, fostering mutual dependence, ethical alignment, and continual progress.

1. Symbiosis Across Eras

Imagine the 1940s Manhattan Project: humans using rudimentary computing machines to crack complex equations that shaped the outcome of World War II. Machines, limited but precise, complemented the strategic thinking of scientists like Oppenheimer. However, the culmination of this effort led to the devastating use of atomic bombs on Hiroshima and Nagasaki in August 1945, claiming the lives of hundreds of thousands of civilians. This tragic chapter underscores the dual-edged nature of technological progress—its potential to both save and destroy—highlighting the ethical responsibility that must accompany innovation.

By the 1980s, robotic arms had transformed automobile assembly lines, enhanced production efficiency while still requiring human oversight to maintain quality standards.

In nuclear power plants today, automated systems seamlessly regulate energy production. These machines, programmed for efficiency, alert human operators during anomalies, averting potential disasters. In such environments, humans safeguard machines' logic with ethical judgment, creating a harmony that defines symbiosis.

2. Adaptation Through Crises

In March 2011, the Fukushima Daiichi nuclear disaster challenged this coexistence. Machines failed to predict the cascading effects of the earthquake and tsunami, but in the aftermath, the collaboration deepened. Advanced AI-driven safety protocols now monitor reactors worldwide, incorporating lessons learned from Fukushima. Humans and machines evolve together, responding dynamically to emerging risks.

A decade ago, on August 6, 2014, I penned a testimony on the website of the Prime Minister of Japan to honor the heroic radiation experts who stood on the frontlines against an invisible, insidious threat. Drawing inspiration from Galileo's words—"If you could see the earth illuminated

when you were in a place as dark as night, it would look to you more splendid than the moon”—I reflected on the resilience of these medical professionals.

Their response to the Fukushima disaster, an ordeal as harrowing as the deepest night, illuminated the world with their courage and humanity. Their unwavering dedication stands as a beacon of hope, compassion and peace for all.

In the 21st century, adaptation became evident in the medical field. Robotic surgeons like the Da Vinci system provide unmatched precision, guided by the steady hands of skilled human operators. Machines adapt to human inputs, while surgeons learn to optimize their interventions based on real-time data provided by the machines.

3. Feedback Loops: The Path to Refinement

The iterative learning of machines has a striking parallel in history. Consider the Enigma machine during World War II. Alan Turing’s team created early algorithms to decipher enemy codes, but these needed

continuous refinement based on daily intelligence updates. This process of "feedback loops" echoes today in AI systems like autonomous vehicles. Sensors gather data from millions of rides, feeding it back to algorithms, ensuring safer journeys.

In the arts, AI programs like OpenAI's DALL·E create vivid imagery from textual prompts, improving over time through user feedback. These systems mirror the dynamic refinement process between painter and canvas, iterating until perfection.

4. Ethical Evolution: Aligning Machines with Human Values

From the Luddites of the 19th century smashing looms to protest against job losses to the AI bias scandals of the 21st century, ethical challenges have shadowed technological progress. Yet humanity learns and evolves. For instance, in the 1980s, medical imaging faced skepticism about radiation risks. Over decades, through public trust-building and regulatory alignment, imaging technology like PET scans transformed into indispensable diagnostic tools.

In AI, tech companies now embed fairness audits into their algorithms, ensuring decisions—whether hiring recommendations or loan approvals—respect societal values. This ethical alignment is critical, as machines influence lives on unprecedented scales.

5. Master to Partner: Shifting Dynamics

Imagine a timeline from ancient tools to modern integrations: Stone Age humans wielding flint knives, Industrial Revolution workers mastering steam engines, and today's office workers collaborating with AI assistants like ChatGPT. As these tools grow in complexity, the relationship shifts from mastery to partnership.

In the near future, imagine farmers equipped with exoskeletons for labor-intensive tasks, or educators using AI tutors that adapt to individual student needs. Machines no longer serve merely as tools; they become collaborators in human endeavors.

6. Policy Frameworks in the Digital Era: A Shared Responsibility

In the digital era, policy frameworks face unprecedented challenges and opportunities. History has shown that regulation often lags behind technological innovation. The 15th-century printing press disrupted existing power structures, yet governance frameworks emerged only decades later. Similarly, the rapid pace of digital transformation today—spurred by artificial intelligence (AI), blockchain, and the Internet of Things—demands proactive and agile policymaking to ensure these technologies serve society equitably.

Governments worldwide are now grappling with setting ethical guidelines for emerging technologies such as autonomous vehicles, AI-driven healthcare, and facial recognition systems. These frameworks must prioritize transparency, fairness, and accountability, ensuring that technologies align with public values and safety. For instance, self-driving cars require ethical decision-making models to navigate life-and-death scenarios, highlighting the intersection of technology and moral philosophy.

In the digital age, AI enhances climate modeling, empowering nations to implement evidence-based policies that align with sustainable development goals. Such collaborations between humans and intelligent systems exemplify how technology can support adaptive governance to address global challenges.

As we stand at the crossroads of technological innovation and societal impact, we must view technology as neither a threat nor an infallible solution but as a powerful tool. When guided by shared values, ethical frameworks, and inclusive policies, it can amplify human ingenuity to solve pressing issues and unlock unprecedented opportunities.

The imperative is clear: lead with foresight, innovate with responsibility, and act with unity. By fostering a culture of trust, transparency, and cooperation, we can achieve Man-Machine Peaceful Coexistence—a future where technology complements humanity, advancing peace, dignity, and prosperity for all.

Let us embrace this shared mission as stewards of the digital age.