Metaverse Is the Next Biggest Thing
Advancing Digitalization from Intelligentization to Realitization

Don’t miss the next biggest thing!
Join us to accelerate its arrival and ensure it benefits all.

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IEEE-USA's 50th Anniversary Cruise
Executive Summary

❖ Metaverse is facing an unprecedented opportunity for explosive and disruptive growth. Our observations include:

- AI will help boost the development of Metaverse on both the supply and demand sides.
- Metaverse will also help boost the development of AI.
- Metaverse is the next stage of Digitalization.
- Metaverse is the next biggest thing.
- Metaverse will also play an important and constructive role in addressing sustainability challenges.

❖ Join us to accelerate the take-off of the metaverse industry for sustainability and humanity. Let us work together on:

- Landscape, Outlook, and Roadmaps
- Open Standards, Conformity Assessment and Certification
- Open-Source Reference Implementations and Pilot Applications
- Digital Assets Pool and Exchange
- Innovation-Driven Competitions and Rankings
- Advocacy and Lobbying for Broad Acceptance and Adoption
- Coordination for Responsible Development: Safety, Privacy, Ethics, Inclusion, and Sustainability
Background: **Metaverse + AI**

AI will help boost the development of Metaverse on both the supply and demand sides.

**SUPPLY SIDE:**

- Enriching the content
- Driving intelligent NPCs
- Understanding the worlds
- Understanding the users

<table>
<thead>
<tr>
<th></th>
<th>“VR” Metaverse</th>
<th>“AR” Metaverse</th>
<th>“DT” Metaverse</th>
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<td><strong>Enriching the content</strong></td>
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* NPCs: Non-Player Characters

On the supply side, large-scale and fine-grained virtual worlds, including massive and diverse virtual scenes and virtual objects, will be created at a hundred or even a thousand times faster with the aid of Generative AI. Hundreds of millions of virtual characters, driven by Generative AI, will provide a variety of deeply personalized interactive experiences and services.
Background: **Metaverse + AI**

AI will help boost the development of Metaverse on both the supply and demand sides

**DEMAND SIDE:**

- New Job Opportunities
- Fewer Working Hours, More Leisure Time
- And more...

On the demand side, whether we like it or not, AI will replace a large amount of human labor. This is not only an inevitable trend but also something that is already happening. The labor market in the real world will polarize. Some people will greatly improve their work efficiency and excellence with the help of AI, gaining more opportunities. However, others will face competition from AI. Metaverse might be the best solution to accommodate the surplus labor force. People who are willing to work will have more job opportunities in metaverses. Those who don’t wish to work can enjoy a relaxed and happy life in metaverses at a lower cost and with less energy consumption than in the real world. Another possibility is that all of humanity will reduce working hours to rest and enjoy life more. The labor market is essentially a competition among people, but it can be managed to avoid overwork and polarization, making AI work for the benefit of all humanity.

1. In many professions, generative AI will significantly improve the skills of amateurs.
2. As a result, only a very small number of people can continue to be called professionals and make a living doing it as a job.
3. Many people will have to look for new job opportunities or enjoy fewer working hours and more leisure time.
4. To accommodate these needs in metaverses is probably the most sustainable and cost-effective approach.
The further development of AI, including the generalization of capabilities of large models, the rise of embodied AI, and the emergence of Artificial General Intelligence (AGI), requires a "real world" training environment to obtain massive multimodal training data. Metaverse can provide such a training environment with the lowest cost and risk, and the highest efficiency and diversity, thereby helping boost the development of AI. **Training AI in metaverses will become the new paradigm for AI research and development.** For example, testing autonomous driving under various complex road conditions in a virtual world is one of the first sprouts of this new paradigm and has already become a common practice in the industry.
Background: Metaverse = Digitalization 5.0

Metaverse is the next stage of Digitalization

Digitalization 1.0: Automation

Digitalization 2.0: Interconnection
Desktop Internet, Mobile Internet, Internet of Things

Digitalization 3.0: Personalization
Web 2.0 = Massive UGC + Personalized Recommendations

Digitalization 4.0: Intelligentization
AI + x, Generative AI (AIGC / AIGS), AGI

Digitalization 5.0: Realitization (Metaverse)

We are currently between two stages of Digitalization: the exploding Intelligentization and the upcoming Realitization (Metaverse).
Background: Metaverse × Everything

Metaverse is the next biggest thing

Experiential View: Metaverse refers to a kind of experience in which the outside world is perceived by the users (human or non-human) as being a universe that is built upon digital technologies as a different universe ("Virtual Reality"), a digital extension of our current universe ("Augmented Reality"), or a digital counterpart of our current universe ("Digital Twin").

Functional View: Metaverse is the next version of World Wide Web ("Web 3.0" or "Web 4.0"), the next generation of the Internet, and the next stage of Digital Transformation.

AI is transforming forces of production and relations of production, while Metaverse will redefine production and redefine life.
We should advance metaverse technology in a sustainable manner and for greater sustainability.

Background: Metaverse & Sustainability

Metaverse will also be a cure for sustainability challenges

- We need to develop and build metaverse infrastructure with low energy consumption and low carbon emissions as far as possible;
- Metaverse can also be used in environmental protection education, climate science research and other fields to provide more support for tackling global climate change;
- **Metaverse will transfer more and more activities from the real world to digital worlds, reducing energy consumption and carbon emissions;**
- Collectively, metaverse will provide an effective path to promote sustainable development and address climate change.
IEEE DRIVES STANDARDIZATION EFFORTS TO PAVE THE ROAD TO THE METAVERSE
IEEE METAVERSE CONGRESS
metaverse.ieee.org

A series of virtual or hybrid sessions

- SESSION 0 (Pilot): Forum about the Metaverse | 14 Jun 2022 | Hybrid (Toronto, Canada)
- SESSION 1 (Kickoff): Demystifying and Defining the Metaverse | 6 Jul 2022 | Virtual
- SESSION 2: The Metaverse and Its Rapid Growth in China | 9 Jul 2022 | Virtual
- SESSION 3: Developing and Deploying the Metaverse | 27 Sep 2022 | Virtual
- SESSION 4 (Shenzhen Summit): New Opportunities from the Metaverse and the New Wave of Digital Economy | 30 Sep 2022 | Hybrid (Shenzhen, China)
- SESSION 5: Behind and Beyond the Metaverse | 8 Dec 2022 | Virtual
- SESSION 6: Behind and Beyond the Metaverse – Year-end Wrap-up | 27 Dec 2022 | Virtual
- SESSION 7 (Davos Special Session): The Future of the Web, the Internet, and the Metaverse | 17-19 Jan 2023 | Hybrid (Davos, Switzerland)
- SESSION 8 (Bangalore Summit): Onboarding Metaverse – From Infrastructure to Applications | 6 Feb 2023 | Hybrid (Bangalore, India)
- SESSION 9: New Year, New Momentum | 14 Feb 2023 | Virtual
- SESSION 10: New Trends, New Opportunities | 28 Feb 2023 | Virtual
- SESSION 11 (New York Summit): Advancing Metaverse for Economic Growth and Sustainability | 14 Apr 2023 | Hybrid (New York, NY, USA)
- SESSION 12: Metaverse on the Brink of Accelerated Growth | 24 Apr 2023 | Virtual
- SESSION 13 (AWE USA Special Session): Redefining Web 3.0 and Accelerating Metaverse for Greater Sustainability | 31 May-2 Jun 2023 | Hybrid (Santa Clara, CA, USA)
- SESSION 14 (WAIC Special Session): The Synergistic Acceleration of Metaverse and AI Development | 6 Jul 2023 | Hybrid (Shanghai, China)
- SESSION 15 (Kyoto Summit): Metaverse Revolution, Web 3.0 Standardization, and NFT Construction for Virtual Economy | 26-27 Jul 2023 | Hybrid (Kyoto, Japan)
- More to come...

With about 480000 attendees collectively, IEEE Metaverse Congress has been one of the best-known events in the global metaverse industry.
Many metaverse-related standards and projects are NOT listed here if their titles do not explicitly include “metaverse”

- **P2048 Standard for Metaverse: Terminology, Definitions, and Taxonomy**
  Status: Project approved by IEEE SASB on 10 November 2022

- **P7016 Standard for Ethically Aligned Design and Life Cycle of Metaverse Systems**
  Status: Project approved by IEEE SASB on 10 November 2022

- **P7016.1 Standard for Ethically Aligned Educational Metadata in Extended Reality (XR) & Metaverse**
  Status: Project approved by IEEE SASB on 30 March 2023

- **P3812.1 Standard for General Requirements for Identity Framework for Metaverse**
  Status: Draft Standard approved by IEEE SASB on 21 September 2023

- **P3231 Standard for a Blockchain-based Energy Metaverse Application Model, Framework, and Requirements**
  Status: Project approved by IEEE SASB on 5 June 2023

- **P3819 Standard for Metaverse Financial System - Reference Architecture and Technical Requirements**
  Status: Project approved by IEEE SASB on 29 June 2023

- **P3422 Recommended Practice for Metaverse Ecosystem Reference Models**
  Status: Project approved by IEEE SASB on 21 September 2023

- **IC22-012 Persistent Computing for Metaverse Initiative**
  Status: Activity approved by IEEE SA CAG on 12 October 2022

- **IC22-015 Decentralized Metaverse Initiative**
  Status: Activity approved by IEEE SA CAG on 12 October 2022

See also “Why Are Standards Important for the Metaverse?”
https://standards.ieee.org/beyond-standards/industry/technology-industry/why-are-standards-important-for-the-metaverse/
IEEE-ISTO Metaverse Acceleration and Sustainability Association

Introduction and Call for Participation

Don’t miss the next biggest thing!
Join us to accelerate its arrival and ensure it benefits all.
MASA Vision and Mission

Vision

- Metaverse Acceleration and Sustainability Association (MASA) will be essential to the global metaverse community as a leading platform for metaverse-related collaborations and collective efforts such as open and responsible metaverse development toward a bright future where metaverse is adequately advanced, equitably accessible, and globally embraced for the benefit of humanity.

Mission

- The mission of the Metaverse Acceleration and Sustainability Association (MASA) is to undertake activities to accelerate the development of metaverse-related technologies, ecosystems and markets across the world, and to do so in a sustainable manner, supporting sustainable development goals.

Our workstreams include but are not limited to:

- Landscape, Outlook, and Roadmaps
- Open Standards, Conformity Assessment and Certification
- Open-Source Reference Implementations and Pilot Applications
- Digital Assets Pool and Exchange
- Innovation-Driving Competitions and Rankings
- Advocacy and Lobbying for Broad Acceptance and Adoption
- Coordination for Responsible Development: Safety, Privacy, Ethics, Inclusion, and Sustainability
MASA Workstream #1:
Landscape, Outlook, and Roadmaps

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Metaverse Technology Landscape, Outlook, and Roadmaps
- To be developed and updated annually, semi-annually, or quarterly

Metaverse Global Market Analysis and Business Outlook
- To be developed and updated annually, semi-annually, or quarterly
MASA Workstream #2: Open Standards, Conformity Assessment and Certification

Open Standards for Metaverse
- Cross adoption and open access for a recommended set of metaverse-related standards from different SDOs
- “Fast-lane” standards development for metaverse-related standardization gaps
- Through IEEE SA Industry Affiliate Network (IAN)
- Welcoming partnership with other organizations: MSF, OMA3, Khronos Group, AOUSD, MPAI, W3C, etc.

Metaverse Conformity Assessment and Certification
- Through IEEE Conformity Assessment Program (ICAP)
MASA Workstream #3:
Open-Source Reference Implementations and Pilot Applications

Open-Source Metaverse Reference Implementations
- Including but not limited to software, hardware, design, data
- To enable extended senses/actions
- To build persistent virtual worlds
- To support digital finance and economy
- Through IEEE SA Open

Metaverse Pilot Applications
- In various niche markets and vertical industries
- Cooperating with Persistent Computing for Metaverse Initiative
- Cooperating with Decentralized Metaverse Initiative
- Cooperating with IEEE VR/AR Advisory Board
- Seeking partnership with investors
MASA Workstream #4:
Digital Assets Pool and Exchange

Generative AI will force the physical economy to shift towards the digital economy. Massive amounts of native digital assets will drive up the demand for ownership and transactions in the form of virtual assets.

Metaverse Digital Assets Pool
- Licensing services for models, designs, virtual assets, and more

Metaverse Digital Assets Exchange
- Trading services for models, designs, virtual assets, and more

When we talk about decentralization, what exactly do we mean?

- **Decentralized Rights**
- **Decentralized Ownership**
- **Decentralized Governance**
- **Decentralized Operations**
- **Decentralized Infrastructure**

Generative AI has lowered the barriers to production. Tasks that required a group of people to form a company can now be done by a single individual. This will drive a transformation of production relations towards decentralization.
MASA Workstream #5: Innovation-Driving Competitions and Rankings

**XR PRIZE CHALLENGE**

by the numbers

- **230** CONCEPT SUBMISSIONS
- **150** TEAMS ADVANCED TO MVP STAGE
- **90** TEAMS DELIVERED MVP
- **11** FINALISTS CHOSEN BY JUDGES
- **3** RUNNER UPS
- **1** WINNER OF THE $100,000 GRAND PRIZE

**THE IMPACT**

- **300,000 tons** carbon reduced
- **42,000 tons** waste reduced/recycled
- **132M people** impacted
- **2300 classrooms, museums, companies, and institutions impacted**
- **90% increase** in engagement, understanding, and confidence
- **24,000 square miles** of natural habitat preserved and restored
- **3000 species** impacted
- **$30K** donated to wildlife restoration

Reference Case: 2023 AWE XR PRIZE

### Metaverse Development and Creation Competitions
- Contests, hackathons, challenges
- Seeking partnership with other competitions and events: AWE, CES, etc.

### Metaverse Product and Service Rankings
- To constructively foster innovation

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MASA Workstream #6: Advocacy and Lobbying for Broad Acceptance and Adoption

With about 480,000 attendees collectively, IEEE Metaverse Congress has been one of the best-known events in the global metaverse community.

Advocacy and Lobbying for Broad Acceptance and Adoption of Metaverse

- To industry and academia
- To governments and policymakers
- To consumers and the public
MAZA Workstream #7:
Coordination for Responsible Development:
Safety, Privacy, Ethics, Inclusion, and Sustainability

Coordination for Responsible Metaverse Development

- Principles for Responsible Metaverse Development: Safety, Privacy, Ethics, Inclusion, Sustainability
- Quantitative metrics to analyze the overall impact of metaverse on sustainability
MASA Structure and Membership Levels

<table>
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<tr>
<th>Membership Level (Entity Member)</th>
<th>Committee Contribution</th>
<th>Committee Ballot</th>
<th>Committee Leadership</th>
<th>Board Governance</th>
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</table>
MASA Advisors

Vint Cerf
"Father of the Internet"

Thomas A. Furness III
"Grandfather of Virtual Reality"

Steve Mann
"Father of Wearable Computing and Augmented Reality"

Michael Grieves
"Father of Digital Twin"

Monique Morrow
President & Co-Founder, The Humanized Internet

Tom Coughlin
2023 IEEE President-Elect; 2024 IEEE President & CEO

Philip Rosedale
Founder of Second Life

Leonardo Chiariglione
Founder of MPEG; President of MPAI

Ori Inbar
Founder & CEO, Augmented World Expo

Eva A. Kaili
Member of European Parliament; 2022 VP of European Parliament

Marc Petit
Co-Host of BuildingTheOpenMetaverse.Org; Former VP of Unreal Engine at Epic Games

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MASA Team

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Founder

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Acting Executive Director

Arpana Patel
Program Manager, IEEE-ISTO

Janice Carroll
Sr. Alliance Program Membership Manager, IEEE-ISTO

Contact: Dr. Yu Yuan
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Join MASA Today
Call for Founding Members

Why Join MASA?

■ “United we stand, divided we fall.” Join MASA for cooperative endeavors that offer a steadfast path for industry advancement amidst market shifts and hype cycles.

■ “The best way to predict the future is to create it.” Join MASA to actively participate in workstreams that not only predict the future but also work in practical ways to turn those predictions into reality.

■ “If you are not at the table, you are probably on the menu.” Join MASA to ensure you are not absent from any crucial consensus-building that shapes the future of metaverse.

Why Now?

■ Unprecedented Opportunities: AI will not only comprehensively enable metaverse but also indirectly make metaverse an essential component of our lives. Further advancements in AI will also rely on metaverse. All these factors are driving metaverse toward explosive growth. Don't miss this unique chance to shape an industry on the verge of remarkable progress.

■ Pressing Challenges: Climate change, labor market transformation, and other sustainability challenges demand urgent and innovative solutions. Metaverse may well be one of the most effective solutions. Join us now in addressing global challenges with metaverse and ensuring metaverse benefits all.
About IEEE and IEEE-ISTO

IEEE

- The Institute of Electrical and Electronics Engineers (IEEE) is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity. IEEE has:
  - Over 427,000 members in more than 190 countries
  - More than 5 million documents in the IEEE Xplore® digital library, with more than 15 million downloads each month
  - An active portfolio of more than 1,000 standards and more than 1,000 projects under development
  - More than 200 transactions, journals, and magazines
  - More than 2,000 conferences and events in 106 countries

- The IEEE Standards Association (IEEE SA) is one of the six major organizational units of IEEE. IEEE SA shall establish, coordinate, develop, approve, and revise IEEE standards and conduct other standards-related activities in fields of interest to IEEE. IEEE SA shall be the IEEE interface in standards-related matters with external bodies.

IEEE-ISTO

- The IEEE Industry Standards and Technology Organization (ISTO) was established in January 1999 as a federation of member alliance programs with the aim of supporting accelerated technology standards development and market adoption for industry. ISTO mentors communities developing, certifying, and promoting their technology standards, best practices, guidelines, open source, and implementation activities.
Yu Yuan, PhD

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Dr. Yu Yuan, President of IEEE Standards Association (IEEE SA), Treasurer of Metaverse Standards Forum (MSF), is a visionary scientist, inventor, entrepreneur, and investor in the areas of Consumer Technology, Multimedia, Virtual Reality, Internet of Things, and Digital Transformation. He has been a passionate volunteer in various leadership positions at IEEE and other professional organizations. He is also serving as a member of the IEEE Board of Directors, a member of the IEEE Consumer Technology Society (CTSoc) Board of Governors, a member of the IEEE Blockchain Technical Community (BCTC) Governing Board, a member of the IEEE Brain Technical Community Steering Committee, a member of the Metaverse Standards Forum (MSF) Board of Directors, the Honorary President of the Japan International Metaverse Association, and the Executive Vice Chair of the China Institute of Communications (CIC) Blockchain Committee. He has a Ph.D., an M.S., and a B.S. in Computer Science from Tsinghua University.