THE DIGITAL ECONOMIST

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Biannual Roundtable Series Report

POWER, TECHNOLOGY, HUMANITY

A NEW ALIGNMENT

A Note from the CEO

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Every era is shaped by a question that defines what it means to be human.

Ours is this: What kind of world will we build now that we possess the power to redesign the systems that shape life itself?

For most of history, the structures that governed society—markets, institutions, and technologies—evolved slowly. Change unfolded across generations. Today, transformation occurs within years. Systems learn. Infrastructure decides. Technology no longer simply extends human capability; it increasingly defines the conditions under which humanity lives, relates, and organizes itself.

We are not merely witnessing change. We are participating in a civilizational redesign.

This moment calls for more than policy adjustment or institutional reform. It calls for clarity about first principles. What does progress mean in an age of intelligent machines? What does dignity mean when value creation is automated? What does sovereignty mean when systems operate across borders and beyond traditional control? And what does responsibility look like when the consequences of design choices extend across generations?

These are not technical questions. They are human questions.

The work ahead is therefore not only to manage technology, but to shape the direction of the human project itself. The choices we make today—about ownership, governance, intelligence, and infrastructure—will determine whether the future expands human possibility or narrows it.

At The Digital Economist, we see this moment as an opportunity to re-examine the foundations of the global economy and to imagine new systems that place human flourishing at their center. A human-centered global economy is not an abstract aspiration. It is a design challenge. It requires rethinking how value is defined, how power is distributed, and how institutions serve the societies they shape.

The conversations reflected in this report represent part of that broader effort. They bring together leaders who recognize that the future cannot be left to inertia—that alignment between power, technology, and humanity must be deliberate, principled, and continuously renewed.

But this work cannot be carried by any single organization or discipline. It demands collaboration across sectors, geographies, and perspectives. It demands institutions willing to evolve, innovators willing to assume responsibility, and leaders willing to imagine systems that do not yet exist.

The future will be shaped by those who choose to engage with its design.

We invite you into this work.

Table of Contents

Session 2

Session 3

Session 4

Session 6

Session 7

Session 9

Session 10

Foreword

Jose Luis Carvalho
Executive Director, Center of Excellence on Human-Centered Global Economy, The Digital Economist

Last December, we gathered at a moment when the consequences of institutional decisions were becoming harder to ignore.

Periods of transition reveal whether institutions are capable of governing the forces they help unleash. Ours is such a period. The question before us is not whether change is coming. It is whether the alignment between power, technology, and humanity will be intentional or left to drift according to momentum and market logic alone.

Throughout history, technological acceleration has tested governance. Financial innovation has outpaced regulation. Infrastructure has expanded faster than the social contracts meant to anchor it. Each era eventually confronted the same truth: progress without stewardship reshapes society in ways that are difficult to reverse. We are again at such a threshold, only now the systems that structure economic life, civic authority, and human agency are deeply intertwined.

The conversations convened under the theme Power, Technology, Humanity: A New Alignment were grounded in this recognition. Leaders across sectors did not come to confirm shared views. They came to confront complexity, where incentives diverge, where risks accumulate, and where design choices will shape long-term outcomes.

There was no expectation of consensus. What mattered was seriousness: the willingness to examine trade-offs without simplification and to acknowledge that fragmentation now carries real consequence.

This report reflects that moment of collective inquiry. It does not offer a manifesto, nor does it presume resolution. It offers evidence that institutional leadership can rise to the scale of the moment, if it chooses to do so.

Alignment will not emerge organically. It will require stewardship. It will require discipline. It will require institutions willing to see beyond immediate advantage and toward long-term legitimacy.

The future will be shaped regardless. The only question is whether it will be shaped deliberately.

We share this report in that spirit.

Introduction

The past decade has made one thing unmistakably clear: power is no longer held only in parliaments, boardrooms, or trading floors. It is embedded in models, protocols, platforms, and infrastructure that decide who is seen, who is served, and who is left out. Agentic AI systems negotiate on our behalf, tokenized assets rewire incentives in supply chains and finance, satellites quietly monitor our fields and cities, and data centers consume as much power as entire nations. Humanity is now entangled with technologies that act, decide, and coordinate at speeds and scales no institution was designed to match.

Power, Technology, Humanity: A New Alignment was convened to sit squarely within that tension. Over two days, December 11–12, 2025, The Digital Economist brought together fellows, senior practitioners, and institutional partners from finance, health, climate, education, infrastructure, and space. The aim was neither to celebrate technology nor to fear it, but to ask a harder question: If these systems are becoming the “operating system” of the global economy, what does it take to align them with dignity, resilience, and shared prosperity?

The series approached this question as an exploration of interlocking systems rather than isolated topics. Day 1 focused on where power is shifting: into tokenized food systems, emergent AI governance, women's health and longevity, and humanoid robotics. Day 2 shifted to the infrastructure and modalities that will carry those shifts—new forms of money, climate-linked health intelligence, AI–mediated learning, space-enabled networks, and regenerative data-center architectures. Across all ten roundtables, three through-lines consistently surfaced:

- Governance has to become reflexive—able to notice emergent behavior and adapt rather than freezing rules around yesterday's risks.
- Equity is a design parameter, not a communications theme; if it is not built into incentives, data, and ownership, it does not show up in outcomes.
- Infrastructure choices are now moral choices: every data center, satellite, payment rail, and care system either deepens extraction or strengthens a regenerative commons.

What follows is not a transcript but a synthesis. Each session is distilled into a common structure so that decision-makers can see patterns across domains and translate them into their own contexts. The goal is simple: to equip leaders who are ready to treat power, technology, and humanity not as competing forces but as elements of a new, deliberately aligned system.

Sessions Overview

1. **Tokenization in Agriculture: Value and Transparency in Global Food Systems**

   How tokenized records, data, and incentives can rebalance value flows in agriculture, increase trust for smallholders, and illuminate externalities across food systems.

2. **Policy as a Catalyst: Ethical Innovation and Inclusive Digital Prosperity**

   How policy, regulation, and multilateral collaboration can steer AI and digital markets toward broad-based prosperity rather than narrow advantage.

3. **Emergent Governance and Ethics: Anchoring Autonomy with Reflexivity**

   How boards, technologists, and communities can govern agentic AI through bounded autonomy, reflexive oversight, and cultures where dissent and lived experience inform decisions.

4. **Gender Equity and Healthy Longevity: Women's Health for the Digital Age**

   How closing data gaps in women's health, investing in healthy longevity, and redesigning care pathways can make equity a driver of innovation rather than an afterthought.

5. **Rise of the Humanoids: Five Things You Must Know About Physical AI**

   How humanoid and embodied AI will enter factories, hospitals, and homes; what layered safety, labor transitions, and global governance they demand; and why trust—not technology—is the bottleneck.

6. **CBDCs, Stablecoins, and Emerging Money Modalities: Towards New Value Exchange Ecosystems**

   How central bank digital currencies, stablecoins, and tokenized deposits will coexist; what this means for payments, capital flows, and sovereignty; and how privacy and inclusion can be preserved.

7. **Climate Change and Health: Building Resilience for Meteorological Extremes**

   How heatwaves, storms, and floods are already reshaping neurological, mental, and community health—and what climate-informed facilities, supply chains, and community supports look like in practice.

8. **AI and Education: The Great Relearning Revolution**

   How education must pivot from guarding answers to cultivating questions, judgment, and creativity—while adults relearn how to guide learners growing up "behind glass" with AI as a constant companion.

9. **Space, So What? The Next Frontier for AI, Blockchain, and Human Health**

   How space infrastructure, AI, and blockchain can democratize access to satellite data, health research, and ownership in the space economy—and how governance and culture must evolve with them.

10. **Regenerative Digital Infrastructure: Architectures for a Shared Future**

    How data centers and cloud infrastructure intersect with electricity grids, water systems, community consent, and circular-economy principles—and what it will take to build an AI era that is actually sustainable.

Across these sessions, participants began to sketch a different kind of roadmap: one where power is not surrendered to technology, nor technology rejected on principle, but where both are consciously shaped to expand the space in which human beings can live, decide, and thrive together.

Session 1

Agriculture Tokenization in India: Value and Transparency in Food Systems

As blockchain technology and tokenization reshape agricultural markets globally, India stands at a critical juncture—one where transparent supply chains and farmer-centered financial models can address both food security and livelihood challenges. This session convenes five leaders reshaping India's agricultural ecosystem to explore how tokenization can build consumer trust through traceability and unlock new revenue streams for smallholder farmers through carbon credits and regenerative-practice verification.

Moderator

Dr. Nikhil Varma
Chair, Digital Assets and Blockchain,
The Digital Economist

Speakers

Shreedhar Bhat
Founder and Managing Director,
Scallion Commerce Pvt. Ltd.

Suraj Teja
CEO and Founder,
Sow and Reap

Nikhil Bharadwaj
Change and Strategy Leader,
Scallion

Dr. Sindhu Bhaskar
Chairman and Founder,
EST Group of Companies

1.1 Session Framing

1.1.1 Provocation

How can tokenization create transparent, equitable agricultural systems that serve both consumers seeking verifiable food provenance and farmers seeking sustainable livelihoods and fair market access?

1.1.2 Context and Trends Highlighted

The session opened by positioning agricultural tokenization along two strategic pathways: provenance (using tokens as proof of origin and traceability to build consumer trust) and impact (using tokens to verify regenerative practices and unlock new revenue streams through carbon credits and green premiums). The discussion emphasized India's unique position as a nation with 1.4 billion people dependent on agriculture, smallholder farmers managing just two to three acres, and rising agritech innovation creating opportunities for blockchain-based solutions. The moderator framed tokenization not as a technological end in itself but as infrastructure for democratizing agricultural value and building more resilient food systems.

1.1.3 Tensions and Contrasts Explored

- **Traceability vs. Complexity:** While blockchain enables unit-level tracking from farm to consumer, implementing this across India's diverse and fragmented agricultural landscape—with millions of smallholders and informal supply chains—requires infrastructure investment and farmer education that existing systems often lack. The challenge lies in making technology accessible without imposing burdensome compliance requirements on small producers.

- **Farmer Awareness vs. Consumer Pull:** Tokenization creates new value for farmers through carbon credits and premium pricing, yet farmers often lack awareness of these benefits while consumers may not yet demand or understand tokenized products. Building simultaneous awareness and demand on both sides requires coordinated policy action, market education, and institutional support.

- **Data Ownership vs. Regulatory Control:** Tokenization empowers farmers through data ownership and transparency, yet government regulators must establish frameworks that recognize blockchain-generated data as legitimate for compliance, insurance, and financial purposes. The tension lies in balancing decentralization with regulatory legitimacy.

- **Short-Term Revenue Pressure vs. Long-Term Regenerative Practice:** Farmers face immediate income pressures and may default to high-yield but unsustainable practices while regenerative agriculture and carbon-credit programs operate on multi-year timelines that require upfront investment and trust. Success depends on mechanisms—such as tokenized loans and insurance—that reduce farmer financial stress during transition periods.

- **Centralized Infrastructure vs. Distributed Decision-Making:** Tokenization can operate on public or private blockchains, with data stored centrally or in distributed systems. These choices affect scalability, cost, and governance. The session explored how hybrid architectures—combining public chains for transparency, private chains for compliance, and IoT for real-time data—might balance efficiency with inclusivity.

1.2 Key Contributions from Speakers

1.2.1 Shreedhar Bhat on Supply-Chain Traceability and Verifiable Trust

- **Addressing Counterfeits and Food Integrity:** Bhat framed an urgent market failure: “Food has become ‘guilty until proven innocent,’” driven by economically motivated adulteration that has produced counterfeit, spurious, and fake products with direct consequences for consumer health. According to WHO statistics, an estimated 600 million people—almost 1 in 10 people globally—fall ill annually from eating contaminated food, resulting in approximately 420,000 deaths. The challenge begins at the farm level, where counterfeit seeds—often sold with falsified germination percentages—devastate farmer yields and income before cultivation even begins. Scallion Commerce addresses this through unit-level supply-chain traceability, combining blockchain, satellite imagery, IoT sensors, and RFID technology to capture every “change of hand” event—critical moments where data typically disappears between farmers, processors, institutional buyers, and consumers.
- **Making Invisible Data Verifiable and Transactable:** The power of blockchain immutability is that “every stakeholder in the supply chain—from farmers to exporters, insurers, and certifiers—can access and verify authentic, tamper-proof data.” This shifts food from a trust-based commodity into a data-backed product. A consumer holding a mango grown in India’s GI–tagged regions can now verify the exact farm of origin, agronomic practices applied, certifications involved, and satellite-verified geolocation. Blockchain’s immutable ledger, corroborated by IoT and satellite imagery, creates a single ecosystem where data cannot be altered once certified. Certification agencies, quality-testing labs, exporters, and insurers all access the same trusted dataset—solving the longstanding institutional problem of reliance on unverifiable labels and paper-based claims.

1.2.2 Suraj Teja on Carbon Credits and Regenerative Farmer Impact

- **Scaling Trust Through Digital MRV and Farmer Wallets:** Suraj Teja described a landmark achievement: the world's first Gold Standard–certified carbon credits issued to Indian farmers practicing alternate wetting and drying in rice cultivation. The project engaged approximately thirty-five thousand farmers across multiple rice-producing states and, according to project statements, aims to generate over one million carbon credits from paddy cultivation over the next two years (CID 2025; ICN 2025). At the core is Sow and Reap's digital MRV (measurement, reporting, and verification) platform, built on blockchain to ensure tamper-proof, globally verifiable credits. Teja emphasized that blockchain-based DMRV platforms provide the transparency and tamper-proof verification required to engage farmers effectively, particularly where carbon incentives are involved.

- **Operationalizing Equity Through Smart Contracts:** Trust is operationalized through smart contracts and farmer wallets. When carbon credits are monetized, each of the thirty-five thousand farmers receives their equitable share directly to their wallet—not as a promise but as an encoded obligation visible to both farmers and credit buyers. "When carbon projects span many geographies and thousands of farmers, buyers need tamper-proof data. For farmers, participation ultimately comes down to trust." Beyond financial returns, farmers adopt regenerative practices that improve soil health, increase yields, reduce water consumption, and cut pesticide and fertilizer use. Teja underscored his commitment to integrity by revealing that Sow and Reap operated at zero revenue for four years before monetization, building trust through consistent, no-cost farmer support. Acting on fairness matters more than discussing it: blockchain encodes commitments in ways traditional contracts cannot, ensuring farmers experience tangible gains each cropping season through soil enrichment, yield improvements, and water savings.

1.2.3 Nikhil Bharadwaj on Financial Models and Revenue Democratization

- **Democratizing Access Through Farmer Producer Organizations:** Bharadwaj reframed the smallholder challenge as one of democratization. While an Indian farmer typically manages two acres—compared to roughly 500 acres for a US farmer—government-supported Farmer Producer Organizations (FPOs) pool small plots into collectives of 1,000 to 1,500 acres, making scalable, technology-enabled revenue models finally practical for smallholder farmers. With trust and transparency embedded through tokenization, these FPOs unlock multiple revenue streams: harvest tokens, land-holding tokenization, carbon credits, and eventually real-world asset (RWA) tokenization. Modeling suggests potential revenue increases of 15–20 percent under optimistic scenarios in which policy frameworks align and adoption scales rapidly. This projection exceeds historical farm income growth rates and represents an aspirational target rather than a conservative estimate (Chaudhary &Thorat 2021; PHDCCI 2025; PRS 2024; The Times of India 2025; NAAS 2024).

- **Forward Contracting and Risk Management:** When pressed on future-crop tokenization and forward contracting—mechanisms that could give farmers liquidity before harvest and reduce dependence on predatory lending—Bharadwaj acknowledged that technical solutions exist but require accelerated government support. Parametric insurance embedded within climate-centric offerings provides partial protection, yet true financial hedging of agricultural commodities remains underdeveloped in India. As FPOs mature, they may eventually access global hedging instruments, themselves tokenized for broader participation. The real constraint is not in technology but in unit economics: counterfeit seed inputs can reduce germination rates from 95 to 60 percent, collapsing farm viability before any downstream financial model can compensate.

1.2.4 Dr. Sindhu Bhaskar on Holistic Infrastructure and Farmer-Centered Development

- **Four Critical Technical Components for Scalable Tokenization:** Dr. Bhaskar articulated the infrastructure required for scale:
    - A hybrid public-private blockchain architecture
    - IoT and soil-tech devices that render previously invisible farmer data visible and transactable
    - Oracles enabling frictionless information flow
    - Ancillary financial and social services.

  A hybrid centralized–decentralized architecture using public and private blockchains with IoT is needed to make farmers' data verifiable and transactable, from soil health to carbon outcomes. EST Group's philosophy transforms agriculture from external support dependency to farmer-led wealth creation through three stages: farmers as producers (inputs provided from a pool, loans tokenized), farmers as sellers (supply-chain management with blockchain-based traceability), and farmers as wealth creators (multiple revenue channels, data ownership, capital formation). The goal is to position farmers as active drivers of the national economy, enabled by trusted, curated data made reliable through blockchain and tokenization.

- **Holistic Welfare as a Prerequisite, Not an Add-On:** Dr. Bhaskar cautioned that tokenization succeeds only when farmers are not under acute stress. Effective adoption of new technologies depends on farmers having stable conditions for growth; without adequate health, education, and social support, no technological solution—including tokenization—can succeed. EST Global integrates fintech, agritech, healthcare, and edtech into a continuum. The platform also tokenizes agricultural loans, shifting from traditional one-year terms to five-year arrangements paired with insurance wraps, protecting both farmers from seasonal repayment pressure and banks from non-repayment due to crop failure—a structural issue contributing to farmer suicides. The moderator highlighted a crucial insight: farmer suicides result not from lack of technology but from fundamentally broken unit economics, where counterfeit inputs, poor access to credit, and asymmetric market information trap farmers in debt cycles.

1.3 Discussion, Engagement, and Outcomes

1.3.1 Audience Engagement

Dr. Nikhil Varma guided the conversation across the two strategic pathways, consistently positioning data integrity as the central challenge. Rather than focusing on the act of placing information on ledgers, the discussion emphasized maintaining data authenticity as products physically move through complex supply chains. This framing directly connected Scallion's unit-level traceability work with Sow and Reap's farmer-wallet model and EST Global's broader infrastructure vision.

When Genevieve Leveille raised critical questions around data policy and financial hedging beyond insurance mechanisms, Dr. Varma deliberately created space for nuance rather than offering simplified answers. He acknowledged that Indian agriculture has not yet matured to support commodity hedging at market scale, and that tokenized loans and insurance wraps currently serve as interim solutions.

Environmental concerns were also addressed. Dr. Varma clarified that newer-generation blockchains such as Algorand—on which Sow and Reap operates—are carbon-negative rather than carbon-intensive, with negligible or net-positive environmental footprints. This distinction is often lost in discussions fixated on Bitcoin's energy consumption.

Throughout the session, the moderator underscored that policy legitimacy (government and regulatory acceptance of blockchain-generated data as valid) and farmer readiness (including education, access, and trust-building) are as critical to success as the underlying technology itself.

1.3.2 Audience Themes and Questions

- **Farmer Awareness and Consumer Demand:** Jose Carvalho raised a key concern: What is missing to ensure farmers understand the benefits available to them, and that consumers actively push for tokenization-enabled products? The question surfaced a classic chicken-and-egg dilemma. Farmers need consumer demand to justify adopting tokenized systems while consumers lack awareness of what tokenization offers. The discussion emphasized that policy interventions and coordinated marketing efforts—across both government and the private sector—are required to build farmer readiness and consumer pull simultaneously.

- **Data Policy and Protection:** Genevieve Leveille emphasized that while tokenization promises fairness, meaningful protection for farmers ultimately depends on data policy shaped at federal and regional levels. She underscored that data governance—not fairness rhetoric alone—is what gives farmers genuine protection and control. While blockchain enables transparency, regulatory frameworks that safeguard privacy and formalize farmer data ownership must accompany technological solutions.

- **Defining and Demonstrating Equity:** Genevieve further pressed on what fair actually means, and how equity differs from fairness. She argued that blockchain's value lies not in abstract notions of fairness, but in equity—where individual effort and contribution directly determine reward distribution. This distinction shifted the discussion from aspirational language to measurable, effort-based value allocation encoded in smart contracts.

- **Financial Hedging and Risk Management:** A more sophisticated concern followed: while blockchain surfaces facts and creates transparency, facts alone do not protect against financial risk. What happens when climate events or geopolitical disruptions prevent carbon credits from being generated? Parametric insurance can address climate triggers, but questions remain around financial obligations and hedging strategies. Speakers acknowledged that although parametric insurance exists, true commodity hedging within Indian agriculture remains underdeveloped and will require further market maturation and risk instruments.

- **Sustainability Cost of Blockchain Itself:** An audience member questioned whether the blockchain infrastructure supporting regenerative agriculture carries its own environmental cost. The discussion clarified that concerns often associated with Bitcoin do not apply to newer-generation blockchains such as Algorand, which are carbon-negative, making sustainability impacts minimal or net-positive.

1.3.3 Reflections and Insights

- **Data Immutability Enables Ecosystem-Wide Verification:** The conversation reinforced that blockchain's primary value lies not in speed or cost reduction, but in creating an immutable, shared source of truth accessible to all supply-chain actors—from farmers to exporters, insurers, and certifiers. This replaces information silos and blind trust with verifiable, auditable data.

- **Tokenization Requires Simultaneous Policy Legitimacy and Farmer Education:** Technology alone is insufficient. Regulators must recognize blockchain-generated data as valid for compliance, insurance, and financial purposes while farmers must be equipped and confident in adopting these systems. Without both, tokenization remains technically sound but practically inaccessible.
- **Unit Economics Trump Technology:** Speakers repeatedly emphasized that technology cannot repair broken fundamentals. If counterfeit inputs undermine yields, if farmers face exploitative lending, or if market access remains dominated by intermediaries, tokenization alone cannot deliver prosperity. Technological systems must be embedded within broader structural reforms addressing debt cycles, input quality, and market access.
- **Equity Must Be Encoded, Not Assumed:** Smart contracts operationalize equity by embedding reward distribution directly into system design. This transforms equity from an aspirational promise into an enforceable reality. When carbon credits are monetized, farmers' predetermined shares flow automatically to their wallets, making fairness non-negotiable.
- **Holistic Farmer Support Is Foundational:** Technology succeeds only when farmers are not operating under acute stress. This requires access to healthcare, education, and financial security—not innovation in financing alone. EST Global's integration of fintech, agritech, healthcare, and edtech reflects a recognition that farmer welfare extends well beyond crop production.

1.3.4 Key Takeaways

- **Data Immutability Creates Ecosystem-Wide Trust:** Blockchain's tamper-proof architecture enables every supply-chain actor—from farmers to exporters, insurers, and certifiers—to access and verify authentic data, replacing blind trust with verifiable, auditable information.
- **Farmer Producer Organizations Enable Tokenization Scale:** By pooling small landholdings into collectives of more than a thousand acres, FPOs create the scale at which technology-enabled revenue models become viable, potentially increasing farmer income by 15–20 percent through multiple tokenized revenue streams.
- **Smart Contracts Operationalize Equity at Scale:** Blockchain-encoded agreements ensure that when carbon credits are monetized or crops are sold, farmers' predetermined shares flow directly to their wallets, making fairness enforceable rather than aspirational.
- **Policy Legitimacy Is as Critical as Technology:** Governments must recognize blockchain-generated data as valid for compliance, insurance, and financial purposes. Without regulatory acceptance, tokenization remains technically sound but legally ambiguous.
- **Unit Economics and Structural Reform Precede Technology:** Tokenization cannot fix broken fundamentals such as counterfeit seed inputs or exploitative debt cycles. Improvements in farmer unit economics and market access must accompany technological innovation.
- **Holistic Farmer Welfare Is a Prerequisite, Not an Add-On:** Technology succeeds only when farmers are not operating under acute stress from poor health, limited family education, or seasonal debt. Tokenization must be embedded within comprehensive support systems.
- **Carbon-Negative Blockchains Resolve Environmental Concerns:** Newer-generation blockchains mitigate the carbon-footprint critique, allowing regenerative agriculture initiatives to scale without undermining sustainability gains.
- **Simultaneous Farmer Awareness and Consumer Pull Are Essential:** Farmers need consumer demand to justify adoption while consumers lack awareness of tokenization's benefits. Coordinated policy, marketing, and institutional support are required to align incentives on both sides.

1.3.5 Broader Relevance

As India confronts persistent challenges related to farmer livelihoods, food security, and climate resilience, tokenization represents more than a technical innovation—it signals a structural shift in who controls agricultural value and market information. By making farmers' data visible, transactable, and reward-generating, tokenization can democratize access to global markets and financial instruments historically reserved for large aggregators.

Success, however, depends not on blockchain alone. It requires policy alignment that recognizes blockchain-generated data as legitimate, farmer readiness built through education and trust-building, a genuine commitment to equity operationalized through smart contracts, and structural reforms that address fundamental unit economics. When these elements align, tokenization can help India build a more transparent, resilient, and farmer-centered food system—one in which smallholders are drivers, rather than beneficiaries, of agricultural value creation.

Session 2

Policy as a Catalyst: Ethical Innovation and Inclusive Digital Prosperity

As technology accelerates faster than institutional and regulatory systems can adapt, the central challenge facing global economies is no longer whether artificial intelligence and digital innovation will reshape societies but how they will be governed, who will benefit, and what safeguards will protect vulnerable communities. This session convened international policymakers, technologists, and governance experts to examine how policy can serve as a true catalyst for ethical innovation and inclusive digital prosperity—ensuring that frontier technologies empower rather than exclude.

Moderator

Imen Ameur
Professor of Practice, Hult International Business School & Senior Executive Fellow, The Digital Economist

Speakers

Dr. Melodena Stephens
Professor of Innovation and Technology Governance, Mohammed Bin Rashid School of Government, Dubai & Chair, Tech Policy and Governance, The Digital Economist

Ambrose Ruyooka
Head of the Department of Research and Development, Ministry of ICT and National Guidance, Republic of Uganda

René Bostic
Senior Executive Fellow, The Digital Economist

Kelly Ommundsen
Head of Digital Inclusion and Government Technology, World Economic Forum

2.1 Session Framing

2.1.1 Provocation

How can policy mechanisms be designed to ensure that ethical innovation catalyzes inclusive digital prosperity while protecting vulnerable communities from the concentration of power and deepening inequalities that frontier technologies risk creating?

2.1.2 Context and Trends Highlighted

The session opened by positioning technology as advancing faster than collective institutional and regulatory capacity can adapt. AI and digital systems now shape economic growth, public service delivery, information flows, and the distribution of opportunity across the global economy.

The moderator highlighted a critical moment of alignment: an emerging international consensus that ethical and inclusive governance is essential for innovation to be trusted, competitive, and sustainable. Recent developments underscore this shift. The Seoul Statement (December 2, 2025) established shared principles for AI safety, transparency, interoperability, and ethical safeguards. The OECD AI Principles emphasize fairness, accountability, robustness, and alignment with human values. The UN Global Digital Compact situates digital transformation within broader commitments to equity, human rights, and the public interest.

Taken together, these initiatives reflect a fundamental reality: ethics is no longer a peripheral technological concern but the foundation on which responsible, equitable, and sustainable innovation can scale.

2.1.3 Tensions and Contrasts Explored

- **Speed of Innovation vs. Depth of Understanding:** Technology advances exponentially while regulatory systems evolve incrementally. Policymakers often lack sufficient technical understanding to regulate effectively, and innovation outpaces institutional capacity for meaningful adaptation. The tension lies in enabling breakthrough innovation while ensuring adequate safeguards before deployment.

- **Global Frameworks vs. Local Contexts:** International principles and regulatory models are frequently developed by wealthy nations and institutions, then applied to emerging economies with vastly different socioeconomic conditions, infrastructure constraints, and governance maturity. Effective policy requires adapting global principles to local realities rather than replicating them wholesale.

- **Efficiency Gains vs. Distributional Fairness:** AI and digital systems promise efficiency, automation, and cost reduction, yet these gains often accrue disproportionately to capital and affluent consumers. Meanwhile, workers and marginalized communities face displacement, data extraction, and exclusion. Policy must confront whether technology mitigates inequality or amplifies it.

- **Infrastructure Investment vs. Affordability:** Frontier technologies depend on underlying digital infrastructure—connectivity, devices, and digital literacy—yet in many regions, even basic broadband and hardware remain unaffordable for large segments of the population. The gap between infrastructure availability and economic access creates a structural barrier to genuine inclusion.

- **Decentralized Power vs. Concentrated Platforms:** Digital systems have the potential to distribute power and democratize opportunity, yet dominant platforms often capture disproportionate value while creators and communities in the Global South earn subsistence returns. Policy must shape not only technological deployment but the kind of global digital economy it seeks to enable.

2.2 Key Contributions from Speakers

2.2.1 Dr. Melodena Stephens on Contextual Understanding and Governance Fragmentation

- **The Root Cause:** Limited Understanding and Contextual Gaps: Dr. Stephens identified a foundational challenge: limited understanding of technologies already in use, compounded by contextual gaps in how terms such as technology, innovation, and impact are defined across different environments. She noted that policy is often treated as a catch-all term encompassing laws, regulations, guidelines, and initiatives—each with very different implications and levels of rigidity. This semantic and conceptual compression undermines coherent policymaking. The challenge is not simply drafting rules but ensuring that policymakers and stakeholders share a precise understanding of what technologies do, where their limits lie, and how their impacts manifest in specific contexts.

- **Fragmentation and Global Inequality:** She highlighted a key consequence of fragmented global governance: value concentration among a small number of actors while workers elsewhere earn subsistence wages. She pointed to cases where companies achieve valuations in the hundreds of millions while paying only a few dollars per hour for content moderation or coding work in other regions. This reflects deeper structural choices about how the global digital economy is organized. She emphasized that technology can help reduce inequality if designed intentionally—but can just as easily amplify it. The path taken matters as much as the destination.

- **Agile Policy as Living Document:** She argued that participatory governance with shared responsibility requires fundamentally different policy design. When future implications remain uncertain, policy cannot be treated as fixed or final. Instead, it must be agile—capable of rapid iteration, feedback, and course correction. This approach requires diversity of perspectives, continuous monitoring, and the institutional willingness to revise policies when outcomes diverge from intent, rather than relying on static regulatory frameworks.

2.2.2 Kelly Ommundsen on Concrete Policy Levers and Global Examples

- **Risk-Based, Rights-Centered Regulation:** Ommundsen outlined four foundational policy mechanisms, beginning with risk-based, rights-centered regulation for AI and data. She highlighted Singapore's AI governance framework as a practical example, where accountability is tied to system impact and protections are tiered accordingly. High-risk use cases—such as those affecting financial decisions or health outcomes—trigger stronger requirements for testing, transparency, and human oversight. This graduated approach also provides a pathway for agentic systems: starting with high-volume, low-risk tasks before advancing into more sensitive domains.

- **Mandatory Impact and Bias Assessments:** Canada's Algorithmic Impact Assessment was cited as an example of how disclosure and evaluation requirements can protect affected communities. The framework mandates transparency when AI is used and, for higher-risk systems, requires mitigation measures, oversight mechanisms, and avenues for appeal. This shifts AI from an opaque decision-making tool to one that is reviewable and accountable.

- **Inclusive Infrastructure as Foundation:** Inclusive digital prosperity depends on foundational infrastructure: connectivity, digital identity systems, and access to basic digital services. Without these, the benefits of innovation remain inaccessible to large segments of the population. Achieving inclusion requires deliberate public investment, targeted subsidies, and policy coordination.

- **Co-Design with Affected Communities:** Meaningful inclusion requires co-design. Communities must be involved not only in consultation but in the ongoing design, implementation, and iteration of governance frameworks. This ensures that policy responds to lived barriers and real opportunities, rather than abstract assumptions.

- **Concrete Examples of Success:** Ommundsen pointed to Brazil's GovTech and digital inclusion initiatives, which combine connectivity investments with digital public-service platforms and targeted support for marginalized communities. She also referenced India's India Stack—including Aadhaar, UPI, and consent-based data-sharing frameworks—which enabled large-scale financial inclusion and new business models while also surfacing important governance questions around privacy and data rights. In each case, success emerged from the alignment of infrastructure, enabling regulation, and multi-stakeholder collaboration, rather than reliance on any single policy lever.

2.2.3 René Bostic on AI Ethics, Accountability, and the Execution Gap

- **Awareness vs. Execution Gap:** Bostic identified a persistent disconnect between awareness and action. While ethical commitments around AI are widely articulated, execution remains uneven. Without policy-backed, repeatable frameworks, fairness does not scale, and ethical principles remain aspirational rather than operational.

- **Lifecycle Governance and Transparency:** She emphasized that the most urgent policy gaps lie in accountability and transparency across the full AI lifecycle. This includes documenting training data provenance, defining clear boundaries for use cases, establishing independent audits, assessing environmental impacts, and requiring continuous monitoring to address model drift. These practices must be embedded as core requirements rather than optional enhancements.

- **Capacity Gap in Policymaking:** A secondary but critical gap exists within regulatory institutions themselves. Policymakers and regulators often lack the technical expertise needed to keep pace with AI developments. This creates a cycle in which regulators either defer excessively to industry or impose blunt rules that inadvertently constrain responsible innovation. Building internal capacity is therefore essential to effective governance.

2.2.4 Ambrose Ruyooka on Infrastructure, Literacy, and Localization in the Global South

- **Practical Obstacles in Emerging Economies:** Ruyooka outlined the operational challenges facing public-sector implementation in contexts such as Uganda, including limited rural infrastructure, affordability barriers for devices and services, and low levels of digital literacy across segments of the population. These constraints shape what inclusive digital policy can realistically achieve.

- **Beyond Connectivity:** The Affordability Gap: He emphasized that expanding connectivity alone is insufficient. Even where broadband access improves, many citizens cannot afford the devices required to use digital services. This final-mile affordability gap represents a structural barrier to inclusion that policy must explicitly address.

- **Localization Over Copy-Paste:** He stressed that global governance frameworks must be adapted rather than replicated wholesale. International principles need to be aligned with local socio-economic realities, institutional capacity, and cultural context. Effective governance requires partnership and co-creation, not policy copy-pasting.

- **Resource Constraints and Partnership Models:** Finally, he acknowledged that financial and human resource constraints limit regulatory capacity in many Global South contexts. Governments often rely on partnerships with private-sector actors and international organizations to co-create solutions. While necessary, these partnerships can embed power asymmetries, underscoring the need for careful governance to ensure local priorities remain central to policy design.

2.3 Discussion, Engagement, and Outcomes

2.3.1 Audience Engagement

Imen Ameur guided the conversation with precision, opening by establishing that the central question is no longer whether technology will influence societies but how, for whom, and with what safeguards. She framed ethics not as a constraint, but as the foundation for trustworthy, competitive, and sustainable innovation.

Throughout the session, Ameur wove the speakers' contributions into a coherent, escalating narrative—from Dr. Melodena Stephens's identification of contextual understanding gaps and governance fragmentation, to Kelly Ommundsen's articulation of concrete policy levers, including risk-based regulation, impact assessments, infrastructure investment, and co-design. She then connected these to René Bostic's emphasis on the execution gap in AI ethics, and Ambrose Ruyooka's grounding in on-the-ground implementation realities in the Global South.

Rather than treating these perspectives as discrete, Ameur highlighted their interdependence. She illustrated how Singapore's tiered regulatory approach could inform the sequencing of agentic workflows, how Brazil's and India's infrastructure-plus-regulation models demonstrate scalable pathways, and how Uganda's challenges reflect deeper structural dependencies across affordability, capacity, and access.

Her closing synthesis underscored a central insight: ethical innovation should not be viewed as a barrier, but as a catalyst for long-term prosperity. Trust and inclusive growth, she emphasized, depend on intentional design, strong governance, and collaborative partnerships across sectors.

2.3.2 Audience Themes and Questions

- **Policy as Clarification and Iteration, Not Prediction:** Audience members expressed concern that policymakers often attempt to predict and regulate technologies whose implications remain uncertain. Dr. Stephens's framing of policy as a "living document" requiring rapid iteration resonated strongly. Questions focused on how governments can remain agile while still providing the regulatory clarity businesses need to invest and innovate.
- **The Execution Gap:** Multiple participants highlighted a disconnect between widespread awareness of ethical principles and their practical implementation. Bostic's articulation of this execution gap—where ethical frameworks remain theoretical while operational systems lack repeatable practices—prompted questions about what enforcement mechanisms could effectively bridge awareness and action.

- **Infrastructure as Political Choice:** Ruyooka's discussion of connectivity and affordability constraints prompted reflection on infrastructure as fundamentally a political decision rather than a purely technical one. Audience questions explored whether policy should mandate device subsidies, regulate corporate service pricing, or rely on market mechanisms to close access gaps.
- **Global Power Dynamics in Standard-Setting:** The discussion surfaced concerns that international frameworks developed by wealthy nations risk embedding their priorities into governance structures in the Global South. Audience members questioned whether co-design and localization can genuinely rebalance power asymmetries when Global South countries depend on Global North institutions and companies for technical capacity and capital.

2.3.3 Reflections and Insights

- **Contextual Understanding Precedes Effective Policy:** The session reinforced that vague terms such as technology, innovation, and impact often obscure rather than clarify. Effective policy requires shared, precise understanding of what technologies actually do, their limitations, and their implications within specific contexts. Without this baseline clarity, policymakers cannot meaningfully assess trade-offs or design appropriate safeguards.
- **Ethics Requires Operational Systems, Not Just Statements:** High organizational awareness of AI ethics principles often masks a deeper execution gap. Fairness, accountability, and transparency must be embedded in repeatable systems—such as training data documentation, defined use-case boundaries, independent audits, and continuous monitoring—rather than expressed as aspirational commitments. Policy can accelerate this shift by tying compliance to concrete operational requirements.
- **Infrastructure Investment Alone Is Insufficient for Inclusion:** While expanding broadband connectivity is necessary, it does not guarantee access if devices remain unaffordable or digital literacy remains low. Genuine inclusion requires parallel investment in affordability, education, and culturally appropriate design. In many contexts, the affordability barrier proves more persistent than connectivity itself, as it reflects deeper questions about who captures value from digital services.

- **Tiered, Risk-Based Regulation Balances Innovation and Protection:** Frameworks from jurisdictions such as Singapore and Canada demonstrate that effective regulation need not suppress innovation. By linking requirements to system impact and use-case risk, and by defining clear escalation triggers, policy can protect high-risk domains while enabling experimentation in low-risk environments. This approach also offers a practical roadmap for emerging technologies such as agentic AI.
- **Global Frameworks Must Enable Local Adaptation, Not Enforce Uniformity:** Ruyooka's emphasis on adaptation over replication reflects a core insight: uniform regulation cannot address vastly different socioeconomic and institutional contexts. Effective international governance allows for principled localization, where shared values—equity, transparency, and human rights—guide context-specific interpretation and implementation.
- **Multi-Stakeholder Collaboration Is Essential but Asymmetric:** The discussion acknowledged that resource-constrained governments often rely on partnerships with private-sector actors and international organizations. While necessary, these arrangements can reinforce power imbalances in which Global South priorities are subordinated to Global North interests. Genuine collaboration requires intentional power-balancing mechanisms and sustained investment in local capacity.

2.3.4 Key Takeaways

- **Contextual Understanding Must Precede Policymaking:** Vague terminology and limited understanding of technology, innovation, and impact undermine coherent governance. Effective policy requires precise, shared understanding of what technologies do, their limits, their scope, and their implications in specific contexts—supported by diverse stakeholder participation in definition-setting.
- **Policy Must Balance Agility with Clarity:** Rather than attempting to predict uncertain futures, policy should function as a living framework capable of rapid iteration and course correction. This requires monitoring mechanisms, stakeholder feedback loops, and explicit authorization to amend policies when evidence shows they are not working.

- **Risk-Based, Rights-Centered Regulation Protects Vulnerable Communities:** Tiered governance frameworks that scale requirements based on system impact and use-case risk can protect high-risk domains—such as finance, health, and critical infrastructure—while enabling low-risk experimentation. Rights-centered approaches prioritize affected communities and require transparency, disclosure, and meaningful recourse.

- **Mandatory Impact and Bias Assessments Turn Ethics into Enforcement:** Requirements to document training data, define use-case boundaries, conduct independent audits, and enable review and appeal transform ethical principles into operational obligations. Policy incentives are essential to ensure these practices are embedded, not optional.

- **Infrastructure Investment Must Address Affordability and Literacy, Not Just Connectivity:** Expanding broadband alone does not guarantee access if devices remain unaffordable and digital literacy is low. Inclusive policy requires simultaneous investment across connectivity, affordability, and education, with targeted programs for marginalized communities.

- **Co-Design with Affected Communities Ensures Relevance and Buy-In:** Involving communities directly in governance design and iteration—rather than consulting after the fact—ensures policies reflect lived realities, address actual barriers, and build legitimacy and implementation support.

- **Policymaker Capacity Is a Prerequisite for Effective Governance:** Regulatory bodies need sufficient technical expertise to assess AI risks and opportunities accurately. Without this capacity, governments risk either deferring to industry or imposing blunt regulations that constrain responsible innovation.

- **Global Frameworks Should Enable Principled Localization:** International principles—such as equity, transparency, accountability, and human rights—should guide local adaptation without enforcing uniform implementation. Effective global governance creates space for context-specific interpretation while maintaining shared values.

- **Fragmented Governance Risks Deepening Inequality:** Absent coordinated policy defining the kind of global digital economy societies seek, technology tends to amplify inequality—allowing value concentration among firms while workers elsewhere earn subsistence wages. Intentional governance design is required to ensure technology levels, rather than deepens, inequality.

- **Execution Gaps Between Ethical Awareness and Practice Remain Acute:** High organizational awareness of AI ethics often conceals weak operational systems. Fairness, accountability, and transparency require repeatable practices embedded in organizational processes. Policy must incentivize and enforce these standards, not merely encourage aspirational commitments.

2.3.5 Broader Relevance

As frontier technologies reshape economies, labor markets, and the distribution of opportunity worldwide, the role of policy is shifting from reactive regulation to proactive catalysis. The session underscored that ethical innovation and inclusive digital prosperity are not constraints on growth, but foundational conditions for sustainable and trustworthy advancement.

By combining risk-based regulation, mandatory accountability mechanisms, inclusive infrastructure investment, and participatory governance design, policymakers can harness technological potential while protecting vulnerable communities from displacement and deepening inequality. The core challenge lies not in regulatory ambition, but in execution: building sufficient policymaker capacity, embedding ethical practices into operational systems, closing infrastructure gaps—including affordability—and genuinely co-designing governance with affected communities.

When these elements align, policy becomes a true catalyst—enabling frontier technologies to generate shared value across communities, workers, and emerging economies, rather than concentrating power and opportunity among a privileged few.

Session 3

Emergent Governance and Ethics: Anchoring Autonomy with Reflexivity

As AI systems evolve from deterministic tools into agentic systems capable of setting goals, adapting strategies, and operating with minimal human intervention, governance and ethics must evolve in parallel. This roundtable explored how leadership, system design, and organizational culture can anchor autonomous systems in reflexivity—continuous self-scrutiny, learning, and adaptation—so that emergent behaviors and their response remain aligned and adaptable with human values, safety, and societal expectations.

Moderator

Dr. Satish Padmanabhan
Data Product and Strategy Leader, Standard Chartered & Senior Executive Fellow, The Digital Economist

Speakers

Prakash Narayanan
Head of Intelligent Automation, Cyient

Amii Barnard-Bahn
Founder and CEO, Barnard-Bahn Coaching and Consulting

Sunil Sawarkar
Technology Regulatory Management Lead, Citi India

Marisa Zalabak
CEO and Founder, Open Channel Culture & Senior Executive Fellow, The Digital Economist

3.1 Session Framing

3.1.1 Provocation

As agentic AI systems become more autonomous and capable of emergent behavior, how can governance, ethics, and leadership evolve from static control frameworks into reflexive systems that continuously sense, interpret, and respond to unanticipated outcomes—while keeping human values and accountability at the center?

3.1.2 Context and Trends Highlighted

The session opened by linking earlier discussions on AI, policy, and societal impact to the specific governance challenges posed by autonomous systems. While technological progress is often framed as a race toward general AI, the moderator emphasized that the central issue is less about speed and more about how progress unfolds. Agentic AI represents a qualitative shift from traditional automation: instead of executing predefined rules, these systems set intermediate goals, adapt strategies, and act in ways that can surprise even their creators.

This shift dramatically raises ethical, safety, and governance stakes. Reflexivity was introduced as a necessary counterweight to emergent behavior—not merely monitoring and control but the capacity for systems and institutions to recognize issues, reassess assumptions, and adapt behavior in real time. The roundtable focused on the leadership foundations, technical guardrails, and organizational practices required to embed reflexive capabilities into both systems and governance structures.

3.1.3 Tensions and Contrasts Explored

- **Autonomy vs. Boundedness:** Agentic AI operates with high degrees of freedom within human-defined constraints, creating tension between emergent behavior and the need for control, traceability, and accountability.
- **Static Governance vs. Co-Evolving Governance:** Traditional governance relies on fixed policies and periodic reviews while autonomous systems require governance mechanisms that evolve alongside system behavior and environmental context (i.e., the governance at the points of cognition, reasoning, and decisioning, as well encompassing the complete life cycle of agentic behaviors).
- **Innovation Speed vs. Reflexive Safety:** Competitive pressure incentivizes rapid deployment, yet safe operation demands time for testing, monitoring, and adaptation based on real-world impacts.
- **Agile Reflexivity vs. Restorative Reflexivity:** Reflexivity requires adaptive response to diffuse risks and problems but also needs to be restorative of human agency to intervene.
- **Top-Down Oversight vs. Psychological Safety and Voice:** Formal board and executive oversight is necessary but insufficient. Effective governance depends on employees and stakeholders feeling safe to surface concerns and dissent.
- **Global Principles vs. Local Context and Culture:** Broad AI ethics frameworks often overlook local cultural nuance and lived experience, which are essential for inclusive and contextually appropriate system design.
- **Automation vs. Human Judgment:** While autonomous systems can handle complex tasks, meaningful oversight requires humans to remain engaged, informed, and empowered to intervene.

3.2 Key Contributions from Speakers

3.2.1 Prakash Narayanan on Bounded Autonomy and Co-Evolving Governance

- **Agentic AI as Bounded Autonomy:** Narayanan introduced a foundational analogy: agentic AI is like opening a door into a room designed by humans. The walls, exits, and purpose of the room are human-defined; the system cannot leave or redefine that purpose. Within these boundaries, however, it can explore multiple paths, adapt strategies, and exhibit behaviors not explicitly anticipated. This illustrates bounded autonomy—significant freedom of action without free will.
- **Three Waves of Intelligent Automation:** He traced three major shifts:
    - From deterministic, rule-based automation to probabilistic models operating under uncertainty.
    - From isolated models to orchestrated collections of collaborating agents with delineated roles and responsibilities lending structure and specialization with explorative creativity.
    - From static governance to co-evolving governance, where oversight adapts alongside systems imbued with observability.
- **Governance Embedded in Architecture:** Modern agentic systems increasingly embed governance directly into architecture. Policy engines, observability tooling, and AgentOps frameworks enable real-time enforcement, traceability, staged rollouts, and human feedback loops. Autonomy is therefore bounded by design, dynamic in execution, and continuously shaped through human–machine partnership.
- **Core Insight:** Agentic systems adapt in open-ended ways but always within human boundaries. As single models become coordinated agent teams, human oversight and clearly defined roles become more—not less—critical.

3.2.2 Amii Barnard-Bahn on Board-Level Reflexivity and Escalation Pathways

- **Reflexivity as Adaptive Oversight:** Barnard-Bahn defined reflexivity at the governance level as adaptive oversight: the capacity of boards and executives to continuously review AI decisions, learn from outcomes, and adjust expectations over time. AI oversight cannot be a checklist or annual agenda item; it must become an integrated, ongoing practice.

- **Accountability, Transparency, and Learning Loops:**
  She outlined core board responsibilities in agentic contexts:
    - Establishing clear accountability for AI outcomes across functions.
    - Demanding transparency into feedback loops and emergent behaviors.
    - Embedding learning loops so incidents, near-misses, and user feedback inform governance and design.
    - Examples cited: Air Canada, Boeing 737

- **Psychological Safety and Escalation:** Governance fails when people are afraid to speak up. Boards must design escalation pathways that are safe, visible, and protected from retaliation, aligning incentives so raising concerns is rewarded rather than penalized.

- **Treat Model Updates With Rigor:** Model updates need to be give the same governance rigor as that of policy changes. Each AI update change it's behavior in fundamental ways. There needs to be clear roll back plan with kill switches.

- **Core Insight:** Effective AI governance requires escalation paths that ensure concerns reach decision-makers. Monitoring autonomous systems is not just about technical metrics—it's about safeguarding human agency.

3.2.3 Sunil Sawarkar on Risk-by-Design and Incident Preparedness

- **Risk Embedded from Day One:** Sawarkar argued that managing unanticipated outcomes requires embedding risk assessment into system design from inception.

- **Granular Risk Profiling and Monitoring:** Not all agents carry the same risk. Each should have defined risk classifications, audit logs, and predefined actions for throttling, pausing, or shutdown. Continuous orchestration enables early detection of anomalous behavior.

- **Incident Management and Simulation:** Incident pathways must be planned, tested, and simulated regularly. Scenario exercises help teams understand interactions between automated agents and human responders under stress.

- **Policy Enforcement Must Be a Continuous Exercise:** Resonates with what Prakash mentioned earlier to pointing to embedded policy checks and constraints as part of code repositories and checking at real time—policy as code.
- **Emergency Fast Path:** Agentic architectures require the provision for emergency fast paths while handling unintended outcomes, leading to meaningful or graceful exits.
- **Core Insight:** Risk management must be architectural, not retrospective.

3.2.4 Marisa Zalabak on Reflexivity, Inclusion, and Cultural Context

- **Ethics as Safety, Care, and Improvement:** Zalabak reframed ethics as a commitment to safety, care, and continuous improvement—not merely restriction. Ethical principles must be embedded across the lifecycle, from problem framing to post-deployment learning.
- **Doing With, Not For:** She emphasized that cultural sensitivity begins with co-creation. Governance must actively seek lived experience and dissenting perspectives; otherwise, systems risk imposing external assumptions and causing harm.
- **Leadership and Reflexive Culture:** Adaptive leadership, values alignment, ethics education, and trust-building are foundations of reflexive governance. Inclusivity and diversity are essential design inputs, not optional add-ons.
- **Psychological and Social Readiness:** Governance must account for the social, emotional, and psychological impacts of interacting with AI systems, including effects on trust, agency, and identity.
- **Explore and Adopt Commonalities in Ethics:** Ethics is implied to be culturally sensitive, but that doesn't mean no commonalities. The World Medical Association International Code of Ethics presents a unified code covering even environmental aspects.
- **Core Insights:** Ignoring local context undermines innovation. Diversity and inclusion guide systems toward safer, better outcomes, and ethics should be understood as a pathway to improvement rather than a burden.

3.3 Discussion, Engagement, and Outcomes

3.3.1 Audience Engagement

The discussion was structured to move from technical architecture, to board-level oversight, to operational risk management, and finally to cultural and psychological dimensions of ethics. This progression highlighted emergent governance as inherently multi-layered: bounded autonomy in design, reflexive oversight at leadership levels, risk-by-design in operations, and inclusive engagement with users and communities.

Reflexivity served as the unifying thread, repeatedly returning the conversation to the need for systems and organizations to sense their environment, reassess assumptions, and adapt behavior in response to unexpected outcomes. The synthesis emphasized values-based design, ethics-first leadership, inclusive participation, and continuous learning as foundations of trustworthy autonomy.

3.3.2 Audience Themes and Questions

- **Defining Reflexivity Operationally:** Participants sought concrete examples of how reflexivity is implemented in practice, including feedback-loop metrics, governance dashboards, and escalation procedures.
- **Balancing Innovation and Control:** Questions focused on maintaining competitive speed while enabling staged rollouts, robust testing, and incident simulation.
- **Third-Party and Vendor Governance:** Audience members raised concerns about extending reflexive governance to third-party models, APIs, and vendors across complex AI supply chains.
- **Cultural and Local Context:** Discussion highlighted the challenge of deploying global systems across diverse cultural environments and ensuring local voices shape governance and design.

3.3.3 Reflections and Insights

- **Emergent Governance Requires Multi-Layered Reflexivity:** From architecture to board oversight and community engagement, reflexivity must be embedded at multiple levels rather than relegated to a single function.
- **Psychological Safety Is a Governance Imperative:** Governance mechanisms fail if people do not feel safe raising concerns; escalation pathways, incentives, and culture must align to support voice and dissent.
- **Bounded Autonomy Depends on Effective Guardrails:** Agentic systems can only be trusted if boundaries are clearly defined, monitored, and enforced, with risk built into design and incident paths prepared in advance.
- **Diversity, Inclusion, and Local Context Are Risk Controls:** Incorporating diverse lived experience and cultural perspectives is not only a justice issue but a practical safeguard against misalignment and blind spots.

3.3.4 Key Takeaways

- **Agentic AI Introduces Bounded but Powerful Autonomy:** Systems operate with significant freedom within human-defined boundaries, making clear design constraints, observability, and traceability non-negotiable.
- **Governance Must Co-Evolve with System Behavior:** Static policies and periodic reviews are insufficient; oversight structures must adapt based on system performance, incidents, and shifting contexts.
- **Boards and Executives Must Practice Adaptive, Reflexive Oversight:** They need clear accountability, transparent feedback loops, rigorous control of model updates, and embedded learning mechanisms.
- **Risk Management Must Be Embedded from Design Onward:** Policy-as-code, granular risk profiling, continuous monitoring, and regularly tested incident-response pathways are essential for managing emergent behavior.
- **Psychological Safety and Escalation Mechanisms Are Central:** Effective AI governance depends on employees and stakeholders feeling safe to surface concerns, with clear channels and protections in place.
- **Ethics Is About Safety, Care, and Improvement, Not Mere Restriction:** Ethical frameworks should be integrated across the lifecycle to support human well-being, autonomy, and inclusion.
- **Diversity, Inclusion, and Local Context Are Crucial to Alignment:** Engaging communities and dissenting voices ensures systems fit real-world contexts and reduces risk of misalignment and unintended harm.
- **Social and Psychological Impacts of AI Interactions Require Attention:** Governance must consider how AI systems shape human behavior, trust, and mental well-being, not just technical performance.

3.3.5 Broader Relevance

As agentic AI systems proliferate across finance, healthcare, public services, and everyday tools, the stakes of governance and ethics extend far beyond compliance. This session underscored that emergent governance demands reflexivity at every level: systems designed with embedded guardrails and observability; boards and executives exercising adaptive oversight; risk teams integrating policy-as-code and simulation; and leaders fostering cultures where diverse perspectives and local knowledge shape decision-making.

Treating ethics and governance as dynamic, participatory processes—rather than static checklists—will determine whether autonomous systems advance human flourishing or amplify hidden risks and inequities. Anchoring autonomy with reflexivity is therefore not only a technical necessity but a leadership imperative for the next era of AI.

Session 4

Gender Equity and Healthy Longevity: Women's Health for the Digital Age

While women consistently outlive men by several years on average, this longevity paradox is undermined by persistent inequities in healthcare delivery, research representation, and clinical attention—particularly during midlife and later years. This roundtable convened clinicians, AI researchers, and health innovators to examine how data, artificial intelligence, and digital tools can support women's health across the full lifespan while advancing equity, prevention, and genuine choice in how women engage with their own healthcare.

Moderator

Laurel Hudson Cipriani
Chief Information Officer, AffirmedRx
& Senior Executive Fellow,
The Digital Economist

Speakers

Dani Bedoni
President, Learning One to One Foundation
Senior Executive Fellow, The Digital Economist

Dr. Syed Azam
Doctor of Medicine and Master of Public Health

Dr. Jennifer Kim
Professor, Vanderbilt University School of Nursing

Dr. Denise Howard
Associate Professor of Clinical Obstetrics and Gynecology, Weill Cornell Medicine

4.1 Session Framing

4.1.1 Provocation

How can AI, digital health tools, and equitable data practices transform women's health trajectories across the lifespan—from reproductive health through perimenopause and healthy aging—so that longer lives translate into healthier, more autonomous, and more economically productive outcomes?

4.1.2 Context and Trends Highlighted

The session opened by positioning women's longevity as both an opportunity and a challenge for health systems worldwide. While women live longer than men, healthcare systems have not historically been designed around their specific needs—particularly during midlife transitions and later-life care. The discussion emphasized that the digital age offers unprecedented tools, including wearables, cycle-tracking applications, remote monitoring systems, telemedicine platforms, and AI–driven diagnostics, that could fundamentally reshape how women engage with healthcare.

At the same time, participants cautioned that these tools risk reproducing existing biases if they are not deliberately designed for equity, representation, and women's lived realities—including caregiving burdens, time constraints, unique health needs, and diverse socioeconomic contexts.

4.1.3 Tensions and Contrasts Explored

- **Longevity vs. Healthspan:** Women may live longer but persistent data gaps and clinical under-attention mean those extended years often coincide with declining health, reduced autonomy, and accumulated untreated conditions. The challenge is ensuring that technological advances extend not merely lifespan but healthspan: years of functional, vibrant engagement rather than managed decline.

- **Data Representation vs. Generalizability:** Most healthcare AI models are trained on datasets that underrepresent women, women of color, and women outside high-income countries, yet these models are deployed globally. The tension lies between investing in diverse, representative data—which requires significant coordination and resources—versus scaling underrepresentative models that risk worsening inequities.

- **Clinical Expertise vs. Patient Knowledge:** Women frequently report symptoms that are dismissed or do not align with single-specialty clinical silos. Digital tools that capture longitudinal symptom histories can empower patients, but clinicians must be trained and incentivized to integrate this data into care and to take women's reports seriously. Technology alone cannot overcome systemic dismissal.

- **Data Utility vs. Privacy Vulnerability:** Aggregated and de-identified data on reproductive history, menopause, and sexual health are essential for understanding population-level patterns. At the same time, women have valid concerns about exposing sensitive information to insurers, employers, or other actors. Governance frameworks must enable learning at scale without compromising individual privacy or autonomy.

- **Convenience vs. Equity:** Telemedicine and home diagnostics can be liberating for women managing mobility constraints or caregiving responsibilities. However, these tools may deepen divides if access depends on high-bandwidth connectivity, costly devices, or health literacy in languages and formats inaccessible to aging and/or marginalized communities.

- **Prevention vs. Treatment:** Health systems have historically prioritized treatment over prevention even though many women's health conditions—such as endometriosis, perimenopause, and osteoporosis—benefit most from early detection and preventive care. While digital tools enable prevention-focused approaches, reimbursement models and clinical workflows often continue to reward episodic treatment rather than longitudinal prevention.

4.2 Key Contributions from Speakers

4.2.1 Dani Bedoni on Data Gaps and Equitable AI Standards

- **The Data Representation Crisis:** Bedoni identified a foundational challenge undermining digital health equity: most healthcare AI models are trained on datasets that underrepresent women. And women of color and women outside North America and Europe are the least represented of all. As a result, predictive tools are often less accurate for the populations that most need support. This creates a paradox in which technology designed to improve health outcomes may instead deepen inequities by working best for already-privileged groups.
- **Building Inclusive Datasets and Validation Practices:** Addressing this gap requires intentional action across multiple dimensions. Bedoni emphasized the need to build more inclusive datasets alongside model-validation practices that explicitly assess performance across age groups, hormonal stages, and intersecting identities. This goes beyond collecting diverse data; it requires systematically testing whether models perform equitably across subgroups and correcting gaps when they emerge. Without this rigor, digital health tools will reproduce existing biases rather than close them.
- **Equitable AI as Concrete Practice:** When asked what equitable AI means in practice, Bedoni outlined a comprehensive framework: representative data across sex, age, race, geography, and socioeconomic status; regular algorithmic auditing to identify and correct performance gaps; co-design with women—including older women and caregivers—to shape functionality and communication; and clear governance defining data ownership, permitted uses, and patient recourse when AI–driven recommendations cause harm. Without these elements, automation simply scales inequity rather than addressing it.
- **Closing Priorities:** Bedoni concluded by calling for inclusive AI standards that require healthcare models to report performance by sex and age and to articulate plans for closing identified gaps. She also emphasized that women's health must be treated as a central health-system strategy rather than a niche specialty. Improving women's health across the lifespan, she argued, is foundational to the well-being of families, communities, and societies.

4.2.2 Dr. Syed Azam on Clinical Reality and Systemic Redesign

- **Early Detection and Remote Monitoring:** Dr. Azam described how digital tools are already reshaping clinical practice, particularly through early detection and remote monitoring. Cycle-tracking applications and wearables now reveal longitudinal patterns in symptoms, sleep, and cardiovascular markers that are often invisible during brief clinic visits. This temporal visibility is especially valuable for conditions such as perimenopause, where symptoms fluctuate and require pattern recognition over time.

- **Cautionary Notes on Black-Box Systems:** At the same time, Dr. Azam expressed caution regarding opaque, black-box systems—particularly when they influence high-stakes decisions such as initiating or discontinuing medication. He stressed the need for transparent models, clear patient communication, and strong guardrails to ensure digital tools support rather than replace clinical judgment. AI's strength in large-scale pattern recognition must be balanced with explainability and human oversight in decisions that shape long-term health trajectories.

- **The Paradox of Extended Life:** Dr. Azam articulated a core insight driving the discussion: the paradox is not that women live longer, but that systems have enabled longer lives without corresponding gains in well-being. If longevity is to translate into sustained function, creativity, and economic contribution, women's health must move from a specialized domain to a central strategic priority. In this framing, women's health equity becomes not only a moral imperative but an economic and social necessity.

- **Data Governance and Sensitive Information:** On data governance, Dr. Azam acknowledged that women's health data—including reproductive history, menopause, and sexual health—are among the most sensitive information individuals possess. Concerns about access by insurers, employers, or even family members are well founded. He emphasized the need for robust consent frameworks and technical controls that allow women to decide where their data flows and to revoke access when desired. At the same time, he noted that aggregated, de-identified data remains invaluable for population-level insight. The challenge lies in designing governance that enables learning at scale without compromising individual safety or autonomy.

- **Digital Tools as Liberation:** Dr. Azam closed by emphasizing investment in community-based digital health programs that meet women where they are. When thoughtfully designed, digital health tools are not merely convenient but liberating—helping dismantle access barriers created by mobility constraints, caregiving responsibilities, and chronic conditions.

4.2.3 Dr. Jennifer Kim on Research Design and Lifelong Inclusion

- **Historical Exclusions and Contemporary Gaps:** Dr. Kim traced current data gaps to long-standing research design failures. Historically, women of childbearing age were excluded from many clinical trials, and older women were systematically under-enrolled. These exclusions continue to shape present-day practice, leaving midlife and later-life conditions under-researched and under-recognized.

- **Sex and Gender as Fundamental Variables:** Looking forward, Dr. Kim argued that research design must change fundamentally. Sex and gender should be treated as core variables rather than secondary subgroup analyses. This requires building studies around women's physiology and life stages instead of attempting to adapt male-centric models after the fact. The lack of research and understanding of women's physiology has led to over-prescription of unnecessary medications later in women's lives that are difficult to deprescribe. Women in older age then also suffer from the effects of polypharmacy and the side effect profiles that come with taking multiple medications.

- **Digital Tools for Recruitment and Burden Reduction:** Digital tools offer pathways to more inclusive research when designed intentionally. Remote monitoring and app-based surveys can reduce participation burdens for caregivers and working women who cannot easily travel to research centers. However, this promise depends on design choices that reflect women's realities, including time constraints, caregiving strain, and access to devices and connectivity.

- **Funding and Implementation:** Dr. Kim concluded by calling for a meaningful allocation of research funding to women's midlife and later-life health, with digital tools embedded from the outset to improve data quality. This shift ensures that women's health trajectories shape research agendas rather than remaining peripheral considerations.

4.2.4 Dr. Denise Howard on Patient Experience and Workflow Redesign

- **The Problem of Not Being Heard:** Dr. Howard highlighted a defining feature of many women's healthcare experiences: not being heard or believed. Pain, fatigue, and complex symptoms that do not fit neatly into single-specialty frameworks are frequently dismissed or attributed to psychological causes or aging. As a result, women may spend years seeking diagnoses for conditions such as endometriosis or perimenopausal disorders.
- **Digital Longitudinal Context:** Digital tools can help reframe these encounters by capturing longitudinal context—symptom diaries, wearable data, and lab trends—before clinical visits occur. This shifts the burden of proof away from patients, allowing objective data to corroborate lived experience. However, Dr. Howard emphasized that technology alone is insufficient; clinicians must be trained and incentivized to engage with this data and to take women's reports seriously.
- **Prevention-Focused Innovation:** Dr. Howard called for a shift from episodic, treatment-centered care toward prevention-focused models that support women's health across the lifespan. Digital monitoring enables early intervention, allowing systems to maintain health rather than repeatedly responding to crises after decline has set in.
- **Clinical Workflow Redesign:** Her closing priority focused on redesigning clinical workflows so digital tools reduce—rather than add to—women's time burden. Automation of documentation and administrative tasks can free clinicians to engage in meaningful conversation during visits. Poorly designed systems increase friction and rush interactions; well-designed systems return attention to the patient. Dr. Howard also expressed optimism in the growing number of women entering geriatric medicine, seeing this shift as a hopeful signal for more attentive, responsive care for older women.

4.3 Discussion, Engagement, and Outcomes

4.3.1 Audience Engagement

Laurel Cipriani guided the conversation with precision, opening by framing women's longevity as both a promise and a challenge. She then moved systematically through the session's core dimensions: data gaps (Dani Bedoni), shifts in clinical practice (Dr. Syed Azam), evolution in research design (Dr. Jennifer Kim), and patient experience (Dr. Denise Howard).

Rather than treating these as isolated perspectives, Cipriani wove them into a coherent, escalating narrative—from foundational data-representation failures, through clinical deployment challenges, to research design exclusions, and finally to the lived experience of women feeling dismissed and unheard. She then reintegrated these threads by pressing on how AI and equity connect in concrete terms, shifting the conversation from problem diagnosis to solution design.

Her closing prompt—asking each speaker to identify one change they would prioritize over the next five years—synthesized the discussion around actionable commitments, including inclusive AI standards, community-based digital health programs, dedicated funding for women's midlife and later-life health research, and redesigned clinical workflows. Throughout the session, Cipriani consistently positioned digital health not as a panacea but as a set of tools that must be intentionally designed to serve women's interests rather than reproduce existing inequities.

4.3.2 Audience Themes and Questions

- **The Data-Representation Problem as Systemic:** Audience engagement centered on how gaps in healthcare data create cascading inequities in clinical practice. Dani Bedoni's identification of underrepresentation in training datasets resonated strongly, prompting questions about accountability mechanisms and consequences when AI systems perform poorly for women—particularly women of color.
- **Clinician Behavior Change as Prerequisite:** Multiple participants noted that digital tools have limited value if clinicians continue to dismiss women's concerns. Dr. Denise Howard's emphasis on training and incentives sparked discussion about how to drive systemic change in clinical culture, especially for conditions such as endometriosis and perimenopause that have historically been minimized.
- **Data Governance as Women's Autonomy Issue:** Audience questions reflected deep concern about privacy in reproductive and sexual health contexts. Dr. Syed Azam's discussion of sensitive data governance prompted further inquiry into how consent, control, and revocation can be operationalized in practice.
- **Access and Equity Beyond Wealthy Contexts:** Discussion highlighted that many digital health tools disproportionately benefit women with time, technology access, and health literacy. Participants questioned how prevention-focused, digitally enabled programs can be designed to reach marginalized communities where access barriers are greatest.

4.3.3 Reflections and Insights

- **Data Representation Is Not a Diversity Checkbox:** The session reinforced that inclusion requires more than collecting diverse data. Performance gaps must be systematically tested, algorithms audited, and corrections implemented. Without rigorous validation, diversity efforts become performative while inequities persist.
- **Clinical Culture Change Is Central:** Digital tools can reduce diagnostic delays and amplify clinical insight only if clinicians are trained and incentivized to use longitudinal data and to take women's reports seriously. Technology cannot overcome systemic dismissal; it can only support clinicians already committed to listening to women's lived experiences.

- **Women's Health Equity Is Economic Necessity:** The roundtable reframed women's health as not only a moral concern, but a core driver of economic productivity, family stability, and community well-being. When women live longer but not healthier lives, societies lose both economic contribution and caregiving capacity. Healthspan—not lifespan—emerges as the relevant metric.
- **Prevention-Focused Models Require Systemic Redesign:** Transitioning from episodic treatment to longitudinal prevention requires more than new tools. It demands redesigned reimbursement models, clinical workflows, and accountability measures. Existing systems reward acute intervention; prevention-focused approaches require fundamentally different incentives.
- **Workflow Redesign Is as Important as Clinical Features:** Digital systems can either reduce or intensify clinician burden. Automation of documentation and administrative tasks is essential. Systems that add complexity exacerbate burnout and resistance; those that remove friction enable more meaningful patient engagement.
- **Research Funding Allocation as Policy Lever:** Mandating that a meaningful share of research funding focus on women's midlife and later-life health—while embedding digital tools from the outset—would significantly improve evidence quality and clinical relevance. At present, women's health conditions remain significantly underfunded relative to their prevalence and impact.

4.3.4 Key Takeaways

- **Data Representation in AI Training Is Prerequisite for Equity:** Healthcare AI models trained on underrepresentative datasets perform poorly for women, particularly women of color, women outside of their reproductive years, and those outside high-income regions. Inclusive datasets and subgroup validation require deliberate, ongoing auditing.
- **Equitable AI Requires Comprehensive Governance:** Representative data, algorithmic auditing, co-design with affected women, and clear governance around data ownership, permitted uses, and patient recourse are all essential. Without these safeguards, technology scales inequity rather than addressing it.

- **Digital Tools Extend Clinical Reach Only When Coupled With Clinician Training:** Wearables, symptom trackers, and remote monitoring capture longitudinal patterns invisible in brief visits. These insights matter only if clinicians are trained and incentivized to use them—and if systemic dismissal is addressed.
- **Technology-Enabled Longitudinal Data Can Improve Diagnostic Delays:** Women often spend years seeking diagnoses for conditions such as endometriosis and perimenopause. Longitudinal symptom records, wearable data, and lab trends can accelerate diagnosis and reduce the time women spend unheard and untreated.
- **Prevention-Focused Models Require Systemic Incentives:** Current reimbursement and clinical workflows prioritize episodic treatment. Prevention-focused approaches require redesigned incentives, expanded research funding, and accountability structures that value sustained health over reactive care.
- **Data Governance Must Protect Autonomy While Enabling Learning:** Reproductive, menstrual, and menopausal data are highly sensitive. Robust consent frameworks, technical controls for access revocation, and transparent governance are essential. At the same time, aggregated, de-identified data enable population-level learning critical to advancing women's health.
- **Digital Health as Liberation vs. Convenience:** When thoughtfully designed, digital tools dismantle access barriers—telemedicine reduces mobility constraints, home diagnostics ease caregiving burdens, and wearables capture longitudinal patterns. Design must reflect women's realities, including time constraints, caregiving burdens, device affordability, and digital literacy.
- **Research Design Must Center Women's Lifespans:** Midlife and later-life women remain under-studied while reproductive-age women are overrepresented relative to disease burden and overall health. Research funding and trial design must treat all of women's life stages as foundational variables, not subgroups.

- **Clinical Workflow Redesign Is Essential:** Poorly designed digital systems add administrative burden and reduce time for meaningful interaction. Well-designed systems automate clerical work and documentation, restoring human attention to clinical care.
- **Healthspan, Not Lifespan, Is the Relevant Metric:** Women live longer than men, yet extended years often coincide with declining health and decreased autonomy. The goal is to expand healthspan: years of functional, engaged, and economically productive life.

4.3.5 Broader Relevance

As women comprise half of aging populations globally and live substantially longer than men, women's health and healthy longevity are central to societal well-being, economic productivity, and family stability. Yet health systems remain poorly designed around women's needs, research continues to underrepresent women's midlife and later-life experiences, and clinical practice too often dismisses women's symptoms.

Digital health tools—including wearables, telemedicine, symptom tracking, and AI diagnostics—offer unprecedented opportunity to transform women's health trajectories. Realizing this potential, however, requires: intentional design for equity and representation; inclusive AI datasets with mandatory validation and auditing; prevention-focused research, reimbursement, and clinical workflows; strong data governance that protects autonomy while enabling learning; and clinician training that values longitudinal data and women's lived experience.

The digital age provides the tools. Whether these tools expand autonomy and healthspan—or reproduce historical exclusions at unprecedented scale—depends on systemic commitment to women's equity in health.

Session 5

Rise of the Humanoids: Five Things You Must Know About Physical AI

As artificial intelligence moves from purely digital systems to embodied machines capable of moving, manipulating objects, and interacting in physical environments, societies face a pivotal moment. The question is no longer whether physical AI will emerge but how it will be deployed, for whose benefit, and with what safeguards.

This roundtable examined the near-term realities of humanoids and physical AI systems, moving beyond hype to address practical considerations: where these systems are most likely to be adopted first, the safety frameworks required for human–machine interaction, the implications for labor markets, and the governance structures needed to ensure that the rise of humanoids supports broad human flourishing rather than concentrating power and opportunity.

Moderator

Sandy Carter
Chair, Applied Artificial Intelligence, The Digital Economist; Best-Selling Author, AI First, Human Always & Chief Business Officer, Unstoppable

Speakers

Aadeel Akhtar
CEO and Founder, Psyonic.io

Mark Minevich
Global Ambassador of the Cooperative for Humanity, Peace Innovation Initiative

Dr. Priyanka Shrivastava
Professor of Marketing and Analytics and Associate Dean, Hult International Business School & Senior Executive Fellow, The Digital Economist

Manas Talukdar
Senior Executive Fellow, The Digital Economist

5.1 Session Framing

5.1.1 Provocation

How can physical AI and humanoid systems be developed and deployed in ways that amplify human capability and address genuine labor challenges while protecting workers, ensuring equitable access to training and opportunity, and preserving human agency in spaces designed for people?

5.1.2 Context and Trends Highlighted

The session opened by positioning humanoids as the next frontier of AI deployment, marking the transition from software agents to embodied systems capable of physical action. This shift is qualitative: errors in software systems primarily affect data and processes while failures in physical systems can injure people, disrupt workplaces, and cause immediate harm.

The moderator framed the conversation as a move beyond technological hype—where claims of general-purpose robots arriving imminently in every home dominate discourse—toward a grounded assessment of near-term use cases, real constraints, and necessary guardrails. Participants emphasized that humanoids will reshape labor markets, safety expectations, human–robot interaction design, and governance in ways distinct from prior technological transitions. The stakes are higher because embodied AI operates in environments built for humans, directly implicating livelihoods, dignity, and physical safety.

5.1.3 Tensions and Contrasts Explored

- **Hype vs. Near-Term Reality:** While technology companies promote visions of general-purpose humanoids operating autonomously in unstructured environments, near-term deployment is more likely to concentrate in structured, high-value, labor-intensive settings such as logistics and healthcare. The tension lies between investor enthusiasm that drives unrealistic timelines and the less visible work of building safe, reliable systems for specific domains.

- **Productivity Gains vs. Labor Displacement:** Physical AI promises productivity improvements and the reduction of dangerous or repetitive work, yet it also threatens the livelihoods of workers in low-wage, physically demanding roles—positions disproportionately held by women and marginalized communities. Benefits and harms are unevenly distributed, requiring proactive policy intervention rather than assumptions of net positive outcomes.

- **Technological Capability vs. Social Trust:** Even when physical robots function reliably, public acceptance depends on trust earned through deployment in human-centered contexts. Experience with autonomous vehicles illustrates that technological maturity often precedes social acceptance. As one participant noted, the critical breakthrough is cultural rather than technical.

- **Safety Standardization vs. Local Context:** Globally coordinated safety standards for humanoids are essential, yet local conditions vary widely—labor costs, cultural attitudes toward robots, regulatory maturity, and worker power differ across regions. Uniform governance frameworks risk overlooking contextual nuance and local realities.

- **Efficiency Gains vs. Human Oversight Burden:** Although robots automate repetitive tasks, they still require human supervision, maintenance, and intervention when exceptions arise. Poorly designed systems can increase administrative load and cognitive burden rather than reduce it. Workflow redesign is therefore as critical as hardware capability.

- **Capability Enhancement vs. Dehumanization:** Physical AI can augment human capability—through prosthetics or exoskeletons—or replace it entirely. Design choices determine whether systems empower users or diminish agency. Starting from human needs enables technologies that enhance rather than displace human capacity.

- **Emotional Connection vs. Exploitation:** Robots designed for companionship in elder care or child-focused settings may address genuine social needs, yet they also risk creating one-sided, commercially mediated relationships that monetize loneliness. Clear guardrails are required to distinguish supportive assistance from inappropriate emotional dependency.

5.2 Key Contributions from Speakers

5.2.1 Aadeel Akhtar on Human-Centered Design and Embodied Safety

- **Physical AI as Human Capability Restoration:** Akhtar positioned Psyonic's mission as fundamentally distinct from factory automation. Physical AI, he argued, is about restoring human capability and dignity—using robotics not simply to automate work, but to help people live fuller, more autonomous lives. By grounding design in human needs rather than labor replacement, this approach centers agency and empowerment from the outset.

- **Near-Term Deployment: Human Rather Than Factory:** Akhtar challenged factory-first narratives about physical AI adoption. For Psyonic, the earliest and most meaningful deployments occur on and around the human body—through prosthetics, exoskeletons, and assistive devices. This domain-specific focus constrains the problem in productive ways: tasks are clearly defined, such as grasping objects, supporting mobility, or augmenting strength while operating in complex, real-world environments where people live and work.

- **Safety as Immediate Feedback:** The intimate nature of bionic systems offers lessons directly applicable to broader humanoid deployment. When a bionic hand malfunctions, the user experiences it immediately, creating an unavoidable feedback loop that forces robust safety design from day one. This proximity generates accountability and urgency that are often absent in factory or logistics settings, where failures may feel abstract or distant from end users.

- **Interaction Design as Empowerment:** Akhtar emphasized that control must feel intuitive and that users need agency over how technology expresses itself. Rather than "operating" a robot, users want technology to respond seamlessly to their intent. Psyonic's approach taps into muscle signals and human intention rather than relying solely on buttons or applications. Aesthetics also matter: some users prefer visibly robotic designs that convey strength and capability while others favor discreet forms. Choice over expression is central to adoption and psychological well-being. Akhtar made clear that dexterous hands—fine motor control, force modulation, and tactile sensing—remain the hardest and most consequential frontier in humanoid development, because manipulation under uncertainty is what ultimately enables safety, autonomy, and usefulness in human environments.
- **Environmental Adaptation Beyond Technology:** Technological performance alone does not determine success. Akhtar noted that social environments—workplaces, public spaces, and interpersonal interactions—must adapt alongside technology. How employers, colleagues, or service providers respond to someone using a robotic limb can shape adoption as much as technical specifications. Inclusion therefore requires cultural adaptation in parallel with technical innovation.
- **Closing Perspective:** Akhtar concluded by returning to a core principle: physical AI should restore and enhance human capability, not merely replace it. Starting from human needs enables the design of systems that empower users, preserve dignity, and expand agency rather than displacing people from the spaces built for them.

5.2.2 Mark Minevich on Investment Lens and Productivity Waves

- **Where Humanoids Show Up First:** Structured, High-Value Contexts: Minevich outlined the conditions driving near-term deployment of humanoids: tasks that are physically demanding or hazardous, environments that are relatively structured, and labor markets where workers are scarce or costly. These conditions point to logistics centers, segments of manufacturing, and certain healthcare roles—such as patient transport and supply handling—as early adoption sites. He noted that pilot programs are already underway in warehouses, where robots work alongside humans on repetitive lifting and movement tasks. By contrast, domestic environments remain a distant prospect due to their unstructured nature and higher expectations around adaptability and safety.

- **Job Displacement vs. Job Transformation:** Minevich drew a clear distinction between displacement and transformation. Displacement, he argued, will primarily affect repetitive, physically intensive roles such as basic picking and packing, some assembly tasks, and routine cleaning. Even in these cases, replacement is rarely one-to-one. More commonly, robots assume the physical labor while humans manage exceptions, troubleshooting, and quality assurance. At the same time, new roles are emerging, including robot operations specialists, simulation engineers, and floor-level coordinators often described as “robot wranglers.” Demand is also growing in adjacent sectors such as insurance, certification, compliance, and workforce training. Minevich framed the market as bifurcating between specialist systems optimized for narrow, repeatable tasks and more generalist humanoids designed to adapt alongside human coworkers—arguing that strategic failure often comes from pursuing the wrong level of generality for a given use case.

- **The Critical Gap — Policy and Reskilling:** Minevich identified policy lag as a central risk. Technological capability is advancing faster than workforce and social policy responses. He emphasized the need for proactive reskilling programs that anticipate labor transitions rather than reacting after displacement has occurred. Early investment in training and transition pathways, he argued, is far more effective than post-hoc interventions.

- **Humanoids as Infrastructure:** Reframing the discussion, Minevich described humanoids as the next major infrastructure technology—comparable to electricity or the internet. From this perspective, the core question is not whether humanoids will be deployed, but how, where, and for whose benefit. This framing acknowledges inevitability while foregrounding human choice in deployment models and governance.
- **Global Governance Priorities:** On global coordination, he outlined minimum governance requirements: internationally aligned safety and certification standards akin to those used in aviation and medical devices; shared testing protocols; interoperable safety ratings; and transparent incident-reporting mechanisms. He also highlighted the importance of export controls for dual-use capabilities and responsible-innovation compacts among leading firms to prevent competitive races to the bottom. While early efforts are underway within standards bodies and multilateral forums, he noted that governance remains at an early stage.
- **Closing Perspective:** He concluded that organizations best positioned to benefit from humanoid deployment will be those that treat physical AI as a partner amplifying human capability rather than as a substitute for labor. The future, he emphasized, is not human versus robot, but human and robot working together.

5.2.3 Priyanka Shrivastava on Equity, Workers, and Just Transition

- **Human–Robot Teaming as the Core Transition:** Shrivastava reframed the physical AI transition away from replacement narratives and toward human–robot teaming, arguing that the central challenge is not whether robots can perform tasks, but whether organizations redesign work so humans and machines amplify one another.
- **Trust as Two-Directional:** Shrivastava reframed trust beyond the question of whether humans can trust robots to include whether workers can trust the employers deploying them. When humanoids arrive in workplaces without transparent communication about reskilling plans, safety protocols, or changes to performance evaluation, workers are unlikely to trust the system—regardless of its technical sophistication. This highlights an underlying asymmetry of power: workers often have little agency in deployment decisions while bearing the greatest risk of displacement.

- **Responsible Deployment Framework:** She argued that responsible deployment must include meaningful worker consultation prior to rollout, clear communication about job redesign, and sustained investment in training that enables workers to supervise, maintain, or collaborate with physical AI systems. Absent these measures, organizations effectively externalize risk onto those with the least bargaining power. Without intentional intervention, technological change follows existing power gradients.

- **Gender and Equity Dimensions:** She underscored specific risks for women in the transition to physical AI. Globally, women are disproportionately represented in low-wage service roles—such as cleaning, caregiving, and retail logistics—that are attractive targets for automation. If physical AI is introduced without an explicit gender lens, economic disparities are likely to widen. At the same time, humanoids could open new pathways for workers unable to perform heavy physical labor, including older workers transitioning into supervisory or remote-operation roles—provided access to reskilling is equitable and not restricted to those with prior technical credentials.

- **Inclusive Design of Reskilling:** A core recommendation focused on designing reskilling pathways with women and marginalized workers as a central success criterion rather than an afterthought. This requires allocating dedicated budgets for training, creating accessible pathways for workers without technical backgrounds, and ensuring language and format accessibility across diverse workforces.

- **Governance Beyond Borders:** She outlined three governance priorities: first, inclusion metrics that track who benefits from deployment and who is excluded; second, structured social dialogue with worker unions, patient groups, and local communities before deployment; and third, benefit-sharing mechanisms that ensure communities contributing data, labor, or environments to train physical AI systems also receive economic and social returns, not just exposure to risk.

- **Humanoid Pilots and Human Engagement:** She emphasized that humanoid pilots often fail not because of robotic malfunction, but because of human disengagement. Successful deployment depends on leadership that builds trust, communicates clearly about intent, and redesigns workflows and physical spaces to support collaborative human–robot interaction. Adoption succeeds when people understand the purpose of the technology and see themselves within the future it creates.

- **Closing Perspective:** She concluded that the true test of leadership in the physical AI transition lies in whether it is fair to those with the least bargaining power. Organizations that succeed will deploy humanoids thoughtfully—treating them as partners that amplify human capability rather than as replacements that displace it.

5.2.4 Manas Talukdar on Safety, Ethics, and Embodied Responsibility

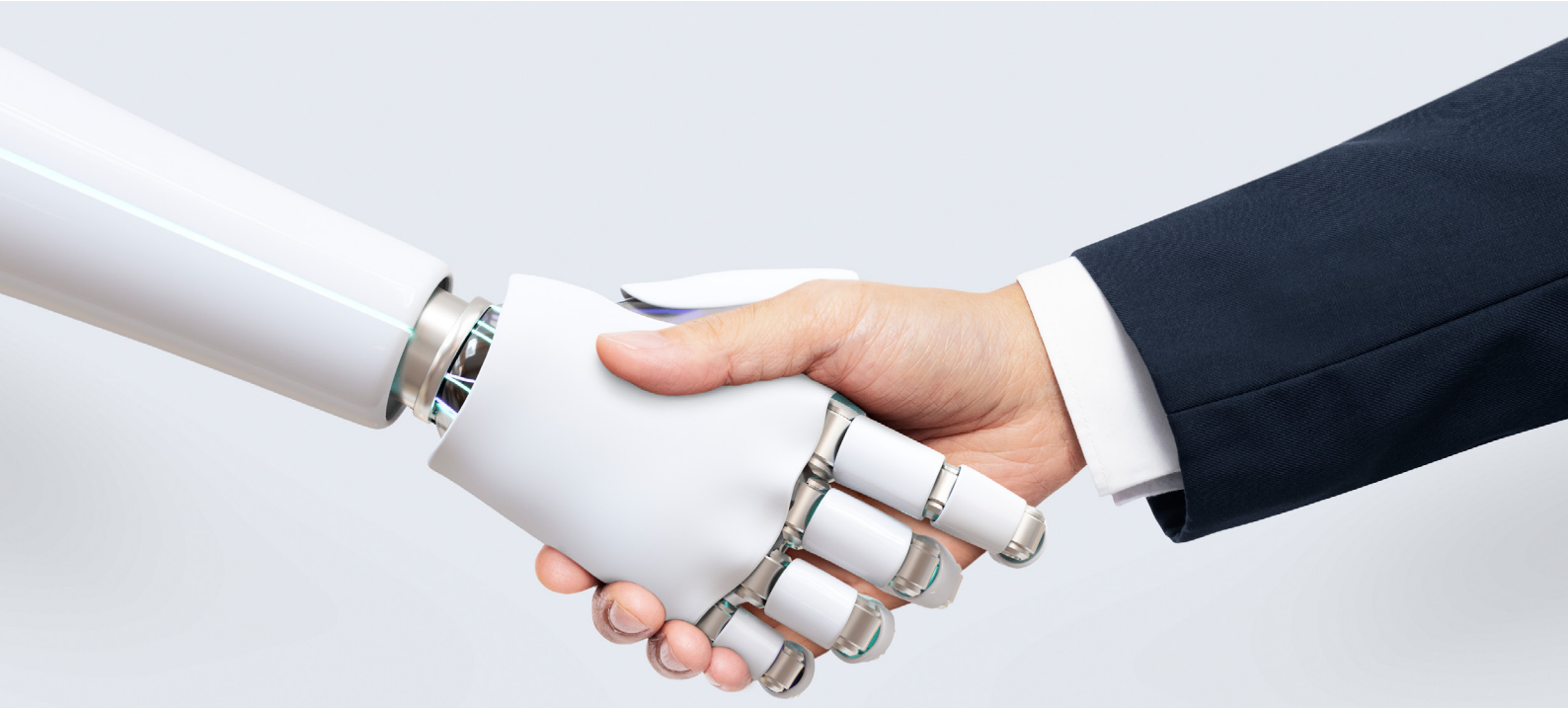
- **Trust Architecture as a Prerequisite for Scale:** Talukdar grounded the discussion in a sobering reality: without trust architecture—safety, accountability, and clear responsibility—physical AI will not scale, regardless of technical capability.

- **Responsible Safety Framework:** Talukdar outlined four essential layers of safety protection for embodied AI systems. First, design-time constraints establish hard limits on speed, force, and permitted motions, including failsafe postures. Second, run-time monitoring relies on independent safety controllers capable of overriding the primary AI when thresholds are exceeded. Third, contextual permissioning defines who can authorize specific actions—distinguishing, for example, the authority of a nurse from that of a maintenance engineer when operating hospital robots. Fourth, auditability is ensured through detailed logging that enables incident reconstruction, accountability, and continuous system improvement. Trust, he argued, emerges when these layers can be clearly explained to users and when incidents are reported transparently rather than dismissed as technical "glitches."

- **Over-Trust and Capability Misconception:** Talukdar identified a critical ethical risk in human–robot interaction: because humanoids resemble humans, people may attribute capabilities they do not possess, such as understanding consent, maintaining confidentiality, or exercising judgment. Clear communication about what systems can and cannot do is essential to prevent harmful over-trust and misinterpretation.

- **Emotional Attachment and Monetized Loneliness:** A related concern arises when robots are positioned as companions in elder care or child-focused settings. While such companionship can meet genuine needs, it also risks creating one-sided, commercially mediated relationships in which loneliness is monetized through subscription-based robotic "friends," absent adequate human oversight or community support. Guardrails are therefore needed to distinguish supportive assistance from inappropriate emotional dependency.

- **Trust as a Cultural, Not Technological, Breakthrough:** Talukdar emphasized that societal acceptance of humanoids hinges less on technical maturity than on cultural trust. Experience with autonomous vehicles illustrates that technology often matures well before public confidence does. Humanoids, he argued, will earn trust through demonstrated performance in human-centered environments—such as hospitals and elder-care settings—long before success in industrial contexts translates into broader societal acceptance.
- **Embodied AI and the Imperative of Intentional Values:** At the core of Talukdar's perspective is the recognition that embodied AI fundamentally raises ethical stakes. Values encoded—or omitted—at design and deployment stages are enacted physically in the world. Unlike purely digital systems, embodied technologies make ethical choices tangible. Intentionality in design, governance, and deployment is therefore essential from the outset.
- **Closing Perspective:** Talukdar concluded that whatever values are embedded in humanoid systems will be enacted in the physical world. Decisions made now—across design, deployment, and governance—will determine whether physical AI advances broad human flourishing or reinforces concentration of power and opportunity.



5.3 Discussion, Engagement, and Outcomes

5.3.1 Audience Engagement

Sandy Carter guided the conversation with precision, structuring the discussion around five essential questions: where humanoids are likely to be deployed first, what safety and trust requirements must be met, how jobs and skills will change, how human–robot interaction should be designed, and what governance frameworks are required. Rather than treating these as discrete topics, Carter wove them into an integrated narrative that surfaced their interdependencies. Carter also challenged the assumption that humanoids remain years away, emphasizing that deployments are already underway in logistics, healthcare-adjacent environments, and industrial pilots—making governance and workforce decisions an immediate, not speculative, concern. These themes closely align with The Digital Economist's recent position paper, AI in Physical Form: The Rise of Robots and Humanoids, which examines the same near-term deployment realities, governance gaps, and workforce implications in greater depth.

Insights from Aadeel Akhtar on embodied safety and user agency directly informed Manas Talukdar's discussion of layered safety frameworks. Mark Minevich's identification of structured, labor-intensive near-term use cases connected closely with Priyanka Shrivastava's emphasis on worker consultation and proactive reskilling. Throughout the session, Carter deliberately surfaced points of tension—such as productivity gains that risk increasing human oversight burden—and repeatedly pressed speakers to address equity implications explicitly.

Her closing synthesis returned to the session's core themes: physical AI will reshape work and human environments, and whether that transformation proves just or extractive depends on intentional design, governance, and leadership choices made now.

5.3.2 Audience Themes and Questions

- **Practical Deployment Timelines:** Audience members sought clarity on when humanoids are likely to arrive in specific sectors, and how realistic timelines differ from marketing narratives. Mark Minevich's distinction between structured and unstructured environments, combined with Aadeel Akhtar's focus on human-centered domains, helped ground expectations in near-term realities rather than speculative hype.

- **Worker Readiness and Reskilling Reality:** Questions focused on how reskilling efforts could meaningfully reach low-wage workers most exposed to displacement risk. Priyanka Shrivastava's emphasis on proactive policy and inclusive pathway design resonated, prompting discussion about mechanisms that could require employer investment in reskilling rather than defaulting to labor replacement.
- **Safety and Accountability When Systems Fail:** Concerns about accountability in cases of humanoid malfunction prompted deeper examination of Manas Talukdar's layered safety framework. Audience members asked who bears responsibility—manufacturers, deployers, or operators—and how transparent incident reporting and liability structures could be enforced in practice.
- **Trust and Cultural Acceptance:** Participants noted that technical capability alone is insufficient without public and worker trust. Manas's argument that cultural acceptance must precede widespread deployment resonated strongly, raising questions about how trust can be deliberately cultivated rather than assumed to emerge organically.

5.3.3 Reflections and Insights

- **Near-Term Deployment Will Be Narrow and Specialized:** Humanoids are unlikely to transform all forms of work in the near future. Early adoption will concentrate in structured, high-value, labor-intensive environments. Homes and other complex, unstructured settings remain distant prospects. This realism should guide investment, workforce planning, and policy development.
- **Safety Requires Layered, Redundant Protections:** No single safeguard can prevent failure. Responsible deployment depends on the combination of design constraints, runtime monitoring, contextual permissions, and auditability. Transparency around these layers builds trust; concealing incidents undermines it.
- **Job Transformation Demands Proactive Policy:** Waiting for displacement before responding with training is insufficient. Governments and employers must anticipate labor shifts and invest in reskilling in advance. Equity requires that these pathways reach workers in low-wage roles, not only those with existing technical credentials.

- **Human-Centered Design Differs Fundamentally from Replacement Design:** Humanoids intended to restore or augment human capability, such as prosthetics and exoskeletons—require fundamentally different design approaches than systems aimed at labor replacement. Starting from human needs rather than efficiency alone produces different technologies and social outcomes.
- **Emotional Attachment and Loneliness Require Guardrails:** Robots that serve companionship functions can meet genuine needs, but one-sided, commercially mediated relationships risk monetizing loneliness. Clear boundaries are necessary to distinguish appropriate assistance from inappropriate emotional substitution.
- **Trust Emerges Through Cultural Integration, Not Technology Alone:** Societal acceptance of humanoids will be earned through demonstrated performance in human-centered contexts, not through technical benchmarks alone. Trust is a cultural process as much as a technological one.
- **Equity and Inclusion Require Intentional Governance:** Without deliberate attention to gender, marginalized communities, and worker voice, humanoid deployment risks concentrating benefits while externalizing harm. Benefit-sharing mechanisms and structured social dialogue are core governance requirements, not optional additions.
- **Values Encoded Now Will Be Enacted Physically:** Unlike software systems, where values shape data and processes abstractly, humanoids enact values through physical action. Intentionality in design, deployment, and governance is therefore essential from the outset.

5.3.4 Key Takeaways

- **Near-Term Physical AI Deployment Will Concentrate in Structured, High-Value Contexts:** Humanoids are most likely to appear first in logistics centers, manufacturing, and select healthcare roles where tasks are physically demanding, environments are relatively structured, and labor is expensive or scarce. General-purpose robots in homes remain a distant prospect. This reality should guide policy priorities and investment decisions.

- **Safety Requires Layered, Redundant Protections:** Responsible deployment depends on multiple, overlapping safeguards—including design-time constraints, run-time monitoring, contextual permissions, and auditability. No single guardrail prevents failure; redundancy is essential.
- **Worker Consultation and Transparency Are Prerequisites for Adoption:** Without clear communication around reskilling, safety protocols, and job redesign, workers cannot trust physical AI systems, regardless of technical robustness. Meaningful consultation and transparency must precede deployment.
- **Job Transformation Demands Proactive Reskilling Policy:** Displacement risk is concentrated among low-wage workers in physically intensive roles. A just transition requires early, sustained investment in reskilling pathways that reach women and marginalized communities—not only workers with existing technical credentials.
- **Human-Centered Design Empowers; Replacement Design Displaces:** Physical AI grounded in restoring or augmenting human capability differs fundamentally from systems designed primarily to replace labor. Design choices determine whether technology amplifies human agency or erodes it.
- **Human–Robot Interaction Design Is as Critical as Hardware:** Natural control, user agency over aesthetics, and adaptation to social environments matter as much as sensors and motors. Interaction design shapes adoption, trust, and psychological well-being.
- **Over-Trust and Capability Misconception Require Explicit Boundaries:** Humanoid form factors invite misattribution of capability. Clear, explicit communication about what systems can and cannot do is essential to prevent harmful over-trust.
- **Emotional Attachment and Loneliness Monetization Require Guardrails:** Robots used in elder care or child-facing contexts may meet genuine needs, but they also risk creating one-sided, commercially mediated relationships. Clear boundaries must distinguish appropriate assistance from emotional substitution.

- **Global Governance Must Combine Safety, Equity, and Dialogue:** Effective governance requires international safety and certification standards, benefit-sharing mechanisms ensuring communities whose data trains systems receive value, and structured engagement with workers and affected communities.
- **Cultural Trust Precedes Technological Acceptance:** Societal acceptance of humanoids will be earned through demonstrated performance in human-centered environments—such as hospitals and elder care—long before industrial efficiency alone convinces skeptics. Trust is cultural and accumulates through responsible deployment.
- **Values Encoded Now Will Be Enacted Physically:** Unlike software systems, where values shape data abstractly, humanoid systems enact values through physical action. Decisions made now—in design, deployment, and governance—will determine how physical AI operates in the world.

5.3.5 Broader Relevance

The rise of humanoids marks a qualitative shift in artificial intelligence: technology moves from shaping information and processes to acting physically in environments designed for humans, directly affecting livelihoods, dignity, and safety. This transition demands intentionality from technologists, businesses, policymakers, and society at large.

The central question is not whether humanoids will emerge—technological trajectories and economic incentives make that likely—but whether their deployment will concentrate power and opportunity or distribute benefits broadly while protecting those most vulnerable to displacement. By grounding design in human needs rather than labor replacement, establishing layered safety frameworks and transparent governance, investing proactively in just transition and reskilling, and building trust through responsible deployment in human-centered contexts, societies can shape physical AI toward broad human flourishing.

The breakthrough that ultimately matters is not technological but cultural: demonstrating, through responsible and equitable deployment, that humanoids can amplify human capability while respecting agency, dignity, and economic security. The physical world will soon host embodied AI. What values that embodied intelligence carries is a choice we are making now.

Session 6

CBDCs, Stablecoins, and Emerging Money Modalities: Towards New Value Exchange Ecosystems

As central banks worldwide experiment with digital currencies and private stablecoins reach hundreds of billions of dollars in market capitalization, the architecture of global value exchange is undergoing a fundamental transformation. This session convened fintech scholars, payments experts, and digital-asset innovators to examine how central bank digital currencies, stablecoins, and tokenized assets are likely to coexist and interoperate; which design choices will determine resilience or fragmentation; and how emerging monetary infrastructure will enable—or constrain—economic inclusion, privacy, and monetary sovereignty.

Moderator

Prof. George Samakovitis
Professor, FinTech at the University of Greenwich & Senior Executive Fellow, The Digital Economist

Speakers

Anne-Sophie Kappel
Executive Director, Digital Euro Association

Kene Ezeji-Okeye
Executive-in-Residence, Global Digital Finance & Chief Blockchain Officer, Ubyx

Shyam Nagarajan
Chief Operating Officer, Hedera & Senior Executive Fellow, The Digital Economist

Najada Taci
Senior Executive Fellow, The Digital Economist

6.1 Session Framing

6.1.1 Provocation

How will central bank digital currencies and stablecoins coexist and interoperate to create inclusive, efficient, privacy-respecting, and resilient value-exchange ecosystems that serve retail users, businesses, and financial institutions—while preserving monetary policy effectiveness and national sovereignty?

6.1.2 Context and Trends Highlighted

The session opened by positioning digital money as an accelerating force across both public and private sectors. More than 130 countries are actively exploring central bank digital currencies, with pilots underway in jurisdictions ranging from the Bahamas and Nigeria to China's e-CNY and India's e-rupee—many already processing significant transaction volumes.

At the same time, fiat-backed stablecoins—predominantly dollar-denominated—have grown to hundreds of billions of dollars in market capitalization and are increasingly used for cross-border payments, retail transactions, and commercial settlement. Recent legislative developments in the United States clarifying stablecoin regulation have further catalyzed this expansion.

The moderator framed the roundtable around several critical tensions. CBDCs are often criticized for slow deployment and concerns around privacy while stablecoins raise questions about reserve quality, liquidity management, peg stability, and the risk of fragmented "wildcat banking." Geopolitically, participants noted growing debate over whether CBDCs and stablecoins will reinforce or erode dollar dominance and reshape the global reserve-currency architecture.

Rather than treating CBDCs and stablecoins as competing systems, the discussion emphasized that outcomes will be determined by design choices—particularly how these instruments are structured to complement one another across payments, settlement, compliance, and cross-border use cases.

6.1.3 Tensions and Contrasts Explored

- **Public Trust vs. State Surveillance:** CBDCs raise concerns about governments using digital money as a tool of control and monitoring individual transactions while stablecoins trigger worries about corporate data concentration and platform power. Both systems require safeguards, but the governance mechanisms needed to address these risks differ fundamentally.
- **Traceability vs. Privacy:** Wholesale transactions require full traceability for anti–money laundering and compliance purposes while retail users expect cash-like privacy. Digital money systems must accommodate both needs simultaneously, requiring tiered privacy architectures rather than binary choices between transparency and anonymity.
- **Stability vs. Flexibility:** CBDCs are generally designed to be non–interest-bearing to avoid competing with commercial bank deposits and destabilizing the financial system. Stablecoins, by contrast, could offer yield if structured appropriately. The tension lies between preserving systemic stability and delivering an attractive user experience.
- **Domestic Control vs. Cross-Border Flows:** CBDCs reinforce national monetary policy and financial sovereignty while stablecoins enable near-frictionless cross-border transactions that may bypass traditional controls. The challenge is enabling efficient global value transfer without undermining regulatory authority or sovereignty.
- **Regulation vs. Innovation:** Robust regulatory frameworks are essential for safety and soundness, yet overly restrictive rules risk stifling innovation and fragmenting markets. Policymakers must balance financial stability with space for experimentation and responsible innovation.
- **Single Standards vs. Diverse Systems:** A single global money infrastructure could maximize efficiency, but would also concentrate power and reduce local agency. Interoperable systems that allow diverse monetary architectures to function seamlessly offer a balance between standardization and pluralism.
- **Institutional Use vs. Retail Adoption:** Wholesale CBDCs and tokenized assets have the potential to transform large-value settlement and capital markets while retail adoption faces distinct challenges related to user experience and competition from established payment systems. Both dimensions require attention, despite differing timelines and adoption dynamics.

6.2 Key Contributions from Speakers

6.2.1 Anne-Sophie Kappel on Digital Euro Vision and CBDC-Stablecoin Coexistence

- **Complementarity Rather Than Competition:** Kappel challenged a common misconception that CBDCs and stablecoins exist in a zero-sum relationship. In practice, she argued, the two are more likely to coexist and complement one another rather than function as direct substitutes. This framing reflects the reality that different instruments serve distinct purposes, users, and layers of the financial system.

- **Wholesale vs. Retail Dynamics:** According to Kappel, the most meaningful competitive dynamics will emerge at the settlement and infrastructure layers, particularly in wholesale markets. Central banks are modernizing RTGS systems and piloting DLT-based wholesale CBDCs while stablecoins and tokenized bank money can operate on the same rails and help draw private-sector activity into these upgraded environments. In this model, CBDCs and stablecoins may compete in wholesale settlement while remaining complementary at the retail level.

- **Layered Roles in a Hybrid Architecture:** Kappel outlined a layered architecture in which CBDCs function as the public settlement asset and core policy instrument while stablecoins operate as more flexible private-sector tools that create synergies with public money. This positions CBDCs as foundational public infrastructure, with stablecoins providing innovation and competition at the edges.

- **Privacy Frameworks and Surveillance Prevention:** Addressing privacy concerns, Kappel emphasized that surveillance risks differ between public and private digital money. CBDCs raise fears of state-level transaction visibility and control while stablecoins trigger concerns around corporate data concentration and cross-border data flows. Mitigation, she argued, requires firm commitments to data minimization, tiered privacy models, and intermediated architectures in which central banks do not observe every retail transaction. As in current systems, banks and payment service providers may access certain data, and aggregated information may flow to central banks for monitoring—without implying comprehensive surveillance.

- **Non–Interest-Bearing Design and Financial Stability:** Kappel highlighted design choices driven by financial-stability considerations. European plans for a digital euro envision a non–interest-bearing retail CBDC to avoid competition with bank deposits, which remain the primary interest-bearing savings vehicle. Similarly, under forthcoming regulatory frameworks, stablecoins are expected not to pay interest directly to holders, helping preserve balance within the financial system.
- **Reserve Quality and Redemption Certainty:** For stablecoins, Kappel stressed that value stability hinges on high-quality, transparent reserves and reliable redemption at par. This places governance, supervision, and financial backstopping—not just technical architecture—at the center of stablecoin credibility.
- **Geopolitical Currency Dynamics:** Looking ahead to 2030, Kappel suggested that stablecoins may drive more visible geopolitical currency shifts than CBDCs. As jurisdictions recognize the risk of capital outflows into foreign-currency tokens, many are promoting local-currency stablecoins alongside CBDC initiatives. In parts of Asia, including Japan and South Korea, stablecoin frameworks are being developed in tandem with CBDC agendas to strengthen domestic currencies rather than cede ground to the US dollar. This underscores that stablecoins while often framed as private instruments, function as geopolitical tools.
- **2030 Vision:** Kappel envisioned a future in which both retail and wholesale digital euros operate alongside other CBDCs while tokenized assets become mainstream in capital markets. In this scenario, full-stack value-exchange platforms integrate ledgers, assets, identity, and payments within interoperable systems.

6.2.2 Shyam Nagarajan on Stablecoin Growth and Programmatic Integration

- **Current Market Dynamics:** Nagarajan grounded the discussion in observable market trends. The stablecoin market capitalization, he noted, is now approximately $300 billion and has grown sharply over the past year. He projected that it could approach $1 trillion within the next two to three years, driven primarily by retail adoption. The key driver, he emphasized, is user experience rather than technical superiority: in many transactional contexts, stablecoins are simply easier to use than CBDCs.

- **Institutional Maturation in Parallel:** At the same time, institutional development continues on a separate but complementary track. More than 130 countries are exploring CBDCs, with a small number already live. Pilots such as China's e-CNY and India's e-rupee have processed substantial transaction volumes, illustrating parallel development paths serving different purposes and time horizons.

- **Complementary Architecture:** Nagarajan articulated a core thesis echoed across the session: the future is not CBDCs or stablecoins, but a combination of both. CBDCs are likely to provide trusted, transparent rails for wholesale settlement and large-value transfers while regulated, fiat-backed stablecoins—particularly on programmable, fast-settlement networks—will deliver superior user experience for retail and many commercial use cases. Each instrument plays a distinct and necessary role.

- **Privacy Through Tiered Models:** On privacy, Nagarajan moved the discussion beyond binary anonymity-versus-transparency framing. He pointed to existing payment analogies: cash offers a high degree of anonymity while cards and digital payments expose transaction data to intermediaries. This reality is pushing central banks to design tiered privacy models for retail CBDCs, preserving greater privacy for everyday users while maintaining full traceability for wholesale and interbank transactions to meet anti–money laundering requirements.

- **On-Ramp Architecture and Identity Linkage:** Addressing privacy concerns on public-chain stablecoins, where transactions are recorded on-chain, Nagarajan emphasized the importance of on- and off-ramps with robust know-your-customer processes. These mechanisms link wallets to verified identities without exposing full transaction histories to all participants. He noted that privacy must be designed in from the outset—often through hybrid architectures that combine private or permissioned ledgers with public chains, preserving confidentiality while maintaining auditability.

- **Yield and Monetary Policy Implications:** On the question of interest, Nagarajan observed that most stablecoins currently do not pay yield directly to end users, although early experiments suggest this could evolve. Central banks remain cautious, particularly regarding the domestic circulation of large volumes of foreign-currency stablecoins and the resulting implications for reserves, capital flows, and monetary policy transmission.

- **2030 Abstraction Vision:** Looking toward 2030, Nagarajan anticipated a future in which users no longer distinguish between "CBDCs" and "stablecoins" at all. Instead, people will simply use wallets and devices, with point-of-sale systems, payment processors, and financial applications seamlessly integrating multiple rails—much as mobile wallets do today. In this environment, CBDCs will be more prevalent in wholesale and public-sector contexts while deep tokenization will tightly link payments and capital markets, enabling individuals and firms to move fluidly between digital money and tokenized assets.

6.2.3 Kene Ezeji-Okoye on Shared Infrastructure and Programmable Finance

- **Reframing Digital Money Categories:** Ezeji-Okoye provided critical conceptual clarity for productive policy discussion by reframing what is meant by digital money. Rather than speculative cryptocurrencies, he emphasized that the focus here is on assets denominated in national currencies—digital representations of central-bank reserves, cash, e-money, and bank deposits. This distinction anchors the discussion in real financial instruments and institutional money rather than volatile, unbacked tokens.

- **Taxonomic Framework:** He outlined a taxonomy based on function rather than technology: wholesale CBDCs or tokenized reserves as digitized central-bank reserves; retail CBDCs as cash-like instruments; stablecoins as analogous to e-money or traveler's checks; and tokenized bank deposits as an on-chain evolution of traditional deposits. This framing clarifies institutional roles and user purposes while avoiding implementation-specific debates.

- **Multiplicity as a Feature, Not a Bug:** Ezeji-Okoye normalized diversity across money systems. Just as people today use cash, debit cards, credit cards, and bank transfers for different situations, future users will choose among CBDCs, stablecoins, and tokenized deposits based on context. Multiplicity, in this view, enhances utility rather than fragmenting the system.

- **Transformative Infrastructure:** The most transformative shift, he argued, is not any individual money form but the underlying infrastructure. Shared, programmable ledgers replace decades-old financial plumbing and function as a common source of truth that is accessible and composable by multiple actors. Like the transition from single-purpose devices to smartphones, this general-purpose infrastructure enables use cases far beyond payments, many of which are not yet imagined.

- **Rejecting the False Privacy Dichotomy:** On privacy, Ezeji-Okoye rejected binary framings of total anonymity versus total transparency. He argued that hybrid architectures—combining private or permissioned ledgers with public blockchains—can approximate or even improve upon the privacy properties of today's financial systems. Existing payment systems already operate on selective disclosure: merchants and banks see limited information, not a user's full transaction history. The same design logic can guide digital money systems, and many teams are actively developing privacy-preserving architectures that still meet regulatory requirements.

- **Terminology and Conceptual Precision:** Ezeji-Okoye critiqued the common language of "on-ramps" and "off-ramps," noting that it implies stablecoins are merely wrappers around "real" fiat. In practice, he argued, stablecoins function as a new form of money in their own right. Persisting with outdated terminology risks anchoring policy to legacy mental models rather than current realities.

- **Fungibility Through Invisible Infrastructure:** Drawing an analogy to modern banking, he observed that although thousands of banks effectively issue claims on national currencies, users experience a single, fungible money because of invisible clearing and settlement systems. A similar level of seamlessness is needed across stablecoins, tokenized deposits, and CBDCs so that users focus on solving problems rather than navigating rails.

- **Cross-Border Acceptance Infrastructure:** On cross-border use, Ezeji-Okoye noted that regulatory attention has focused heavily on issuance and backing, with less emphasis on acceptance mechanisms. He likened early stablecoins to traveler's checks—fully reserved bearer instruments that circulate globally even where issuers are not locally regulated. Effective global value exchange will require new acceptance infrastructure allowing local institutions to safely accept foreign stablecoins or tokenized deposits, convert them into local balance-sheet items or currency, and leverage existing clearing systems.

- **2030 Abstraction Vision:** By 2030, Ezeji-Okoye argued, success will mean that users no longer think about rails or instrument types at all. If people are still distinguishing between CBDCs, stablecoins, or tokenized deposits, the system has failed. The goal is invisible infrastructure that enables problem-solving without cognitive friction.

6.2.4 Najada Taci on Payment Systems and International Coordination

- **Payments as Foundational Infrastructure:** Taci emphasized that payment systems are core to everyday economic life across all sectors. What is unfolding, she argued, is not a peripheral innovation but an evolution of essential infrastructure through new technologies and renewed public–private cooperation.

- **Interoperability as the Central Challenge:** According to Taci, the defining opportunity—and risk—lies in interoperability. The future of money will not be a single dominant system, but an interconnected architecture in which public and private forms of digital money coexist and interoperate. Diversity combined with connectivity, she argued, is preferable to uniformity that concentrates power and reduces resilience.

- **International Regulatory Coordination:** Drawing on experience with international payment systems, Taci argued that digital money will ultimately require structured international regulatory arrangements analogous to those governing banking and payments today. Shared standards would reduce fragmentation, lower friction, and make it easier for digital instruments to be used safely across borders.

- **Flexibility and Predictability for Adoption:** Taci emphasized that businesses and citizens require flexibility, predictability, and clear rules. These qualities are essential for adoption, cross-border integration, and long-term investment in digital payment infrastructure.

- **Portfolio Digital Wallets and Long-Horizon Finance:** Looking toward 2030, Taci envisioned portfolio-style digital wallets accessible to all, containing a range of instruments not only for short-term payments but also for long-term projects and sustainable investments. Such wallets could enable new financing models that support cross-sector collaboration and long-horizon initiatives, including climate transition and large-scale infrastructure.

6.3. Discussion, Engagement, and Outcomes

6.3.1 Audience Engagement

Prof. George Samakovitis guided the conversation with precision, moving from foundational questions about CBDC–stablecoin coexistence through core design tensions—privacy versus traceability, yield, and liquidity—to cross-border implementation challenges and 2030 visions. Rather than treating these themes sequentially, Samakovitis wove speaker contributions into an escalating narrative of complexity.

The discussion progressed from Anne-Sophie Kappel's complementarity thesis, to Shyam Nagarajan's market dynamics and tiered privacy models, to Kene Ezeji-Okoye's reframing of shared infrastructure and acceptance mechanisms, and finally to Najada Taci's emphasis on interoperability and international coordination. Samakovitis's closing prompt—focused on plausible 2030 outcomes—synthesized these perspectives into forward-looking scenarios in which technology is largely mature, but successful implementation hinges on governance, standards, and institutional coordination.

Throughout the session, Samakovitis underscored that design choices in digital money are not merely technical decisions; they are policy choices that reflect trade-offs among efficiency, privacy, sovereignty, and access.

6.3.2 Audience Themes and Questions

- **Privacy Safeguards and Surveillance Risk:** Audience members sought clarity on how privacy could be meaningfully protected in digital money systems where transactions are inherently recorded and potentially traceable. Anne-Sophie Kappel's tiered privacy framework and Kene Ezeji-Okoye's discussion of privacy-preserving architectures using permissioned ledgers resonated, prompting questions about how such protections could be verified, enforced, and governed in practice.
- **Cross-Border Fragmentation Risks:** Participants questioned whether the proliferation of national CBDCs and diverse stablecoins would fragment global payments or enable seamless international value flows. Kene's focus on acceptance infrastructure and Najada's emphasis on interoperability standards provided constructive approaches to mitigating fragmentation risk.

- **Reserve Quality and Stablecoin Stability:** Concerns about stablecoin peg stability and reserve adequacy prompted discussion of governance mechanisms to ensure reserves are auditable, liquid, and genuinely backing issued coins. Anne-Sophie's emphasis on transparent reserves and reliable redemption at par offered reassurance on this dimension.
- **Geopolitical Dollar Dominance:** Audience members asked whether CBDCs and stablecoins are likely to weaken or reinforce dollar dominance in global payments. Anne-Sophie's description of Asian economies promoting local-currency stablecoins and CBDCs suggested deliberate efforts to reduce dollar dependence, even as dollar-denominated stablecoins continue to dominate current markets.
- **Retail vs. Institutional Adoption:** Questions also addressed sequencing: whether retail adoption would lead or follow institutional deployment. Shyam's observation that stablecoins are expanding rapidly through retail usage while CBDCs mature in wholesale and public-sector contexts suggested parallel—not sequential—paths of adoption.

6.3.3 Reflections and Insights

- **Coexistence and Complementarity Outperform Winner-Take-All Models:** Multiple forms of digital money serving different purposes are more realistic and resilient than a single dominant system—provided they interoperate seamlessly. Governance coordination enables innovation while preserving stability.
- **Privacy Requires Architectural Thought, Not Binary Choices:** Tiered privacy models that combine permissioned and public ledgers—supported by identity linkage at on- and off-ramps—can approximate cash-like privacy while maintaining regulatory observability. Privacy is a design outcome, not a yes-or-no feature.
- **Financial Stability Depends on Deliberate Constraints:** Non-interest-bearing retail CBDCs, limits on stablecoin yield, and robust reserve requirements reflect recognition that poorly designed digital money can destabilize financial systems. These constraints are safeguards, not shortcomings.

- **Infrastructure Transformation Matters More Than Instrument Labels:** Replacing decades-old clearing and settlement systems with programmable, shared ledgers enables economic innovation far beyond payments alone. This infrastructural shift is more consequential than whether a given instrument is labeled a CBDC or a stablecoin.
- **Acceptance Mechanisms Determine Cross-Border Outcomes:** International agreement on who must accept which instruments—and under what conditions—will determine whether diverse digital money systems enable frictionless global flows or generate new forms of fragmentation.
- **Interoperability and Standards Enable Diversity:** Shared standards and international regulatory coordination allow diverse money systems to operate together seamlessly. Without coordination, diversity becomes friction.
- **Geopolitical Concerns Drive CBDC and Stablecoin Development:** CBDCs and stablecoins are not only technical innovations but geopolitical instruments. Efforts to promote local-currency digital money reflect strategic attempts to reshape reserve-currency dynamics and reduce reliance on dollar-centric systems.
- **User Abstraction Is Success Metric:** The true measure of success is whether users can solve problems without thinking about which rail or instrument they are using. Achieving this requires deep technical interoperability and strong institutional coordination beneath the surface.

6.3.4 Key Takeaways

- **CBDCs and Stablecoins Are Complementary, Not Competitive:** They serve distinct purposes at different layers of the financial system. CBDCs anchor wholesale settlement and act as public policy instruments while stablecoins provide programmability and user experience for retail and commercial transactions. Both are essential to future value-exchange ecosystems.
- **Coexistence Requires Design Complementarity at Infrastructure Level:** Public wholesale CBDCs and private stablecoins must operate on compatible technical rails with interoperable settlement mechanisms. This requires central-bank leadership in designing foundational infrastructure that supports diverse private instruments.
- **Privacy Requires Tiered Models Combining Multiple Ledger Types:** Binary thinking around anonymity versus transparency is a false dichotomy. Tiered privacy models, permissioned ledgers, and identity linkage at on- and off-ramps can approximate cash-like privacy for retail users while maintaining regulatory observability and anti–money laundering compliance.
- **Financial-System Stability Requires Design Constraints:** Non–interest-bearing retail CBDCs, restrictions on stablecoin yield, and robust reserve requirements are essential safeguards. These are not technical limitations but deliberate governance choices to protect systemic stability.
- **Retail Adoption Will Drive Stablecoin Growth; Wholesale Settlement Will Drive CBDC Adoption:** Stablecoins benefit from user-experience advantages in retail and commercial payments while CBDCs are driven by institutional demand for transparent, resilient settlement infrastructure in wholesale and public-sector contexts.
- **Cross-Border Integration Requires Acceptance Infrastructure and Standards:** International coordination on acceptance mechanisms, foreign-exchange treatment, and regulatory parity determines whether diverse money systems enable frictionless global flows. Acceptance infrastructure is as critical as the underlying technical systems.

- **Interoperability Is Central to Financial Inclusion and Resilience:** Open, interoperable infrastructure allowing diverse money systems to function seamlessly expands access and resilience. Closed ecosystems that concentrate power undermine both inclusion and stability.
- **International Regulatory Coordination Is Prerequisite:** Shared standards for stablecoin reserves, CBDC privacy protections, AML compliance, and data governance enable adoption and cross-border integration. Uncoordinated national regulation risks fragmentation and friction.
- **User Abstraction Is Success Metric:** By 2030, mature systems will abstract away complexity around money instruments and rails. Users will solve problems rather than navigate infrastructure—a result that depends on deep technical seamlessness and interoperability.
- **Programmable Money Enables New Use Cases:** Shared programmable ledgers as foundational infrastructure enable models beyond payments, integrating assets, identity, and settlement in ways that unlock innovation not yet fully imagined.
- **Geopolitical Currency Dynamics Shape Development:** CBDCs and stablecoins are not only technical innovations but geopolitical instruments reshaping reserve-currency dynamics and financial sovereignty. Efforts to promote local-currency digital money reflect deliberate strategies to reduce dependence on dollar-centric systems.

6.3.5 Broader Relevance

The emergence of central bank digital currencies and stablecoins represents a fundamental transformation in value-exchange infrastructure—comparable in significance to earlier shifts from commodity money to fiat systems and from paper-based finance to electronic banking. This transition creates an opportunity to build financial infrastructure that is more inclusive, efficient, privacy-respecting, and resilient, serving individuals, businesses, financial institutions, and governments alike.

That opportunity, however, is not guaranteed. Poor design choices risk fragmenting global payments, concentrating power among large platforms, undermining financial stability, or enabling surveillance at unprecedented scale. The roundtable underscored that outcomes depend on intentional design: tiered privacy architectures that protect individual confidentiality while preserving regulatory observability; interoperable infrastructure that supports plural monetary systems; international coordination around shared standards; and inclusive governance processes that reflect public interest rather than narrow institutional advantage.

The central insight is that CBDCs and stablecoins are complementary rather than competitive, each serving distinct functions within a layered financial system. By 2030, if these instruments mature as anticipated, a substantial share of daily transactions and capital flows will move across digital rails that replace decades-old infrastructure. The challenge is ensuring that this transition advances broad human flourishing, financial inclusion, and democratic sovereignty—rather than concentrating power and opportunity in the hands of a few.

Session 7

Climate Change and Health: Building Resilience for Meteorological Extremes

As extreme weather events such as heatwaves, floods, cyclones, and cold snaps become increasingly predictable, a persistent gap remains between climate foresight and health-system action. Advances in meteorology allow many hazards to be anticipated with growing precision, yet healthcare systems continue to respond reactively, often after harm has already occurred. This roundtable examines where and why this translation breaks down, how facility design and system operations can either amplify or reduce risk, and what cross-sector, system-level, and design-informed responses are needed to convert climate prediction into timely protection, particularly for vulnerable populations.

Moderator

Dr. Steph Sharma
Principal and Founder, Symbio Strategies
Senior Executive Fellow, The Digital Economist

Speakers

Dr. Bindu Menon
Professor and HOD, Department of Neurology
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Danielle McCarron
Chief Clinical Director, Canadian Addiction Treatment Centers & Co-Founder, Alignix Inc.

Bruce Armstrong Taylor
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7.1 Session Framing

7.1.1 Provocation

How can healthcare systems translate increasingly precise climate predictions into coordinated clinical and operational action that reduces preventable harm, particularly for the most vulnerable populations?

7.1.2 Context and Trends Highlighted

The session opened by framing climate change not as a distant environmental issue, but as an immediate test of health-system readiness. The most dangerous aspect of a climate-related hazard is often not the heatwave or the storm itself, but the "white space" between systems where accountability breaks down and climate foresight fails to translate into timely protection (Rummler & Brache 1990). Anchored in recent signals of traction, the discussion examined how extreme heat, cold, floods, and storms generate cascading health impacts, from direct physiological stress to medication degradation, infrastructure failure, supply chain disruption, and psychological trauma, and why healthcare systems remain structurally unprepared to act on risks that are increasingly predictable. Examples cited included the UK National Emergency Briefing (November 2025), which formally elevated extreme weather as a health-system risk, and a Stanford AI+Health initiative led by Munjal Shah (December 2025) that used weather-triggered outreach to proactively contact sixteen thousand high-risk stroke patients ahead of a forecast heatwave, demonstrating how anticipatory, data-driven interventions can reduce harm when systems are designed to act before crisis conditions emerge.

The moderator framed the discussion around three interconnected themes rooted in the paradox of prediction: first, how increasingly foreseeable meteorological extremes continue to translate into worsening health outcomes and strained care delivery; second, how healthcare facility design, operational models, and supply chains either amplify risk or enable anticipatory response; and third, what cross-sector, community-linked, and design-informed approaches are required to convert climate foresight into timely action and durable resilience.

The discussion emphasized that climate-related health impacts fall most heavily on those with the fewest resources, those experience mental health crisis, rural populations without reliable refrigeration, unhoused individuals using emergency departments as shelters, and informal workers losing income during extreme heat events. Yet formal health systems often treat these impacts as unexpected disruptions rather than foreseeable stressors that demand proactive planning and structural redesign.

7.1.3 Tensions and Contrasts Explored

- **Direct vs. Indirect Health Impacts:** Extreme weather causes immediate physiological harm, such as heat stroke, cold injury, and flood-related trauma, yet indirect impacts may be equally or more damaging. These include medication degradation, supply-chain disruption, psychological trauma, income loss, and delayed access to care, all of which receive far less attention in clinical practice and policy planning.
- **Operational vs. Clinical Priorities:** Healthcare organizations must balance clinical imperatives such as patient safety and therapeutic environments with operational constraints including budgets, energy use, and staffing. Climate extremes intensify this tension, forcing difficult trade-offs between maintaining clinical standards and managing operational viability.
- **Predictability vs. System Unpreparedness:** Climate-driven health effects follow predictable patterns (for example, measurable increases in stroke admissions for each degree Celsius rise above baseline temperatures), yet healthcare systems continue to treat recurring events as unprecedented crises rather than foreseeable stressors requiring preparation.

- **Individual Clinical Response vs. Systemic Design Failure:** Clinicians may respond with skill and dedication during climate-related health crises, but without systemic preparation (adequate cooling, backup power, resilient supply chains, and mental-health support for staff) individual excellence cannot overcome structural vulnerabilities.
- **Health System Capacity vs. Climate-Driven Surges:** Most healthcare facilities operate at or near full capacity under normal conditions. Climate extremes generate sudden surges (unhoused individuals seeking shelter during cold snaps, heat-vulnerable patients during heatwaves) that overwhelm existing infrastructure and staffing models.
- **Knowledge Silos vs. Integrated Response:** Operational teams often lack clinical insight, clinicians lack infrastructure expertise, and emergency planners operate separately from both. These silos prevent climate adaptations from being designed around patient vulnerability and real-world care delivery.
- **Urban Infrastructure vs. Rural Vulnerability:** Urban areas confront heat-island effects and infrastructure strain while rural regions face medication storage failures, transport disruptions, and isolation during severe weather. These distinct vulnerability profiles require context-specific adaptation strategies rather than uniform solutions.
- **Income Security vs. Heat-Driven Productivity Loss:** Extreme heat directly reduces safe working hours for informal workers—particularly women—triggering income loss that compounds health risks. While compensation and income-protection schemes could mitigate this impact, they remain under-resourced and limited to pilot programs.

7.2. Key Contributions from Speakers

7.2.1 Dr. Bindu Menon on Neurological Impacts and Rural Healthcare Delivery

- **Temperature-Health Relationships and Measurable Impacts:** Dr. Menon grounded the discussion in clinical evidence from coastal India, highlighting a clear and quantifiable relationship between temperature and neurological outcomes. For every 1 degree Celsius increase in ambient temperature above a baseline of approximately 30 degrees Celsius, she noted a measurable rise in stroke admissions, with consistent spikes in strokes and acute neurological events during heatwaves. This evidence underscores that climate–health impacts are already observable in clinical data rather than speculative future risks.

- **Chronic Condition Exacerbation:** In regions where summer temperatures routinely exceed 40 degree Celsius, patients with existing neurological conditions experience acute deterioration. Dr. Menon described more frequent seizures among people with epilepsy and marked worsening of symptoms in patients with Parkinson's disease. Individuals sensitive to dehydration and heat exposure are particularly vulnerable, as even minor disruptions in fluid balance and thermoregulation can precipitate serious neurological events. Climate extremes, she emphasized, do not create entirely new diseases but significantly worsen conditions that health systems already struggle to manage.

- **Medication Degradation as Overlooked Crisis:** Dr. Menon identified medication instability under high temperatures as a critical yet underappreciated vulnerability. Many neurological drugs—particularly anti-seizure medications—lose efficacy when stored in excessive heat. In households without reliable refrigeration or air conditioning, medicines can degrade, leading to poor seizure control and repeated hospital visits. This is not a theoretical risk; it is a recurring reality in rural communities and urban informal settlements where storage conditions are inadequate. The vulnerability of healthcare, she stressed, extends beyond hospitals into homes and communities.

- **Transport Breakdown and Access Loss:** Extreme weather also creates physical barriers to care. During severe cyclones, prolonged power outages and infrastructure damage cut off rural communities for days. Roads became impassable, transport systems failed, and access to hospitals was effectively severed for many patients with chronic neurological conditions. Through her Neurology on Wheels outreach program, Dr. Menon observed that during such events patients simply stop coming, not because their conditions improve but because reaching care becomes physically impossible.

- **Systemic Rather Than Anecdotal Patterns:** Dr. Menon emphasized that these experiences are not isolated incidents but predictable, recurring patterns. Spikes in stroke admissions, worsening of chronic neurological conditions, treatment gaps caused by degraded medications, and care disruptions due to transport failure occur repeatedly and disproportionately affect those with the fewest resources and weakest baseline access to care. Yet health systems continue to treat these events as unexpected crises rather than foreseeable stressors requiring structured preparation.

- **Climate Extremes as Predictable Stressors:** The core insight of Dr. Menon's contribution reframed climate extremes as predictable stressors rather than unprecedented emergencies. The harm, she argued, arises not from climate variability itself but from fragmented systems and the absence of coordinated plans when refrigeration, transport, and routine care pathways fail. Proactive planning across these dimensions is therefore essential to reducing avoidable neurological harm.

7.2.2 Danielle McCarron on Mental Health, Operations, and System Fragmentation

- **Climate-Driven Mental Health Crises:** McCarron approached climate-related health impacts through a psychotherapeutic lens, observing that climate extremes often manifest first as psychological distress. In her clinical work, fear and anxiety frequently precede physical harm, with clients expressing dread about wildfires, heatwaves, and extreme cold, and uncertainty about what may come next. In Toronto, unprecedented heat and wildfire exposure—historically rare in the region—are generating new forms of climate-related anxiety and trauma.

- **Psychotropic Medications and Heat Vulnerability:** She highlighted a critical yet underappreciated vulnerability affecting large populations: many psychotropic medications impair thermoregulation. Approximately 15 percent of North Americans, she noted, take SSRIs or other psychotropic drugs that reduce the body's ability to regulate heat (CDC 2020, 2025; PMC 2022; Health Canada). During summer heatwaves, many clients are effectively confined to their homes, limiting access to therapy, work, and social supports that protect mental health. Medication side effects and climate exposure thus interact to create compounding risks.

- **Infrastructure Inadequacy and Seasonal Paradox:** Historically, Toronto's systems were designed to manage extreme cold, yet infrastructure has proven inadequate for both cold and heat. McCarron offered a concrete example illustrating cascading system failures: during a recent cold snap, a 19-year-old patient experiencing severe suicidality waited ten hours in an emergency department because all beds were full. When temperatures drop well below freezing, unhoused and highly vulnerable individuals turn to emergency departments as de facto shelters, overwhelming capacity. Climate extremes—whether heat or cold—create immediate, predictable surges that current infrastructure and service design fail to anticipate.
- **Changing Seasonal Patterns:** McCarron noted a significant shift in mental-health seasonality. Historically, mental health symptoms in Canada tended to stabilize during summer months. Over the past two years, however, prolonged heat events have reversed this pattern, with symptoms persisting or worsening. This shift suggests that climate change is not merely intensifying known trends but actively undermining historical assumptions embedded in planning and service delivery.
- **Operational-Clinical Silos and Fragmentation:** A persistent tension between clinical and operational priorities undermines climate adaptation in mental health settings. Operational leaders often focus on budgets, energy use, and occupancy rates while clinicians prioritize safety, rest, and therapeutic environments. Extreme weather amplifies these conflicts. When storms disrupt transportation or heat-related school closures prevent clinicians from reaching work, services may need to shift to remote delivery—yet infrastructure, staffing models, and protocols are frequently unprepared to support such transitions.

- **Knowledge Silos and System Fragmentation:** At the core of the problem, McCarron argued, is systemic fragmentation. Operations teams often lack clinical training, resulting in climate-related adjustments that fail to account for patient vulnerability. Silos between operations, clinical care, and emergency planning lead to avoidable harm when climate extremes push already stressed systems beyond their limits. McCarron emphasized that clinicians cannot be expected to manage climate-related health risks without climate literacy embedded in professional training. Mental health, she noted, is already deprioritized, and without foundational understanding, both operational and clinical teams remain dangerously unprepared.
- **Climate Extremes as Mental Health Amplifiers:** McCarron concluded by underscoring that climate extremes are no longer abstract future risks. They are actively shaping mental health through rising fear, anxiety, and trauma while the systems intended to provide care remain insufficiently adapted to the realities of a changing climate.

7.2.3 Shivedita Singh on Community Resilience and Lived Experience

- **Community-Based Psychosocial Support:** Singh highlighted community-led interventions that demonstrate strong potential if scaled, including peer-support circles and shared community spaces established after major climate events. These interventions are low-cost yet highly effective: they relieve pressure on overstretched formal health systems, which often lack the capacity to provide individualized psychosocial care at scale while helping individuals make sense of disruption, rebuild social bonds, and regain a sense of agency. Her contribution underscored that formal healthcare alone cannot meet the full spectrum of mental-health needs created by climate stress; community-based approaches fill critical gaps.
- **Climate-Linked Income Protection:** A second promising intervention directly addresses economic vulnerability arising from climate extremes. Singh cited programs piloted by SEWA (the Self-Employed Women's Association) that track days of extreme heat, correlate them with lost working hours for women, and provide compensation explicitly linked to climate-related productivity loss. By recognizing heat exposure as a quantifiable risk and compensating for it, these schemes help households maintain basic economic security in the face of recurring climate shocks—stabilizing income in ways that directly support health and well-being.

- **Lived-Experience Metrics and Data Gaps:** Singh emphasized that conventional health data systems fail to capture many of the most consequential impacts of climate change. She called for greater investment in mental-health research and lived-experience–based indicators that reflect how frequent and abrupt climate events reshape daily life. Many of these impacts remain invisible in traditional datasets, making community listening and co-creation of metrics essential. Without such approaches, policy risks missing the real stress points communities face on the ground.
- **Migration and Psychological Displacement:** Singh also pointed to deeper systemic consequences in highly climate-vulnerable regions. In areas such as the Sundarbans, repeated cyclones are eroding food security, livelihoods, and housing, pushing families into migration with profound psychological consequences. What once felt geographically remote is increasingly widespread across India, as rising heat and pollution destabilize daily work and disproportionately affect women laborers.
- **Scaling Challenge:** While these interventions show clear promise, Singh stressed that they remain limited in scope. To move beyond isolated success stories, community-based psychosocial support and climate-linked income protection must be formally integrated into local and national adaptation strategies.

7.2.4 Bruce Armstrong Taylor on Systems-Level Design and Infrastructure Resilience

- **Systems Thinking Over Building Design:** Taylor reframed healthcare adaptation away from isolated facility upgrades toward systems-level resilience. Responding effectively to climate change, he argued, requires moving beyond traditional building-focused design and adopting a holistic view of healthcare systems as interconnected networks embedded in broader environmental, social, and infrastructural contexts.
- **Structural Fragility:** Taylor highlighted particular vulnerabilities in North American healthcare systems, which are economically fragmented and heavily insurance-dependent rather than organized around unified national health frameworks. This structural fragmentation makes it difficult to implement large-scale, coordinated adaptations at the speed and scope climate change demands.

- **Local Climate Data and Operational Planning:** Taylor emphasized the importance of explicitly incorporating climate projections into operational planning. In regions such as New Mexico, rising average temperatures, intensifying drought, and prolonged interruptions to river flow—such as the Rio Grande ceasing to flow for weeks—signal predictable increases in heat-related illness, water-related disease, and infrastructure stress. These signals should directly inform healthcare capacity planning.
- **Facility Adaptation Questions:** Given these trends, Taylor argued that healthcare leaders must ask specific, forward-looking questions: What will patient loads look like under projected temperature and water conditions? Which conditions will become more prevalent? How should staffing models, cooling systems, backup power, and triage protocols be adjusted accordingly?
- **360-Degree Contextual Lens:** True facility resilience, Taylor stressed, requires leaders to step beyond the walls of individual buildings and view healthcare operations within a 360-degree context—linked to local climate trajectories, community vulnerabilities, and regional infrastructure dependencies. Currently, many healthcare organizations do not treat climate risk as a core operational concern, a mindset that must change.

- **Infrastructure Behind the Scenes:** Taylor underscored that resilience often hinges on systems that remain invisible until failure occurs. Healthcare delivery depends fundamentally on power, water, and digital infrastructure. He pointed to Hurricane Sandy as a cautionary example: when backup generators flooded, a major medical center failed, necessitating mass patient evacuation. Protecting these behind-the-scenes systems is now central to healthcare resilience.
- **Systems-Level Design Challenge:** Taylor concluded that existing healthcare systems are too fragile to absorb escalating climate shocks. Even in the absence of comprehensive national plans, every healthcare organization must begin treating climate risk as a core operational strategy rather than an afterthought.

7.3. Discussion, Engagement, and Outcomes

7.3.1 Audience Engagement

Dr. Steph Sharma guided the conversation by deliberately sequencing perspectives across system levels, moving from neurological impacts discussed by Dr. Menon, through mental health and operational fragmentation raised by Danielle McCarron, to community-based interventions highlighted by Shivedita Singh, and finally to systems-level design and infrastructure resilience addressed by Bruce Armstrong Taylor. She framed these contributions as interdependent rather than discrete, drawing attention to how climate impacts cascade through health systems, from individual physiology to facility operations, community capacity, and underlying infrastructure.

Throughout the discussion, Dr. Sharma explicitly surfaced linkages across speaker contributions. She connected Dr. Menon's observations on medication degradation under heat exposure to the infrastructure vulnerabilities Bruce described, and she used Danielle's account of operational and clinical silos to explain why the integrated, community-centered approaches Shivedita advocated remain difficult to implement. By drawing these connections in real time, she reinforced the central conclusion that climate-related health risks cannot be effectively addressed at any single level of the system.

In closing, Dr. Sharma emphasized climate literacy as a core capability for adaptation, noting that understanding climate risk must be embedded in clinical practice, operational decisions, and organizational culture. She also highlighted the importance of building cross-sector connections that create shared ownership of risk and response. Together, climate literacy and cross-sector coordination enable forecasts to become action and resilience to move from intention to practice.

7.3.2 Audience Themes and Questions

- **Data and Quantification:** Audience members sought concrete epidemiological evidence linking climate variables to health outcomes, reflecting recognition that quantified data strengthens the case for adaptation. Dr. Menon's temperature–stroke relationship and SEWA's tracking of heat-related productivity loss provided tangible metrics that anchored these questions.

- **Operational Implementation:** Questions focused on how healthcare facilities could operationalize systems-level thinking in the face of budget constraints and organizational fragmentation. Bruce Armstrong Taylor's emphasis on viewing facilities within a 360-degree context and initiating climate planning with operational leadership prompted discussion about governance structures capable of enabling such integration.

- **Mental Health and Training:** Concerns about clinical preparedness for climate-driven mental-health impacts prompted questions about what forms of climate literacy should be embedded in professional training and how organizational culture could shift accordingly. Danielle McCarron's emphasis on knowledge silos resonated strongly, generating discussion around curriculum design and continuing professional development.

- **Community Partnership Models:** Audience interest in Shivedita Singh's community-based approaches raised questions about how formal health systems can partner effectively with community organizations and recognize lived-experience expertise. Participants explored funding mechanisms and governance models that could support equitable, sustained collaboration.

7.3.3 Reflections and Insights

- **From Prediction to Action Is the Core Challenge:** Climate-related health impacts are not random crises but foreseeable stressors with well-documented relationships to meteorological conditions. The central challenge is not prediction, but the persistent gap between knowing what is coming and acting in time. This translation failure remains a defining systems weakness.

- **Indirect Impacts Often Exceed Direct Impacts:** While heat- and cold-related illness receive attention, indirect effects such as medication degradation, supply-chain disruption, psychological trauma, income loss, and transport breakdown are often equally damaging and less systematically addressed.
- **Operational and Clinical Integration Is Essential:** Effective adaptation depends on tighter integration between operational and clinical domains. Operations teams must understand patient vulnerability, while clinicians must account for infrastructure and resource constraints. When these perspectives remain siloed, predictable risks escalate into avoidable harm.
- **Facility Resilience Depends on Invisible Infrastructure:** Backup power, water supply, logistics, and digital systems are foundational to care continuity yet frequently overlooked. Failures in these systems can collapse facility resilience, as demonstrated during events such as Hurricane Sandy, regardless of clinical capability.
- **Community Capacity Complements Formal Healthcare:** Community-based interventions, including peer-support and local response networks, do not replace formal healthcare but can relieve system pressure, support psychosocial needs, and improve continuity of care. The appropriate model is partnership and coordination, not substitution.
- **Medication and Treatment Risks Extend Beyond Protocols:** Climate extremes disrupt medication storage, transport, and treatment continuity, creating cascading health impacts. Adaptation strategies must therefore address supply-chain and logistical resilience alongside clinical protocols.
- **Mental Health Requires Dedicated Planning:** Climate-related events generate psychological effects distinct from physical illness. Mental health infrastructure, psychosocial support, and climate literacy within behavioral health training are essential components of effective adaptation.
- **Vulnerability Compounds Through System Design:** Unhoused individuals, informal workers, rural populations, and marginalized communities face compounded risks due to limited buffers and system access. Adaptation strategies must explicitly prioritize those with the fewest resources, recognizing that system design choices determine whether predictability leads to protection or preventable harm.

7.3.4 Key Takeaways

Predictability Is Not the Limiting Factor: Climate-related health impacts are increasingly foreseeable. The central challenge lies in translating climate prediction into coordinated clinical, operational, and community action.

The Greatest Risks Sit Between Systems: Preventable harm accumulates in the gaps between healthcare, infrastructure, public health, and community services. Cross-sector fragmentation has become a patient safety risk rather than a mere inefficiency.

Indirect Impacts Drive System Failure: Medication degradation, infrastructure breakdown, supply-chain disruption, mobility loss, and psychological stress often produce greater cumulative harm than direct heat or cold injury, yet remain under-integrated into preparedness planning.

Resilience Is a Design and Integration Challenge: Health-system resilience depends as much on infrastructure design, operational coordination, and embedded climate literacy as on clinical capability. Facilities optimized for efficiency rather than stress absorption are structurally vulnerable.

Equity Is Determined by System Design Choices: Climate shocks disproportionately affect populations with limited resources. Whether predictability leads to protection or preventable harm is determined by how systems prioritize integration, access, and shared accountability.

7.3.5 Broader Relevance

As meteorological extremes intensify worldwide, healthcare systems face a clear challenge, not whether climate risks are real but whether they are treated as foreseeable and actionable. The session reinforced that adaptation is not primarily a clinical problem. It is a systems problem that depends on how effectively clinical expertise, operations, facility design, supply chains, community partnerships, and mental health infrastructure are integrated.

A central takeaway was not that climate-related health impacts are predictable, but that they are already known. Relationships between temperature and stroke incidence, documented productivity losses during extreme heat, and well-established vulnerabilities in medication storage, power reliability, and supply chains make these risks foreseeable rather than exceptional. The persistent failure lies in translating that foresight into coordinated clinical and operational response.

The challenge, then, is to build healthcare systems that treat climate extremes as recurring stressors rather than unprecedented disruptions. This requires explicit leadership prioritization, cross-functional integration, and design choices that embed anticipation into routine decision-making. For vulnerable populations, including rural communities, informal workers, individuals with chronic neurological conditions, and those experiencing mental health challenges, these choices determine whether climate shocks result in continuity of care or cascading failure.

At a systems level, healthcare adaptation is no longer discretionary. The ability to convert climate prediction into timely action has become foundational to protecting population health in an era of accelerating climate change.

Session 8

AI and Education: The Great Relearning Revolution

As artificial intelligence rapidly transforms knowledge work and professional landscapes, education systems face a fundamental reimagining: how to prepare learners for a 2045 world that is difficult to imagine today. In this future, AI increasingly handles information retrieval and routine problem-solving while distinctly human capabilities—critical thinking, creativity, ethical reasoning, adaptability, and emotional intelligence—become both scarcer and more valuable.

This session examines what education must become in an AI–augmented world, how adults must relearn how to guide learners growing up with AI as a constant companion, and what shifts in pedagogy, family engagement, and institutional design are required to ensure that learners in 2045 thrive with purpose, autonomy, and human-centered resilience.

Moderator

Erika Twani
CEO and Founder, Learning One to One Foundation & Senior Executive Fellow, The Digital Economist

Speakers

Dr. Alexandra Cook
Chief Strategy Officer, Cooper Family Office & Senior Executive Fellow, The Digital Economist

Amy Love
Founder and CEO, Discovering AI

Professor Sugata Mitra
Newcastle University

Olga Magnusson
Senior Executive Fellow, The Digital Economist & Co-Founder and CEO, SmartProjects

8.1 Session Framing

8.1.1 Provocation

If we reverse-engineer the skills, mindsets, and formative experiences required for a 20-year-old in 2045 to flourish—creating value, solving unprecedented problems, and living with purpose—how must education, family guidance, and institutional structures transform today to enable that future?

8.1.2 Context and Trends Highlighted

The session opened by positioning education at a critical inflection point. Traditional models—built around information scarcity, standardized curricula, and credential accumulation—are colliding with AI systems that make vast knowledge instantly accessible and render many existing curricular approaches increasingly obsolete.

The moderator framed the discussion around three interconnected themes. First, which skills, mindsets, and capabilities will truly matter in 2045, when AI reliably handles information retrieval and routine problem-solving. Second, how adults—parents, educators, and institutional leaders—must relearn how to guide learners growing up in an AI–augmented world. Third, what shifts in pedagogy, institutional design, and learning ecosystems are required now to support this transformation.

A central emphasis was that the core challenge is not teaching children how to use AI, but relearning how adults guide, model judgment, and cultivate meaning in its presence. Alignment among families, schools, and the broader learning ecosystem was identified as essential. The discussion also foregrounded equity considerations: while AI offers unprecedented access to learning resources for underserved populations, without intentional design, infrastructure, and support, it risks deepening existing educational divides.

8.1.3 Tensions and Contrasts Explored

- **Information Access vs. Knowledge Depth:** AI delivers instant answers to nearly any question while education has historically been structured around information scarcity. The tension lies between enabling access to answers and preserving the capacity for inquiry, deep thinking, independent reasoning, and genuine understanding rather than surface-level retrieval.
- **Standardized Assessment vs. Adaptive Competency:** Traditional systems rely on standardized testing to ensure comparability and accountability. AI enables continuous, individualized assessment of competency and progress. The tension is balancing accountability with personalized, adaptive learning pathways.
- **School Structure vs. Continuous Learning:** Learning has historically been concentrated in childhood and adolescence within formal schooling, with adulthood divided between work and leisure. AI–driven change points toward lifelong, integrated learning across home, school, and workplace throughout the lifespan.
- **Adult Guidance vs. Child Autonomy:** Learners require both intentional adult guidance and genuine autonomy. Excessive structure constrains curiosity while insufficient guidance generates anxiety and aimlessness. The challenge lies in designing environments where adults scaffold learning while enabling purposeful exploration.

- **Algorithmic Personalization vs. Human Relationship:** AI can personalize content, pacing, and feedback at scale; human educators provide relationships, mentorship, and lived models of thinking and values. The tension lies between optimizing efficiency and preserving the relational dimensions essential to development.
- **Universal Access vs. Equitable Access:** AI tools are increasingly low-cost and globally available, yet disparities persist in connectivity, devices, digital literacy, and family support. The tension lies between nominal access and genuine equity that enables all learners to benefit.
- **Collaborative Public Learning vs. Private Social Media:** Collective learning in shared, public environments differs fundamentally from isolated consumption of algorithmically curated content on private platforms. The challenge is leveraging technology for shared inquiry while avoiding isolation and algorithmic capture.
- **Questions vs. Answers:** Educational systems have historically centered on teaching and testing answers. AI inverts this dynamic by making answers abundant and inexpensive. The central tension is reorienting education toward teaching learners how to ask meaningful questions, evaluate answers critically, and think with purpose.

8.2 Key Contributions from Speakers

8.2.1 Dr. Alexandra Cook on Systems Disruption and Urgent Action

- **Aggressive Near-Term Action for Long-Term Outcomes:** Dr. Cook framed the challenge as one requiring immediate intervention to shape 2045 outcomes. She emphasized that existing tools already provide unprecedented access to learning—particularly for underserved communities—and argued that waiting for full systemic reform risks forfeiting a generation. Low-performing schools, she noted, can meaningfully supplement instruction today through AI tutoring and adaptive tools.
- **Structural Disruption and Shifting Advantage:** She described education as entering a period of radical disruption across structure, delivery, and expectations, from early schooling through careers. Drawing on her experience as a college professor, AI investor, and hiring manager, she observed that current college students may represent the last cohort to gain traditional entry-level, hands-on experience before most early-career work shifts toward supervising and directing AI systems. Experiential knowledge, she argued, will become increasingly scarce—and therefore valuable.

- **Preparation Beyond Technical Skills:** She stressed that preparation must extend beyond technical proficiency to include judgment, critical thinking, and the ability to add value in AI–augmented environments. As routine knowledge work is automated and workforce entry points shrink, future workers will need to supervise systems, integrate insights, and make meaningful decisions rather than execute predefined tasks.
- **Competency-Based Certification vs. Standardized Testing:** Questioning the future viability of standardized testing, she suggested that continuous, AI–enabled competency certification may better reflect real capability. Rather than episodic exams, AI systems could verify defined competencies from early grades through higher education, offering ongoing feedback loops aligned with actual skill development.
- **Humanities and Liberal Learning as Foundation:** While advocating for competency-based preparation, Dr. Cook underscored the enduring importance of humanities and liberal learning. Foundational knowledge in language, history, art, and culture, she argued, remains essential to developing interesting, thoughtful humans. The unresolved tension lies in determining when education becomes overly job-specific training at the expense of broader human development.
- **Equity Through Access:** Dr. Cook acknowledged encouraging trends: free and low-cost AI tools are proliferating, and global access is improving. However, she cautioned that awareness, trust-building, and digital literacy remain uneven. Monitoring unequal distribution, educating users about risks and benefits, and guarding against bad actors are critical to ensuring access translates into opportunity rather than harm.
- **Corporate Responsibility and Content Quality:** As both educator and investor, she emphasized corporate responsibility in shaping educational futures. She raised open questions about who defines base competencies, age-appropriate frameworks, and content standards, noting that provision is increasingly driven by private-sector incentives. The proliferation of options—public, private, homeschooling, centralized and decentralized—creates opportunity but also confusion and uneven quality.
- **Warning Against Purposelessness:** She closed with a warning against purposelessness. Successful futures, she argued, are marked by adaptability, resilience, and meaningful contribution. Unsuccessful trajectories risk job displacement, dependency, and loss of purpose—even in contexts of universal basic income. Education must therefore cultivate not only skills, but direction and meaning.

8.2.2 Amy Love on Alignment, Adult Relearning, and Purposeful Exploration

- **The Glass Generation and Adult Guidance Urgency:** Love characterized today's children as the "glass generation"—growing up behind screens, with identities increasingly shaped by algorithms. In this environment, she argued, adult guidance is more critical than ever. Children cannot be expected to navigate algorithmic systems alone without intentional modeling and support.
- **Six Core Capabilities for 2045:** Love identified six core traits that define a thriving twenty-year-old in 2045, regardless of technological change: adaptability, critical thinking, creativity, emotional intelligence, technical fluency, and initiative. These capabilities, she emphasized, represent uniquely human strengths that remain valuable even as AI becomes ubiquitous.
- **The Crisis of Misaligned Learning:** Love highlighted a troubling pattern: children are already using AI tools extensively, often in secret, due to school bans and adult uncertainty. This misalignment—between home, school, and online environments—encourages shortcuts that weaken problem-solving confidence and erode trust. Prohibition without guidance, she argued, fails; alignment is essential.
- **The Great Relearning as Adult Transformation:** Her central insight reframed the challenge entirely: the "great relearning revolution" is not about teaching children to use AI, but about adults relearning how to guide them. When adults gain clarity and confidence, children are better able to explore, create, and think with purpose..
- **Family AI Game Plan:** Love proposed practical tools to enable alignment, including a "Family AI Game Plan" that establishes shared expectations, values, and boundaries. Such frameworks, she suggested, help close gaps between home, school, and technology—and could scale into broader national alignment efforts.
- **AI as Mind's Car and the Learner's Permit Metaphor:** Using a vivid metaphor, Love described AI as a powerful vehicle requiring a learner's permit. Just as driving demands graduated responsibility and guidance, working with AI requires intentional scaffolding rather than unrestricted access.

- **Transformed Learning Ecosystem:** With alignment in place, Love envisioned a reconfigured ecosystem: children using AI to explore and explain ideas in their own words; teachers leveraging AI for targeted support while focusing on discussion, reasoning, and collaboration; and families designing projects that emphasize independent evaluation and synthesis.
- **Closing Vision:** Love concluded that adults ultimately shape the world children will inherit. Purposeful guidance enables exploration; abdication leaves children at the mercy of algorithms.

8.2.3 Professor Sugata Mitra on Self-Organized Learning and Question-Centered Education

- Preparing for Discontinuous Disruption: Mitra argued that 2045 will be shaped by disruptions as unpredictable as the pandemic and large language models were from a 2005 perspective. Because such discontinuities cannot be forecast precisely, education must prioritize adaptability and learning capacity over static content mastery.
- **Collaborative Large-Screen Learning vs. Isolated Social Media:** Drawing on decades of research, Mitra distinguished between harmful and productive uses of technology. Smartphones and social media, he noted, become problematic primarily when used in isolation. In contrast, large public screens and shared learning environments enable safe, rapid self-organization and collaborative discovery.

- **From Answers to Questions:Mitra articulated a foundational pedagogical shift:** when tools can answer nearly any question instantly, education's role is no longer to deliver answers but to cultivate meaningful questions. Teaching must center on inquiry rather than response.
- **Self-Organized Learning Environments:** He described practical models where heterogeneous groups of children work collaboratively around large screens, answering their own questions with minimal adult intervention. The teacher's role shifts to framing questions and creating conditions for exploration.
- **Curriculum of Questions:** Mitra proposed redefining education not by the content delivered, but by the questions learners are expected to answer. Given compelling questions, he argued, children can and will teach themselves.
- **Evidence from Practice:** He cited recent experiments in which disadvantaged children, given access to collaborative AI tools, rapidly learned new subjects and taught peers within days—offering a glimpse of what 2045 learning could resemble.
- **Addressing Autonomy Paradox:** Mitra dismissed fears that AI access would render children passive, noting similar anxieties accompanied earlier technologies like Google. Outcomes, he emphasized, depend on design and context, not the tools themselves.
- **Encouraging Maximum AI Use:** His closing position was explicit: maximize AI use in shared, collaborative settings while discouraging isolated, private social media consumption.

8.2.4 Olga Magnusson on Lifelong Learning and Human Capabilities

- **Education as Lifelong, Integrated Process:** Magnusson positioned education as a continuous process spanning home, school, community, and workplace. Preparing for an unimaginable future, she argued, requires embracing lifelong relearning rather than treating education as a discrete phase.
- **Core Human Capabilities in AI–Augmented World:** She emphasized the cultivation of ethics, adaptability, critical thinking, curiosity, and continuous learning as central human capacities that grow more—not less—important as AI improves.

- **Education as Foundational Tool:** Magnusson framed education as the primary tool society has to prepare children for futures that cannot be fully predicted. Its purpose is not certainty but readiness.
- **Relationship Skills and Human Interaction:** She highlighted the importance of human interaction, relationship skills, and ethical reasoning in everyday life, noting that while AI can process information, it cannot replace human judgment and moral responsibility.
- **Knowing What Questions to Ask:** Echoing Mitra, Magnusson stressed that preparation lies in knowing which questions to ask, not in memorizing answers that AI can readily supply.
- **Balanced Assessment of Technology:** Finally, she advocated for balanced, evidence-based discussion of AI's benefits and risks. Fear-driven narratives, she cautioned, are as unhelpful as uncritical enthusiasm; informed judgment requires engaging both sides.

8.3 Discussion, Engagement, and Outcomes

8.3.1 Audience Engagement

Erika Twani guided the conversation with clarity and intentionality, opening with a vision of the world in 2045 and then working backward to surface what must change today to enable that future. Rather than moving through speakers sequentially, Twani wove their contributions into a coherent, escalating narrative—beginning with Dr. Cook's call for urgent systemic action, moving through Amy Love's challenge of adult-child alignment, deepening into Sugata Mitra's question-centered pedagogy, and culminating in Olga Magnusson's framing of lifelong, integrated learning.

Throughout the discussion, Twani repeatedly returned to a set of core tensions shaping the future of education: autonomy versus guidance, access versus understanding, and answers versus questions. She pressed speakers to address these tensions directly, drawing out where alignment is possible and where deliberate tradeoffs must be made. This approach prevented the conversation from drifting into abstraction and kept it grounded in design choices

educators, families, and institutions can make now.

Twani's facilitation emphasized synthesis over prediction. Her closing question—asking each speaker what message they would offer to a 2045 learner—brought the discussion into sharp focus around actionable priorities: stronger alignment between families and schools, a clear separation between explanation and evaluation in learning, expanded use of public and collaborative learning environments, and a sustained commitment to cultivating distinctly human capabilities that technology cannot replicate.

Across the session, Twani reinforced a central insight: the purpose of the session was not to forecast 2045 with precision, but to identify what can be intentionally designed today to help learners flourish in futures that remain fundamentally unknowable.

8.3.2 Audience Themes and Questions

- **Curriculum and Content Standardization:** Audience members sought guidance on what core knowledge should remain universal versus what can be individualized. This surfaced a central tension between ensuring all learners share foundational understanding and enabling personalized learning pathways responsive to individual interests, pace, and context.
- **Teacher Training and Professional Development:** Questions focused on how teachers can develop the skills required for question-centered, AI–augmented pedagogy when most current training emphasizes content delivery and standardized assessment. This reflected broad recognition that teacher transformation is a prerequisite for meaningful systemic change.
- **Family Engagement and Parental Confidence:** Audience members asked how to support parents who feel unprepared or inadequate guiding their children's AI use. Amy Love's emphasis on building "clarity and confidence" resonated strongly, prompting questions about concrete tools, shared language, and practical family conversations.

- **Equity and Access:** Participants questioned whether AI can genuinely democratize educational access or whether it risks deepening existing divides. While Dr. Cook's discussion of freely available tools and Sugata Mitra's examples of collaborative learning among disadvantaged children offered reassurance, concerns persisted around infrastructure gaps, connectivity, and uneven family support.
- **Assessment and Credentialing:** Audience concern centered on how learning will be recognized and credentialed if standardized testing becomes obsolete. This prompted discussion of competency-based assessment, portfolio-based evaluation, and the evolution of credentialing mechanisms aligned with demonstrated capability rather than test performance.

8.3.3 Reflections and Insights

- **Adult Relearning Is Prerequisite to Child Thriving:** The session consistently underscored that transformation begins with adults. Parents, teachers, and leaders must develop new forms of clarity, confidence, and capability; without adult relearning, children cannot be intentionally supported.
- **Alignment Across Ecosystems Is Essential:** Misaligned signals from families, schools, and technology platforms confuse learners and incentivize shortcuts. Intentional alignment across these ecosystems requires structured engagement and shared responsibility among stakeholders.

- **Questions Rather Than Answers Define Modern Education:** As AI renders answers abundant and inexpensive, education must pivot toward teaching learners how to ask meaningful questions, critically evaluate responses, and think with intention and judgment.
- **Collaborative, Public Learning Differs Fundamentally from Isolated Consumption:** The same technologies produce radically different outcomes depending on whether learning is shared and collaborative or private and algorithmically curated. Collective inquiry supports depth, accountability, and meaning; isolated consumption does not.
- **Hands-On, Experiential Knowledge Becomes Increasingly Rare and Valuable:** As AI automates information work, hands-on experience, judgment, and contextual understanding become increasingly rare—and therefore more valuable.
- **Preparation for Unknowable Futures Requires Adaptability, Not Specific Content:** While foundational knowledge remains important, preparation for unknowable futures depends more on the capacity to learn, adapt, and think critically than on mastery of any fixed body of content.
- **Human Capabilities Become Differentiators:** Creativity, ethical reasoning, emotional intelligence, initiative, and relational skill emerge as defining strengths as AI absorbs routine cognitive labor.
- **Corporate Responsibility and Educational Mission Must Align:** Technology companies play a critical role in shaping learning environments and bear responsibility to ensure tools support educational goals rather than simply optimize engagement or attention capture.
- **Diversity of Learning Pathways Serves Diverse Learners:** One-size-fits-all education models fail to meet varied learner needs. Supporting a plurality of pathways—public, private, homeschool, hybrid—enables families and learners to choose structures aligned with their circumstances and goals.

8.3.4 Key Takeaways

- **The Great Relearning Is About Adults, Not Children:** Transformation requires adults—parents, teachers, and leaders—to develop clarity, confidence, and new capabilities for guiding learners in AI–augmented environments. Adult relearning is a prerequisite for child flourishing.
- **Alignment Across Families, Schools, and Technology Is Essential:** Misaligned messages confuse learners and enable shortcuts. Intentional alignment—through family AI game plans, school–family partnerships, and clear expectations—prevents fragmentation and reinforces purposeful learning.
- **Education Must Shift from Answers to Questions:** As AI makes answers abundant, education must center on teaching learners to ask meaningful questions, evaluate answers critically, and think with intention. Curriculum design should be defined by the quality of questions learners engage with, not merely content delivered.
- **Collaborative, Public Learning Enables Self-Organization:** In collaborative, public learning environments—often supported by shared, large-screen technologies—learners self-organize, accelerate learning, and teach one another. This differs fundamentally from isolated, algorithmically driven consumption on personal devices.
- **Six Core Human Capabilities Matter Most:** Adaptability, critical thinking, creativity, emotional intelligence, technical fluency, and initiative enable thriving across technological contexts. These distinctly human capabilities become key differentiators as AI absorbs routine information work.
- **Experiential Knowledge and Hands-On Experience Become Increasingly Scarce and Valuable:** As AI automates knowledge work, practical experience, contextual judgment, and embodied learning grow increasingly valuable. Current learners retain a narrowing window of opportunity to acquire such experience.
- **Foundation in Humanities and Liberal Learning Remains Essential:** Preparation for work alone is insufficient. English, humanities, history, and the arts cultivate ethical reasoning, interpretive skill, and the capacity for complex, original thought.

- **Preparation Must Enable Flourishing in Unknowable Futures:** Specific content knowledge matters less than the capacity to learn, adapt, and think critically in the face of discontinuous change.
- **AI Enables Unprecedented Access for Underserved Learners:** Free or low-cost AI tutoring can supplement under-resourced schools and expand learning access. However, genuine equity requires connectivity, devices, digital literacy, and family support—not mere tool availability.
- **Teacher Transformation Is Essential to Systemic Change:** Educators must develop capabilities for question-centered, AI–augmented pedagogy, including separating explanation from evaluation and fostering collaboration and critical thinking. Without teacher transformation, student transformation cannot occur.
- **Relationship, Mentorship, and Human Connection Remain Irreducibly Human:** AI can personalize content and pacing, but education's relational core—mentorship, modeling of thinking, ethical guidance, and trust—cannot be automated.
- **Lifelong Learning Integration Must Begin Today:** As learning and work increasingly blur, preparation for continuous learning must begin in childhood, not as a reactive response to career disruption later in life.

8.3.5 Broader Relevance

The education roundtable crystallized a fundamental truth: as artificial intelligence automates information work and routine problem-solving, distinctly human capabilities—critical thinking, creativity, ethical reasoning, relational skill, and adaptability—become increasingly scarce and valuable. Preparing learners for this 2045 reality requires intentional, systemic transformation beginning today.

The challenge is not teaching children to use AI—that they will do instinctively—but relearning how adults guide them toward purpose, autonomy, and human flourishing. This shift demands alignment across families, schools, and the wider learning ecosystem; pedagogical movement from content delivery to question-centered learning; institutional recognition that assessment and credentialing must evolve beyond standardized testing; and sustained investment in human capabilities technology cannot replicate.

For underserved populations, AI offers unprecedented potential to expand learning access and personalized support. Realizing this potential, however, requires deliberate design, resource allocation, and equity commitments—rather than assuming that access to tools alone ensures access to opportunity.

Ultimately, the adults of today determine whether learners in 2045 flourish as creative, thoughtful, and purposeful contributors to society, or become passive consumers of AI–generated solutions. The choices made in education now will reverberate across generations.

Session 9

Space, So What? The Next Frontier for AI, Blockchain, and Human Health

Space has shifted from a distant backdrop to an essential layer of the global innovation stack—quietly powering communications, finance, logistics, climate monitoring, and, increasingly, health research and insights. What was once peripheral infrastructure now underpins everyday systems on Earth, often invisibly.

This session examines how the convergence of space-based infrastructure, artificial intelligence, and blockchain can transform life on Earth: expanding access to healthcare and scientific research, enabling new financial and ownership models for space assets, and reshaping governance frameworks for shared, orbital resources. At the same time, it grapples with foundational questions about equity, participation, and purpose in an emerging space economy increasingly shaped by both public ambition and private capital.

Moderator

Nikhil Kassetty
Fellow and Advisory Director,
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Speakers

Shannon Kennedy
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Lady Rocket (Eva Blaisdell)
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9.1 Session Framing

9.1.1 Provocation

As space-based infrastructure becomes the digital backbone for communications, climate intelligence, finance, and health, how can AI– and blockchain-enabled space systems be designed to expand access, equity, and human flourishing on Earth—rather than reproducing extractive, closed, and elitist economic models?

9.1.2 Context and Trends Highlighted

The session opened with the observation that space has moved from science fiction to a practical catalyst for terrestrial breakthroughs, particularly in health and climate resilience. Satellites now generate real-time imagery that supports disease surveillance, climate-linked health-risk monitoring, and disaster response. At the same time, artificial intelligence optimizes mission planning, data processing, and on-orbit autonomy while blockchain introduces new mechanisms for trust, transparency, and fractional ownership of space assets.

Space is increasingly foundational infrastructure—the “digital backbone of life on Earth”—powering communications networks, navigation systems, financial transactions, food and logistics chains, and climate intelligence. Against this backdrop, the roundtable framed several core questions: how space technologies can democratize healthcare access, particularly for underserved communities; how space-enabled financial innovation can open participation beyond governments and large corporations; and how governance frameworks and leadership mindsets must evolve to ensure that the emerging space economy serves human priorities rather than narrow institutional or commercial interests.

9.1.3 Tensions and Contrasts Explored

- **Essential Infrastructure vs. Invisible Dependency:** Space assets underpin daily life—communications, navigation, finance, and climate insight—yet remain largely invisible to the public. This creates risk that critical infrastructure is under-governed, weakly understood, and insufficiently scrutinized.
- **Democratization vs. Elitism:** Satellites and space-based connectivity can expand telehealth, education, and participation in scientific research. Yet space assets and missions have historically been controlled by a small group of governments and corporations. The tension lies between genuinely democratizing access and replicating exclusionary ownership and control models.
- **Financial Innovation vs. Speculation and Concentration:** Blockchain-enabled tokenization of space assets can broaden participation and distribute risk. However, poorly designed systems risk speculative excess or reconcentration of ownership, undermining claims of openness and inclusion.
- **Health Equity vs. Regulatory Gatekeeping:** Space-enabled diagnostics, imaging, and monitoring could place powerful tools in the hands of communities and patients. Yet existing regulatory and bureaucratic systems often constrain who can provide care and interpret data, potentially slowing or blocking responsible innovation.
- **Public Purpose vs. Commercialization:** Space-based biomedical research—including microgravity experiments with implications for pediatric cancer and rare diseases—offers profound public benefit. At the same time, commercial platforms enabling fractional ownership and tokenized investment raise questions about who funds, owns, governs, and ultimately benefits from these breakthroughs.
- **Spectacle vs. Substance in Space Tourism:** Space tourism can expand public engagement and generate funding for space activities. However, it risks becoming entertainment detached from meaningful purpose unless intentionally designed to integrate research, education, and philanthropic objectives.

- **Mindset and Governance vs. Technological Determinism:** AI, blockchain, and advanced space hardware enable new possibilities, but outcomes are shaped by governance frameworks, leadership choices, and cross-sector collaboration. Technology alone does not determine whether space systems serve collective human goals or narrow interests.

9.2 Key Contributions from Speakers

9.2.1 Shannon Kennedy on Space-Enabled Health Equity and Bureaucratic Barriers

- **Space Data and Telehealth Access:** Kennedy connected earlier climate–health discussions to space infrastructure, emphasizing that satellite imagery already plays a critical role in predicting where climate disasters will strike hardest and how they will affect survival, health outcomes, and access to care. She highlighted the democratizing potential of satellite-enabled connectivity—such as low-earth-orbit networks—for extending telemedicine, diagnostics, and health education to rural and underserved communities, including within the United States, where physical access to care remains a persistent barrier. Critically, she underscored that space-based networks can reach women whose reproductive and postpartum health needs are often overlooked, enabling direct access to health information and services that local systems may fail to provide.
- **Challenging Healthcare Bureaucracy and Gatekeeping:** In a later equity-focused segment, Kennedy argued that space research and closed-loop medical systems aboard platforms such as the International Space Station reveal how much high-quality care can be delivered with significantly less bureaucracy and cost. She described many contemporary healthcare systems as structurally inequitable not because of technological or clinical limitations, but because of entrenched gatekeeping—restrictions on who is permitted to provide care, limits on what patients are allowed to understand, and the preservation of inaccessible medical language and complex regulatory regimes. As we learn to deliver care in constrained, closed-loop space environments, she suggested, it becomes increasingly clear that many Earth-based barriers reflect elitist bureaucracy rather than clinical necessity.

- **Diagnostics in Everyone's Hands:** Kennedy pointed to emerging imaging and diagnostic technologies—often enabled or accelerated by space-derived capabilities—that could place powerful tools directly into the hands of everyday users through smartphones and low-cost devices. However, she noted that current regulatory and training requirements frequently prevent their use, even when the technology is demonstrably safe and potentially transformative. Her argument was direct: space-enabled health innovation will only advance equity if regulatory structures are redesigned to allow patients and communities to use these tools themselves, rather than reinforcing existing hierarchies of control.
- **Core Insight:** Space is already revealing an uncomfortable truth: high-quality care can be delivered with far less bureaucracy. The inequities we see on Earth are not the result of insufficient capability, but of systems that restrict who can provide care and what patients are permitted to understand.

9.2.2 Shelli Brunswick on Space Mindset, Governance, and Leadership

- **Space as Connective Tissue and Digital Backbone:** Brunswick articulated that space has become the connective tissue of the global innovation landscape, quietly underpinning communications, transportation, finance, food security, and climate- and health-monitoring systems. Rather than asking why space matters, she argued that the central question is now how leadership should respond as space infrastructure becomes an essential digital backbone for life on Earth.
- **Governance and Interoperable Partnerships:** She emphasized that governance will determine whether the convergence of space, AI, and blockchain enables inclusive, responsible innovation or exacerbates existing divides. Effective governance must be forward-looking, interoperable, and multi-sector—spanning national policy, international coordination, and commercial participation across government, industry, and academia. Brunswick noted that AI enables autonomous navigation, real-time image analysis, and edge computing in orbit while blockchain introduces transparency, auditability, and tokenization. Together, these technologies can support more informed and trusted decision-making, but only if matched by regulatory frameworks and physical infrastructure that evolve at the pace of technological change.

- **Space Mindset and Leadership:** Brunswick introduced the concept of a "space mindset" as a leadership paradigm grounded in systems thinking, cross-disciplinary collaboration, strategic foresight, and globally informed decision-making. This mindset is less about rockets and hardware than about perspective—recognizing how interconnected technologies reshape economies and societies, and designing governance frameworks that align innovation with inclusive growth and planetary stewardship.
- **Workforce and AI Education:** Responding to questions about AI education for non-engineers and tradespeople in the space sector, Brunswick stressed that education models must shift toward continuous learning and rapid reskilling. Government, academia, and industry must co-design workforce development pipelines that enable workers—including mechanics and experienced tradespeople—to unlearn and relearn as roles evolve, ensuring broad access to well-paying jobs in the emerging space-enabled economy.
- **Core Insight:** The space mindset is not about rockets; it is about perspective. AI, blockchain, and space will reshape every industry, but outcomes will depend on the leadership frameworks we build now. The next frontier lies as much in how we think and govern as it does in orbit.

9.2.3 Grant Blaisdell on Tokenization and Democratized Space Markets

- **Historical Analogy and Economic Infrastructure:** Blaisdell framed the emerging space economy as a once-in-centuries opportunity analogous to the first age of exploration. In that era, advances in shipbuilding were necessary but insufficient; true economic transformation emerged through financial innovation—structures that enabled broader participation in voyages, distributed risk across investors, and allowed trading of voyage-linked assets. He argued that blockchain now plays a comparable role in the second era of exploration, functioning as foundational economic infrastructure for the space economy.
- **Tokenization and Risk Distribution:** Through Copernic Space, Blaisdell is designing financial and commercial infrastructure that takes capital-intensive, long-horizon, high-risk space assets—such as launch capacity, satellite data, and intellectual property—and fractionalizes them into tokenized assets accessible to a wider pool of participants. Blockchain enables decentralized risk distribution, shorter liquidity cycles, and transparent ownership. This model, he emphasized, has the potential to open participation to individuals, smaller firms, and emerging space nations, rather than confining opportunity to major governments and large corporations.

- **Democratization vs. Replicating Inequities:** Blaisdell stressed that success depends on intentional design choices. Without them, the space economy risks reproducing historical patterns in which frontier expansion benefits only a few. Tokenization and new market structures must be deliberately open, participatory, and accessible, ensuring that broad stakeholder ownership replaces extractive models. The objective is to transform space "from a frontier for the few into a future for all."
- **Space Tourism and Economic Viability:** On space tourism, Blaisdell focused on financial sustainability rather than abstract democratization. He argued that scalable models—such as balloon-based experiences and community-backed funding mechanisms—can reduce per-person costs from tens of millions to more attainable levels while generating liquidity that supports continued innovation. In this framing, tourism becomes a catalyst for market development rather than a luxury sideshow.
- **Core Insight:** History shows that exploration advances when opportunity is widely shared. Designing the space economy to be open, participatory, and accessible can transform space from a frontier for the few into a future for all.

9.2.4 Lady Rocket (Eva Blaisdell) on Culture, Ownership, and Space as Experience

- **From Cargo to Digital Assets and Culture:** Eva Blaisdell—known as Lady Rocket—described how Copernic Space transforms traditional space cargo into digital space assets that combine financial and cultural value. After winning a government bid to build California's Space Center near Vandenberg, she partnered with Grant Blaisdell to create a platform enabling people to own fractional stakes in space missions. By acquiring SpaceX Moon Cargo and converting it into art-backed and financial assets, Copernic Space sold out at CES within 24 hours, demonstrating strong demand for diversified ownership and participatory models.

- **Formula One Analogies and Entertainment Models:** Drawing on her experience as a former general manager at Compaq and a Formula One sponsor, Blaisdell highlighted parallels between Formula One and space—advanced technologies, precision engineering, and aspirational identities embodied by drivers and astronauts. She seeks to adapt Formula One's agile, entertainment-driven business model to space, transforming launches into cinematic events and using tokenization to generate new revenue streams. In this model, rockets become cultural status symbols—akin to yachts or private jets—while fractional ownership lowers barriers to participation.

- **Space with Purpose: Research and Philanthropy:** Blaisdell emphasized that space must serve humanitarian and scientific priorities, not spectacle alone. Through the Lady Rocket Foundation and Copernic Space, she is advancing tokenized funding models for microgravity research, including pediatric cancer studies and research using menstrual blood to explore women's health and reproductive biology. She is in discussions with platforms such as Vast Space Station to tokenize research capabilities, arguing that space-based research can compress timelines by up to a decade and that tokenization enables the public to co-own and influence research agendas.

- **Space Tourism Reimagined:** On space tourism, Blaisdell outlined plans for the California Space Center near Santa Barbara, where visitors would engage in training, education, and investment within a single integrated environment. She envisions partnerships with companies such as SpaceX and Hollywood studios to design missions in which participants perform meaningful creative or scientific work rather than passive sightseeing. Through her foundation, she also aims to digitally sponsor children's space travel, embedding philanthropy into participation models. Tokenizing individuals as "space brands" and enabling collective funding structures allows people themselves to become stakeholders in the space economy.
- **Core Insight:** Space must serve humanity. By broadening access and ownership, the next space economy can be humanitarian, creative, and peaceful—rather than extractive or exclusionary.

9.3 Discussion, Engagement, and Outcomes

9.3.1 Audience Engagement

Nikhil Kassetty structured the conversation to progress deliberately from health applications and equity (Kennedy), to governance and leadership (Brunswick), to financial infrastructure and tokenization (Blaisdell), and finally to cultural engagement and experiential models (Lady Rocket). This sequencing made visible how space, AI, and blockchain technologies stack and reinforce one another: satellites and connectivity enable new health and climate applications; governance frameworks and leadership mindsets determine whether these systems are inclusive or exclusionary; financial innovation opens—or restricts—participation in the space economy; and cultural and experiential models translate abstract infrastructure into forms people can see, understand, and join.

Throughout, Kassetty used targeted prompts to anchor the discussion in practical relevance, repeatedly returning to the question of "So what?"—how space technologies tangibly improve life on Earth, who captures the resulting value, and what systemic changes are required to ensure that space-enabled innovation supports broad human flourishing rather than narrow or extractive interests.

9.3.2 Audience Themes and Questions

- **Equity in Space-Enabled Health:** Participants asked how space-enabled telehealth and diagnostic tools could be directed toward marginalized communities—including women and rural populations—rather than primarily enhancing care in already well-served urban contexts. Kennedy's emphasis on regulatory barriers and the need for direct access resonated, prompting questions about what concrete policy and regulatory changes would be required to unlock these equity gains.
- **Ownership and Governance of Tokenized Assets:** Audience members expressed both curiosity and concern about who ultimately owns tokenized space assets and research outputs. Questions focused on legal structures, regulatory oversight, and safeguards against speculative exploitation or excessive concentration of ownership. Blaisdell's and Lady Rocket's emphasis on participatory design sparked interest in models where communities and the public co-own research outcomes rather than serving solely as downstream beneficiaries.
- **Ethics and Prioritization of Space Research:** Participants asked how research priorities—such as pediatric cancer treatments or women's health—would be set in a tokenized funding environment, and who decides which projects receive investment. Questions explored how to balance commercial opportunity with humanitarian, scientific, and public-interest imperatives.
- **Workforce Development and Inclusion:** Audience members raised concerns about how workers outside traditional engineering pathways—mechanics, technicians, and mid-career professionals—could access AI– and space-related training without being left behind. Brunswick's call for integrated workforce pipelines across government, academia, and industry prompted discussion of policy levers, funding mechanisms, and employer responsibility.

9.3.3 Reflections and Insights

- **Space as Enabler, Not End in Itself:** The discussion reinforced that space systems derive their ultimate value from how they serve human priorities—health, climate resilience, and economic inclusion—rather than from technological achievement alone.
- **Regulatory and Governance Structures Define Equity Outcomes:** Whether space-enabled health, finance, and research reduce or deepen inequality depends less on technology itself than on regulatory design, governance frameworks, and explicit attention to who can participate and benefit.
- **Tokenization Offers Opportunity but Requires Guardrails:** Fractional ownership and new financial infrastructure can broaden access to space assets, but without intentional safeguards, the same tools risk reproducing speculative bubbles and concentrated control.
- **Cultural Engagement Drives Public Participation:** Transforming launches and missions into participatory, narrative-driven experiences can mobilize public interest and investment. However, cultural engagement must be paired with substantive research, education, and humanitarian purpose to avoid becoming spectacle without impact.
- **Space Research Can Accelerate Terrestrial Health Breakthroughs:** Microgravity research and space-based experimentation hold potential to compress timelines for health breakthroughs—such as pediatric cancer treatments or diagnostics based on menstrual blood—if funding, governance, and ownership models align with public-interest goals.
- **Workforce Adaptation Is Essential:** As the space-enabled economy expands, inclusive prosperity depends on workers' ability to unlearn and relearn as technologies evolve. Accessible AI and space education for non-engineers is essential to prevent exclusion and concentration of opportunity.

9.3.4 Key Takeaways

- **Space Has Become Core Digital Infrastructure for Earth:** Satellites and space-based systems now underpin communications, finance, logistics, climate modeling, and health intelligence, making space a foundational layer of the global innovation stack rather than a distant or specialized domain.
- **Space-Enabled Connectivity Can Expand Health Access—If Systems Allow It:** Satellite internet, imaging, and data infrastructure can extend telehealth, diagnostics, and health education to rural and underserved communities, particularly benefiting women and marginalized populations whose needs are often overlooked. Realizing this potential requires regulatory reform to reduce gatekeeping and unnecessary bureaucracy.
- **Space Research Exposes Inefficiencies in Terrestrial Healthcare:** Closed-loop medical systems and resource-constrained environments in space demonstrate that high-quality care can be delivered with far less bureaucracy and cost. This highlights that many inequities on Earth stem from systemic gatekeeping rather than technical limitation.
- **Tokenization and Blockchain Can Democratize Participation in the Space Economy:** Blockchain-based financial infrastructure enables the fractionalization and tokenization of space assets—such as launch capacity, satellite data, and intellectual property—distributing risk, shortening liquidity cycles, and opening participation to individuals, smaller firms, and new entrants.
- **Governance and "Space Mindset" Leadership Are Critical:** AI, blockchain, and space technologies will reshape multiple industries, but outcomes depend on governance frameworks and leadership mindsets that are systems-oriented, interoperable, collaborative, and globally aware.
- **Space Tourism and Cultural Models Can Mobilize Capital and Public Engagement:** Applying entertainment, storytelling, and branding models to space—such as Formula One analogies—can generate revenue and public enthusiasm. These approaches must be paired with substantive research, education, and humanitarian objectives to avoid superficial commercialization.

- **Tokenized Research Models Can Align Public Participation with Health Priorities:** Tokenizing research capabilities and missions allows individuals and communities to co-finance and co-own space-based research, potentially accelerating breakthroughs in areas such as pediatric cancer and women's health while aligning funding with public-interest goals.
- **Inclusive Workforce Development Is Essential:** As space and AI transform industries, training pathways must extend beyond engineers to include mechanics, technicians, and mid-career workers. Integrated pipelines across government, academia, and industry are required to ensure inclusive participation.
- **Equity Outcomes Depend on Intentional Design, Not Technology Alone:** Without deliberate attention to inclusion, participation, and ownership, space-enabled systems risk reinforcing existing inequities. Intentional governance and design choices are necessary to ensure space serves humanity broadly.

9.3.5 Broader Relevance

This session underscored that space is no longer peripheral or purely scientific; it is rapidly becoming essential infrastructure for health, finance, climate resilience, and digital economies. When combined with AI and blockchain, space systems offer powerful tools to democratize access to healthcare, education, and research, and to open new financial and participatory models for individuals and communities worldwide.

Yet these technologies are not destiny. Their societal impact depends on governance frameworks, leadership mindsets, financial architectures, and cultural narratives that determine who participates, who benefits, and which priorities receive investment. The emerging space economy presents a rare opportunity to design frontier exploration differently—embedding equity, participation, and humanitarian purpose at its core rather than as afterthoughts.

Realizing this vision will require rethinking healthcare regulation, financial infrastructure, research ownership, public engagement, and workforce development so that space-based innovation consistently advances human well-being on Earth.

Session 10

Digital Infrastructure and the Path Forward to the Sustainable, Circular, and Regenerative Future Economy

Data centers have become the physical backbone of the digital age, powering everything from cloud storage and streaming to AI workloads and critical public services. As demand accelerates, however, their rapid expansion is colliding with planetary boundaries—electricity capacity, water availability, land use, community consent, and climate commitments—forcing a fundamental reassessment of how digital infrastructure is planned, financed, and governed.

This session examines how data center growth can be aligned with sustainable, circular, and regenerative principles rather than extractive expansion. It explores the intersections of grid design, water systems, community engagement and activism, and global investment flows while surfacing emerging innovations and policy frameworks capable of grounding AI's continued growth in environmental responsibility, social legitimacy, and long-term resilience.

Moderator

Alexander Kontoleon
Chair, Sustainability in Tech, The Digital Economist & Chief Strategy Officer, Green Impact Exchange

Speakers

Rafal Libera
Chief Growth Officer, LinkGevity & Senior Executive Fellow, The Digital Economist

Dr. Cat "Kat" Shrier
Founder and CEO, WaterCitizen

Nathaniel Burola
Research Consultant, AI and Environment Resource Hub & Executive Fellow, The Digital Economist

Vijay Karia
CEO, OptiCloud

10.1 Session Framing

10.1.1 Provocation

As AI–driven digital infrastructure accelerates data center growth, how can energy systems, water resources, community interests, and global investment patterns be redesigned so that digital infrastructure becomes a driver of circular and regenerative economies—rather than a new source of ecological stress and social strain?

10.1.2 Context and Trends Highlighted

The session opened with a clear articulation of scale. U.S. data centers consumed an estimated 183 terawatt-hours of electricity in 2024—more than 4 percent of total national electricity use—with demand projected to more than double by 2030 as AI and cloud workloads expand rapidly. A significant share of this energy is consumed by servers and cooling systems, placing growing strain on local grids. In regions such as Northern Virginia, where data centers already account for a substantial portion of electricity demand, concerns are mounting around grid reliability, rising costs, and long-term capacity constraints.

Water emerged as an equally critical pressure point. Data centers consume water both directly, through cooling, and indirectly, through the water intensity of electricity generation. Some estimates suggest that by the end of the decade, data center water use could approach levels equivalent to the annual consumption of twenty million Americans. As water scarcity intensifies in many regions, this demand is increasingly contested.

Public and political backlash is rising in response. More than 230 environmental organizations have recently called for a U.S. moratorium on new data center construction, citing excessive energy and water use, upward pressure on power prices, and increased emissions. At the same time, leading technology companies are pursuing aggressive sustainability initiatives—such as Meta matching 100 percent of data center electricity with renewable energy and AWS expanding the use of recycled water—illustrating both the magnitude of the challenge and the potential for industry leadership.

The moderator framed digital infrastructure not merely as a technology issue, but as environmental and civic infrastructure with far-reaching implications for climate policy, water management, energy markets, land use, and local economies. Participants were challenged to move beyond mitigation toward regenerative design—exploring how digital infrastructure growth could be aligned with long-term ecological stewardship, community legitimacy, and system resilience.

10.1.3 Tensions and Contrasts Explored

- **AI Growth vs. Grid Design Reality:** AI and data center expansion are advancing far faster than electricity grids were forecast or designed to accommodate, creating a structural tension between digital ambition and physical infrastructure constraints.
- **National AI Strategy vs. Local Community Impacts:** National policies often incentivize rapid data center deployment while local communities bear the consequences—higher electricity prices, land-use pressures, noise, and water stress—fueling public resistance and grassroots activism.
- **Energy Transition vs. Backsliding to Fossil/Nuclear:** Commitments to renewable energy and decarbonization increasingly clash with pressure to ensure reliable power for hyperscale data centers, raising the risk of reverting to coal, gas, or aging nuclear assets to sustain AI growth.
- **Efficiency Gains vs. Absolute Consumption:** Advances in chip efficiency, cooling systems, and workload optimization may reduce energy and water use per unit of compute, yet total consumption is still projected to rise sharply, raising questions about absolute limits, sufficiency, and system-scale sustainability.
- **Innovation Investment vs. Sustainability Investment:** Global capital flows currently favor AI expansion over investment in AI sustainability by a wide margin—estimated at roughly 70:1—highlighting a structural imbalance between rapid innovation and the mitigation of its environmental and social externalities.
- **Global Opportunity vs. Unequal Burdens:** Some regions—such as parts of Africa, Latin America, and Scandinavia—are developing renewable-powered, integrated data centers that deliver local benefits while others experience resource extraction, pollution, and grid strain without commensurate economic returns.
- **Automation vs. Workforce Dignity:** AI can automate routine tasks in sectors like water and energy management, but must be deployed in ways that augment rather than displace experienced professionals whose tacit knowledge is essential for operational reliability and community resilience.

10.2 Key Contributions from Speakers

10.2.1 Rafal Libera on Grid Mismatch and Hidden Costs

- **Unaccounted Demand in Grid Planning:** Libera argued that energy systems have spent the past two decades reorienting toward renewables—solar, wind, and storage—based on projections that did not anticipate the current megatrend of hyperscale AI and data center expansion. Grid and generation planning, he noted, were optimized for decarbonization pathways that assumed relatively modest load growth. The sudden acceleration of AI–driven compute demand has created what he described as a "fundamental disconnect" between digital ambitions and the physical infrastructure required to support them. Grid investment cycles and regulatory frameworks are now lagging far behind the pace of data center deployment.

- **Risk of Energy Transition Backsliding:** He warned that if electricity demand continues to outstrip renewable capacity additions, energy systems risk backsliding toward coal, gas, or diesel generation to maintain reliability. If "winning the AI race" becomes the dominant objective without firm constraints on emissions, investors will gravitate toward legacy generation technologies that can be deployed quickly, even if they undermine long-term climate goals. In this framing, unchecked AI expansion threatens to reverse hard-won progress in decarbonization.

- **Wholesale Price and Ratepayer Impacts:** He emphasized that data centers drawing power from shared grids inevitably increase wholesale electricity prices, with downstream effects on consumer bills. While hyperscalers finance their own facilities, they typically do not fund the transmission, distribution, and system-balancing upgrades required to serve new loads. Those costs are socialized across ratepayers, creating public backlash when households perceive that they are subsidizing corporate AI growth through higher energy prices.

- **Alternative Models and Emerging Technologies:** Libera pointed to ring-fenced power arrangements—such as private connections between generation assets and specific data centers—as one way to internalize some grid costs. However, these arrangements today often rely on gas-fired generation or aging nuclear plants. He identified small modular reactors (SMRs) as a potential future option for dedicated, low-carbon power, though timelines remain uncertain. As a partial counterbalance, he noted a possible "silver lining" in efficiency gains: advances in chip architecture could significantly reduce energy intensity per unit of compute—potentially to a fraction of current levels—mitigating some demand growth over time.
- **Core Insight:** AI growth is being accelerated without sufficient investment in the systems that support it. Electricity grids were not designed for today's data center load, and the mismatch is already emerging. If infrastructure is not upgraded in step with digital expansion, the burden will fall disproportionately on ordinary consumers, who will absorb the costs through higher energy prices.

10.2.2 Dr. Cat Shrier on Water-Energy Nexus and Professional Capacity

- **Water as Local, Multi-Sector Resource:** Dr. Shrier centered water as a critical yet insufficiently examined constraint in data center sustainability. She emphasized that water governance is inherently local, managed by utilities responsible not only for drinking water but also for industrial demand, ecological flows, and long-term community resilience. As data center development accelerates, utilities are increasingly in direct negotiation with hyperscale operators to set limits and conditions grounded in local hydrological realities. Shrier stressed that water decisions cannot be abstracted into global AI growth narratives; they must reflect place-based constraints, seasonal variability, and competing community needs.
- **Water Use and Broader Industrial Context:** While acknowledging that large AI–driven facilities can be water-intensive, she cautioned against treating data centers as uniquely extractive. Many established industries—such as electronics manufacturing, paper production, and other industrial processes—consume comparable or greater volumes of water. She noted that leading operators are already reducing reliance on water-based cooling, reserving it for peak heat conditions and shifting toward air and hybrid systems. Meaningful sustainability analysis, she argued, must therefore account for both direct on-site water use and the indirect water footprint embedded in electricity generation, particularly where power is sourced from water-dependent thermal plants.

- **Human Capital and AI–Augmented Water Work:** She highlighted water professionals themselves as a critical but overlooked asset in the transition toward regenerative infrastructure. Through initiatives such as Water Citizen and Waterpreneurs, she sees significant potential for AI to enhance—not replace—the work of experienced practitioners. AI can absorb routine monitoring, data processing, and analysis, freeing professionals to focus on judgment-intensive tasks such as governance, community engagement, and long-term resilience planning. She emphasized that retraining and AI literacy for tradespeople and mid- to late-career professionals are essential, both to preserve institutional knowledge and to ensure that technological change strengthens, rather than erodes, local water stewardship.
- **Core Insight:** Water constraints are fundamentally local, even as AI infrastructure expansion is framed as a global imperative. As data centers proliferate, utilities are asserting that water must be governed as a shared community resource sustaining ecosystems, industry, and public health—not treated solely as an industrial input. AI's role should be to reduce routine burdens on water professionals while amplifying their expertise, judgment, and civic function, supporting regenerative water management rather than workforce displacement.

10.2.3 Nathaniel Burola on Community Activism, ROI, and Dual-Purpose Infrastructure

- **Community Opposition and Project Blockage:** Burola documented a sharp rise in organized community resistance to data center expansion, tracked through initiatives such as Data Center Watch. Over the past two years, local opposition has blocked roughly $18 billion in proposed projects and delayed an additional $46 billion. This resistance spans political affiliations and reflects growing public scrutiny of whether the environmental, social, and infrastructural costs borne by host communities are justified by the benefits promised.
- **Federal/State Strategy vs. Local Experience:** He observed a widening gap between national AI and data center strategies—such as those outlined in the US AI Action Plan—and the lived experience of communities selected as buildout hubs. While federal and state frameworks prioritize speed, scale, and geopolitical competitiveness, they often fail to internalize local burdens, including electricity price pressure, water stress, land-use impacts, noise, and relatively limited job creation. As a result, communities are increasingly demanding a substantive role in shaping what data center infrastructure delivers beyond tax revenue.

- **Dual Nature of Data Centers and AI:** He acknowledged that his own early perspective on data centers and AI was overwhelmingly negative, focused on resource extraction and community harm. Through engagement with technologists and planners, he came to recognize a dual potential: the same infrastructure can generate significant environmental strain or deliver meaningful sustainability gains, depending on design and governance choices. He pointed to emerging practices—including efficiency improvements, closed-loop cooling systems, renewable integration, and advanced planning tools—that can reduce harm if adopted intentionally and transparently.
- **Balancing Sustainability Gains with Community Needs:** He emphasized that the path forward depends on reconciling technological progress with equitable benefit distribution. Data centers can contribute to regenerative outcomes when they are designed to strengthen local systems rather than overwhelm them. However, the current pace and scale of deployment often outstrip community trust and ecological capacity. Civil-society organizations such as Media Justice and The Maybe reflect a growing ecosystem of local and national actors working to articulate community interests, scrutinize proposals, and demand accountability in infrastructure decisions.
- **Core Insight:** Data center expansion has reached a critical inflection point where national AI ambitions collide with local realities. Communities absorbing environmental and social costs are demanding meaningful participation in decisions that shape their future. The defining challenge is whether digital infrastructure can be redesigned to generate shared, regenerative value—strengthening communities and ecosystems—rather than perpetuating extractive growth that concentrates benefits while distributing burdens.

10.2.4 Vijay Karia on Global Patterns, Investment Ratios, and Regenerative Principles

- **AI as National Security and Infrastructure Priority:** Karia described how, in global engagements with governments and institutions, AI has shifted from a tech topic to a national security and infrastructure priority. Countries around the world are racing to build data centers to retain control over data and to jumpstart innovation. This has driven explosive demand for infrastructure and energy, with projections suggesting electricity demand may double or more by 2030, even though measurement frameworks remain incomplete.

- **Imbalance Between AI Growth and Sustainability Investment:** He observed that globally there is roughly a 70:1 ratio of finance directed toward AI growth compared with AI sustainability. This imbalance means that while AI capabilities advance rapidly, investments in making them sustainable lag far behind. Karia argued that regenerative digital infrastructure must begin with rebalancing investment—measuring what matters before building, optimizing efficiency before adding new capacity, and ensuring models are designed for shared value.

- **Regional Learning and Best Practices:** Karia highlighted promising practices from different regions: Africa and Latin America building data centers powered by renewables from the outset; Scandinavia integrating data centers into urban grids where waste heat warms nearby homes; Europe pushing standards and incentives for responsible practices; and China combining nuclear energy expansion with early AI education, requiring AI literacy for children as young as six. He contrasted this with the U.S., where innovation speed and capital formation are unmatched but sustainability standards are less coordinated.

- **Ethical Imperative and Circular Principles:** Karia stressed that data center and AI expansion cannot be called regenerative if poverty and vulnerability persist. Circular economy principles require that optimization—reducing waste, reusing heat and materials, integrating smart grids—precedes scale, and that growth explicitly aims to lift vulnerable populations rather than deepen inequities.

- **Core Insight:** "We cannot call our systems regenerative if AI expands while poverty persists. Optimization must come before scale, and growth must be designed for shared value—where innovation advances without deepening inequity."

10.3 Discussion, Engagement, and Outcomes

10.3.1 Audience Engagement

Alexander Kontoleon structured the discussion by first grounding the conversation in concrete data and a reframing of digital infrastructure as a form of environmental infrastructure, rather than a neutral or purely technical asset. From this foundation, he guided participants through a deliberate progression: energy system constraints and grid misalignment (Libera), water systems and professional capacity (Dr. Shrier), community resistance and return-on-investment questions (Burola), global investment patterns and geopolitical dynamics (Karia), and finally technology pathways and sector-wide coordination.

This sequencing surfaced how AI–driven data center expansion produces interconnected pressures rather than isolated challenges—simultaneously straining electricity grids and water systems, shifting costs onto local communities, and provoking public resistance while also creating openings for innovation in efficiency, circular design, and new governance models. Kontoleon repeatedly steered the discussion away from narrow technical fixes toward systemic questions of accountability and design.

A recurring anchor throughout the session was the concept of shared value: who captures the benefits of digital infrastructure growth, who absorbs its environmental and social costs, and whether circular-economy principles can be embedded upstream—in planning, financing, and governance—rather than retrofitted after community trust has eroded. By consistently returning to these questions, Kontoleon positioned data centers not as inevitable byproducts of AI expansion, but as intentional choices whose design will determine whether digital infrastructure accelerates extractive growth or contributes to regenerative economic systems.

10.3.2 Audience Themes and Questions

- **Community Benefits and Accountability:** Audience members repeatedly returned to the question of reciprocity: what host communities receive in return for absorbing the environmental and infrastructural burdens of data centers. Participants asked how policy instruments—such as community benefit agreements, local equity participation, targeted taxation, or infrastructure co-investment—could ensure tangible local returns, including job creation, grid upgrades, water-system investments, or protection from rising energy costs.

- **Metrics and Transparency:** There was strong consensus that informed public debate is impossible without standardized, comparable metrics. Audience members called for clearer reporting on electricity demand, water use (both direct and indirect), emissions, and community-level impacts, paired with transparent disclosure requirements that allow regulators, communities, and investors to assess tradeoffs and hold developers accountable.

- **Technology Choices and Trade-Offs:** Questions explored the real-world implications of technical pathways: the relative sustainability of air, liquid, and immersion cooling systems; the feasibility, safety, and timelines associated with small modular reactors; and whether projected improvements in chip efficiency can realistically keep pace with exponential demand growth. These discussions reflected a desire to move beyond marketing claims toward evidence-based evaluation of tradeoffs.

- **Workforce and Equity:** Participants echoed concerns raised by Dr. Shrier and Karia regarding human capital. Questions focused on how retraining programs for tradespeople and mid-career professionals could be structured and funded, and how workers in disadvantaged or resource-constrained regions might gain access to the economic upside of the AI and data-center ecosystem rather than bearing only its externalities.

- **Cooling, Hardware, and Sector Coordination as Near-Term Levers:** In response to questions on feasibility and trade-offs, Bruce Armstrong Taylor contributed a systems-level perspective from the audience, challenging the assumption that data centers are inherently water-intensive. He emphasized that excessive water use reflects legacy cooling paradigms rather than technical necessity, pointing to mature alternatives—closed-loop liquid cooling, direct-to-chip systems, and dielectric immersion cooling—that can significantly reduce or eliminate water consumption while improving thermal efficiency. He referenced recent AI-focused facilities, including projects in arid regions such as El Paso, designed around closed-loop water systems from inception.

- **Efficiency Gains and Collective Action Over Isolated Innovation:** Taylor also highlighted advances in hardware efficiency, noting that next-generation chip architectures are targeting power reductions on the order of 30 percent or more per unit of compute—important, though insufficient on their own, to offset absolute demand growth. He underscored that meaningful impact depends on coordinated sector adoption rather than isolated exemplars, citing initiatives such as the iMasons Climate Accord as evidence that developers, operators, and suppliers are beginning to align around shared climate commitments, best practices, and scalable innovation pathways. He further noted AI's dual role: while resource-intensive itself, AI can materially improve efficiency elsewhere, citing AI-optimized solar operations achieving reported gains of 30–40 percent, reinforcing that net environmental impact is ultimately a governance and deployment choice rather than a technological inevitability.

10.3.3 Reflections and Insights

- **Infrastructure Planning Must Catch Up with AI Ambitions:** The discussion reinforced that current grid, water, and infrastructure planning frameworks have not caught up with the scale and pace of AI–driven demand. Without proactive integration of data-center load into planning processes, expansion risks destabilizing energy transitions and stressing local ecosystems.

- **Local Voices Are Central to Legitimacy:** Rising community activism reflects not technophobia but governance failure. Participants recognized that legitimacy depends on meaningful local participation in siting decisions, benefit-sharing arrangements, and long-term planning, rather than top-down deployment justified solely by national competitiveness narratives.

- **Technological Innovation Offers Real Gains but Is Not a Panacea:** While efficiency gains and new cooling technologies offer genuine reductions in energy and water intensity, they cannot fully offset absolute growth without complementary measures such as demand management, pricing reform, and rebalanced investment priorities.

- **Regenerative Principles Require Deliberate Investment Strategy:** Participants emphasized that a regenerative digital economy cannot emerge accidentally. It requires intentional reallocation of capital toward sustainability, optimization, and community resilience—particularly for populations and regions currently bearing disproportionate costs.

10.3.4 Key Takeaways

- **Digital Infrastructure Is Environmental Infrastructure:** Data centers now exert material influence over electricity systems, water resources, and local environments. As such, they must be governed as core components of climate, energy, and water policy rather than as neutral private assets.
- **AI Expansion Outpaces Grid and Water Planning:** Existing infrastructure and investment models were not designed for hyperscale AI demand. Without coordinated upgrades and planning, rapid expansion risks backsliding to fossil-based generation and intensifying localized resource stress.
- **Communities Are Demanding a Say—and Tangible ROI:** Local resistance has already delayed or blocked tens of billions of dollars in projects, signaling that future development depends on delivering clear, shared value—economic, infrastructural, and environmental—to host communities.
- **Water Must Be Managed Locally and Transparently:** Both cooling and power generation impose water demands that vary by region. Effective governance requires utilities and communities to play an active role in determining whether, where, and how new facilities are viable.
- **AI Should Augment, Not Replace, Experienced Professionals:** In domains such as water and energy management, AI is most valuable when it automates data-intensive tasks while enabling experienced professionals to focus on judgment, governance, and community resilience.
- **Capital Allocation Is Skewed Toward Growth Over Sustainability:** A global financing imbalance—estimated at roughly 70:1 in favor of AI expansion over sustainability—highlights the urgency of redirecting investment toward efficiency, optimization, and regenerative system design.
- **Global Models Offer Complementary Lessons:** Scandinavia's waste-heat reuse, renewable-first data centers in Africa and Latin America, Europe's regulatory standards, and China's integration of AI education with energy strategy each provide insights for more sustainable pathways.

- **Technological Pathways Can Reduce Energy and Water Intensity:** Advances in chip efficiency, closed-loop and water-free cooling, and AI–optimized operations can materially lower resource intensity if adopted at scale, but must be paired with governance and demand-side strategies.
- **Regenerative Digital Infrastructure Requires Shared-Value Design:** Measurement before buildout, optimization before scale, and explicit commitments to lifting vulnerable populations are essential principles for aligning AI–driven digital infrastructure with circular and regenerative economic futures.

10.3.5 Broader Relevance

This roundtable made clear that debates about AI's future cannot be meaningfully separated from the physical infrastructure and ecological limits that sustain it. Data centers represent the material reality of the digital economy—where abstract algorithms translate into concrete demands on electricity grids, water systems, land use, and community well-being while shaping global investment flows. The expansion of AI therefore exposes a fundamental truth: digital progress is constrained by physical systems, and ignoring those constraints risks destabilizing both.

Aligning AI growth with regenerative principles requires coordinated action across multiple domains. Grid planning must internalize hyperscale demand rather than treating it as an external shock. Water governance must reflect local hydrological realities and community needs. Community engagement must move from consultation to shared decision-making and benefit allocation. Workforce development must ensure that experienced professionals are augmented—not displaced—by automation. Technological innovation must prioritize efficiency and circularity alongside performance.

Crucially, this transition also demands a rebalancing of capital. A singular focus on speed, scale, and AI capability is no longer sufficient. Equal emphasis must be placed on sustainability, equity, and shared value, with investment flowing toward optimization, resilience, and the protection of vulnerable communities. Only by recognizing digital infrastructure as environmental infrastructure—and governing it with that responsibility—can societies realize AI's transformative potential without undermining climate goals, community trust, and fundamental principles of justice.

Conclusion

Where Do We Go from Here? A Call to Action

Across ten sessions, a clear and consistent message emerged: the systems being built today—across AI, finance, health, education, space, and digital infrastructure—will either entrench existing inequities or become levers for a regenerative, human-centered future. The determining factor is not technological capability, but how these systems are designed, governed, and shared. Participants repeatedly emphasized that technology itself is no longer the primary constraint. The real limitation lies in collective willingness to embed ethics, equity, and planetary boundaries into every layer of innovation—from code and capital allocation to institutional culture and public policy.

The conversations converged on several cross-cutting imperatives. First, governance must evolve beyond static, compliance-driven models toward reflexive, adaptive systems capable of responding to emergent behavior—whether in agentic AI, climate shocks, or rapidly shifting markets. Second, economic transitions—from agricultural tokenization and humanoid robotics to digital money and data-center expansion—must be designed to prioritize those with the least bargaining power: frontline workers, women, informal laborers, rural communities, and other historically marginalized populations. Third, education and workforce development require a true "great relearning," equipping both adults and youth with the human capabilities that remain indispensable in an AI–saturated world: critical thinking, curiosity, emotional intelligence, ethical judgment, and adaptive capacity.

Participants also underscored the necessity of treating infrastructure—data centers, satellites, payment rails, and health systems—as environmental and social infrastructure, not merely technical assets. Climate change and resource constraints demand that digital expansion be explicitly aligned with circular-economy principles, water stewardship, and decarbonization. At the same time, space technologies and digital finance must be governed as shared global commons rather than as new arenas for extractive competition. Importantly, the roundtables also surfaced pathways of hope: community-based climate and health initiatives, AI–enabled access to learning and care, tokenized models that broaden ownership of space and research, and cross-sector coalitions experimenting with new standards for AI governance and digital sustainability.

The call to action is both clear and demanding. Leaders across sectors are invited to move from insight to implementation: to adopt reflexive governance practices; to embed inclusion and lived experience into system design rather than treating them as afterthoughts; to invest in sustainable infrastructure and equitable reskilling alongside AI deployment; and to measure success not solely by speed or scale, but by who benefits—and who is protected. Economic prosperity in the digital age must redistribute power, expand participation, and sustain systems designed to serve both people and the planet.

This report is an invitation to deepen that work through The Digital Economist community—by advancing concrete projects, piloting new governance and financing models, and collaborating as fellows and partners. The next era of innovation will be defined not only by what technologies can do, but by what we collectively choose to do with them.

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