Agenda

- The Importance of AI/ML in Future Networks

- The Role of Standards in AI/ML Integration

- Challenges in AI/ML Dataset Management

- Case Studies and Success Stories

- Looking Forward (Future Directions and Innovations)

- Conclusion/Takeways

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Brazil Overview

- Largest country in South America with a dynamic telecommunications sector (more than 344 M contracts in Telco sector).

- Integration of AI/ML transforming network operations, security, and user experience.

- **Role of ANATEL:**
  - Regulates and promotes AI/ML adoption in Brazil's telecom sector
  - Participates in international forums to align with global best practices

BRAZIL

Setting the Scene: The Importance of AI/ML in Future Networks*
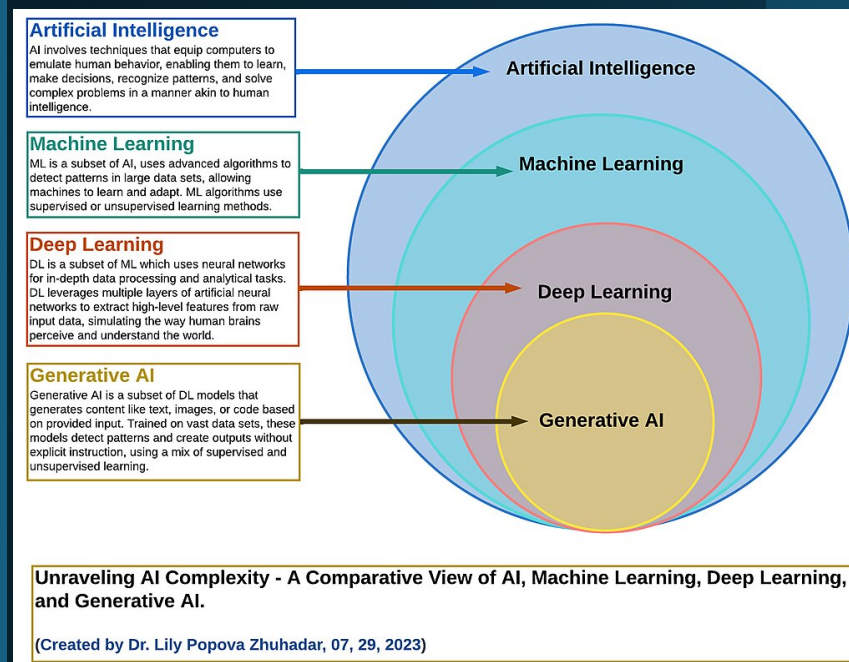
- **Network Optimization:**
  - AI/ML for predicting network congestion and managing bandwidth efficiently
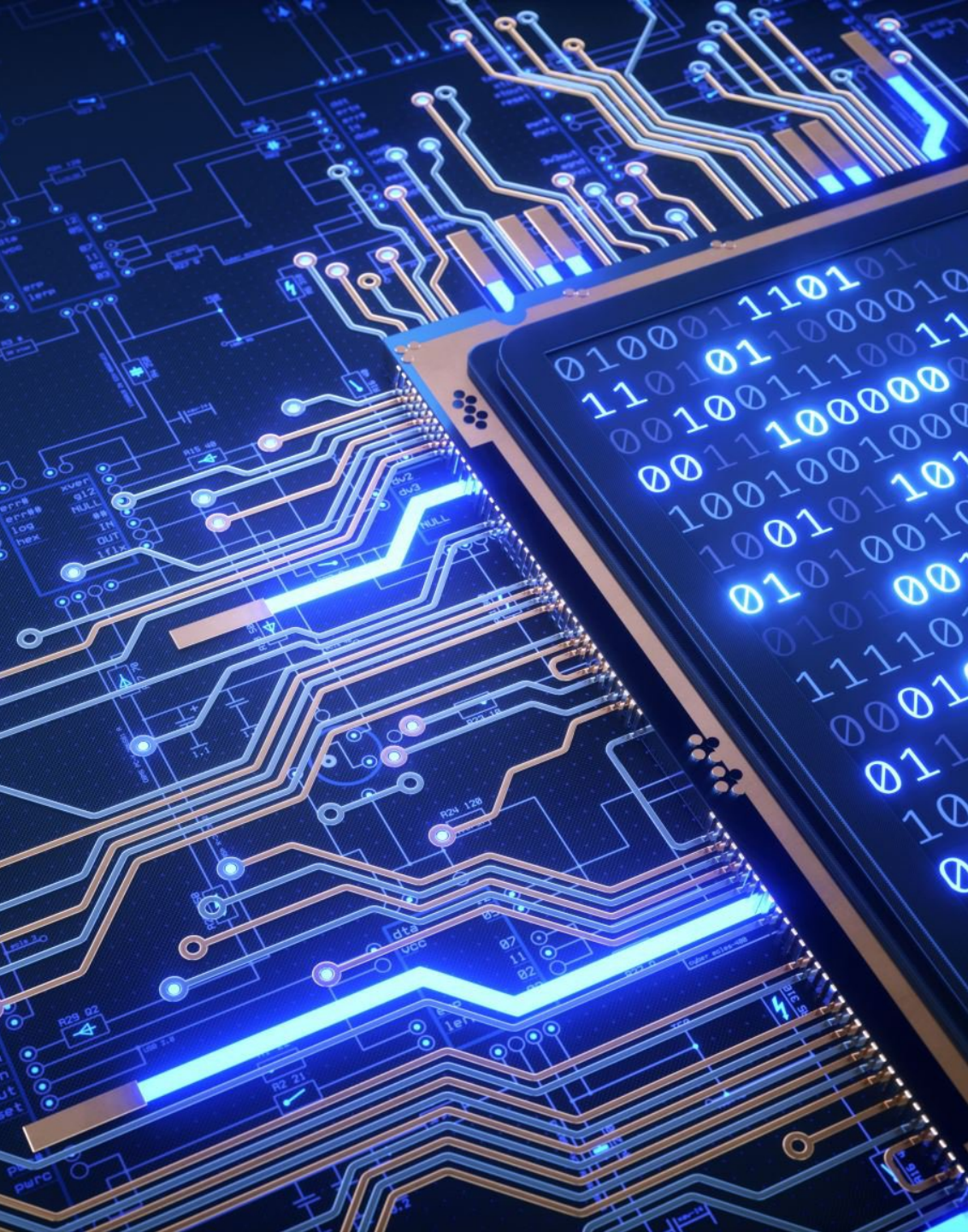 - Predictive maintenance reducing operational costs and preventing network failures
- **Enhanced Security:**
  - AI-based security systems detecting and neutralizing cyber threats in real-time
  - Regulatory frameworks should incorporate AI/ML in cybersecurity protocols
- **User Experience (UX) Enhancement:**
  - AI chatbots providing 24/7 support, quick query resolution, higher customer satisfaction
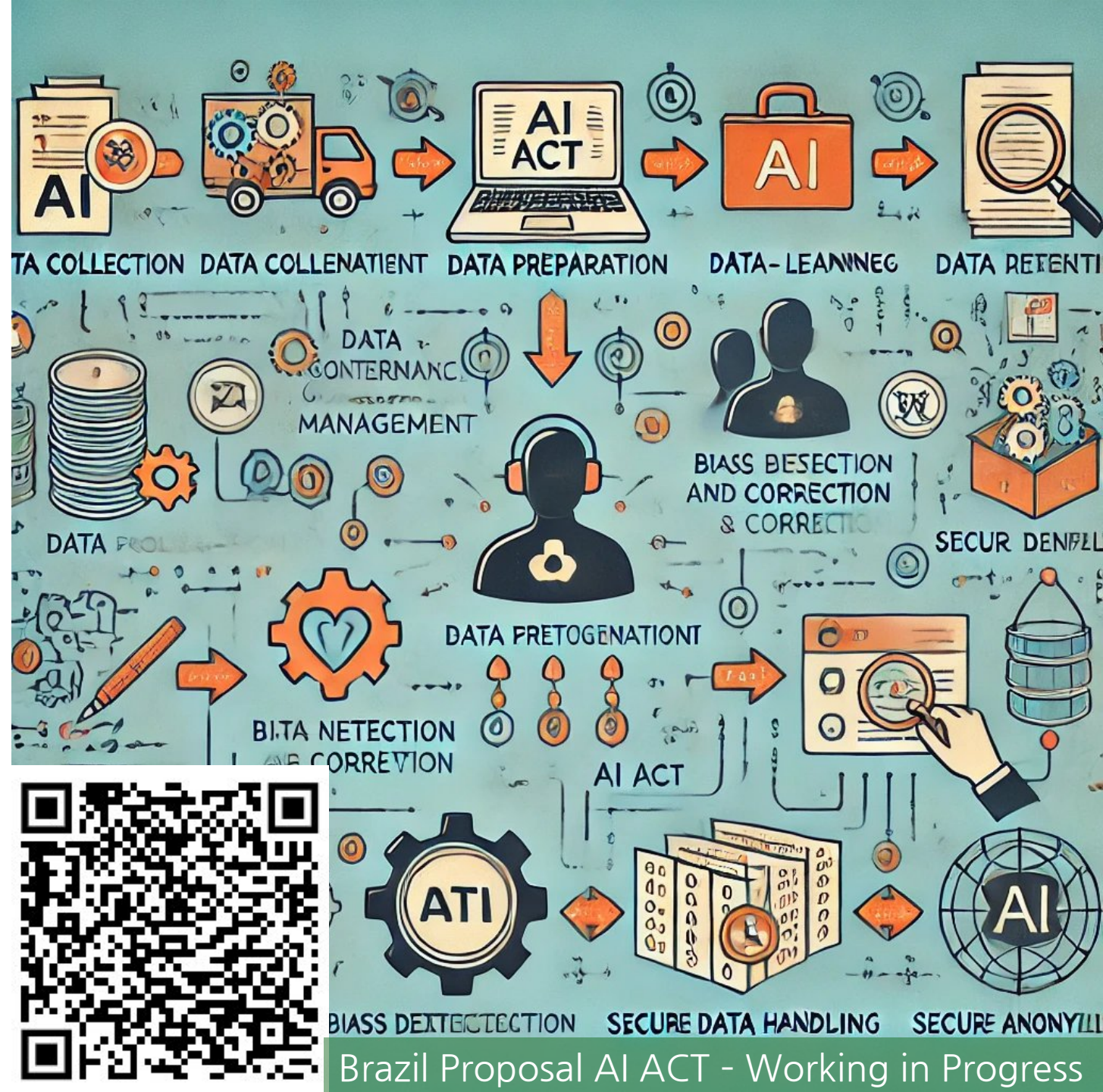 - Personalized content using AI/ML, tailored user experiences, enhanced engagement

Artificial Intelligence
AI involves techniques that equip computers to emulate human behavior, enabling them to learn, make decisions, recognize patterns, and solve complex problems in a manner akin to human intelligence.

Machine Learning
ML is a subset of AI, uses advanced algorithms to detect patterns in large data sets, allowing machines to learn and adapt. ML algorithms use supervised or unsupervised learning methods.

Deep Learning
DL is a subset of ML which uses neural networks for in-depth data processing and analytical tasks. DL leverages multiple layers of artificial neural networks to extract high-level features from raw input data, simulating the way human brains perceive and understand the world.

Generative AI
Generative AI is a subset of DL models that generates content like text, images, or code based on provided input. Trained on vast data sets, these models detect patterns and create outputs without explicit instruction, using a mix of supervised and unsupervised learning.

Unraveling AI Complexity - A Comparative View of AI, Machine Learning, Deep Learning, and Generative AI.

(Created by Dr. Lily Popova Zhuhadar, 07, 29, 2023)

Artificial Intelligence and its Impact on Wireless Infrastructure" da _Wireless Infrastructure Association_

The Role of Standards in AI/ML Integration

- **Interoperability**: Standards ensure AI/ML applications work seamlessly across different systems, facilitating broader adoption and innovation.

- **Reliability**: Standards provide guidelines for consistent performance of AI/ML models, essential for maintaining service quality and user trust.

- **Security:** Standards establish robust security measures to protect data integrity and privacy, safeguarding networks against cyber threats.

EU AI Act - Article 10

- **Stringent data governance for high-risk AI:** Ensures quality, relevance, and bias mitigation in datasets; mandates comprehensive data management and safeguards.

- **Special data processing:** Allows handling special personal data with strict security measures; emphasizes transparency, accountability, and data deletion post-use.
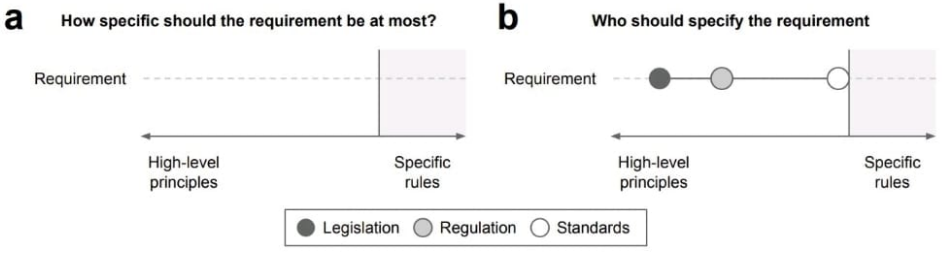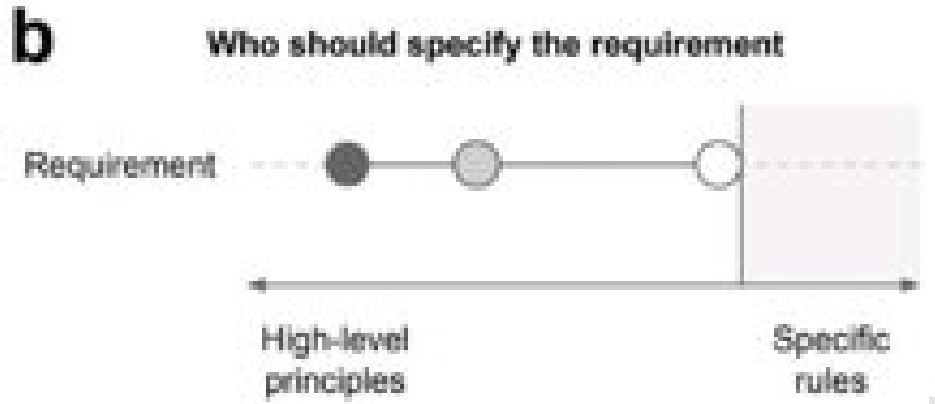
Regulatory Spectrum How and Who

The Oxford Handbook on the Foundations and Regulation of Generative AI 33

a How specific should the requirement be at most?

Requirement

High-level principles — Specific rules

b Who should specify the requirement

Requirement

High-level principles — Specific rules

● Legislation ○ Regulation ○ Standards

Figure 4: Illustrating the purpose of the two sets of questions

| How specific should the requirement be at most?	Who should specify the requirement?
• How well-understood are relevant risks? • Is it clear what specific behavior would reduce those risks? • How important is legal certainty? • How aligned are the regulatees' incentives with the regulatory objective?	• How much expertise and information do the actors have? • How often do the requirements need to be updated and how onerous is the up-dating process? • How aligned are the actors' incentives with the regulatory objective? • To what extent are higher-level actors able to oversee lower-level actors?

Table 3: Overview of the two sets of questions

- <u>Two Extremes of the Regulatory Spectrum</u>:
- Specific Rules
  - Example: "Frontier AI systems must be evaluated for hazardous model features following the established protocol.
- High-Level Principles
  - Example: "Frontier AI systems must be safe and secure."

b Who should specify the requirement

Requirement

High-level principles — Specific rules

● Legislation ○ Regulation ○ Standards

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Challenges in AI/ML Dataset Management

- **Data Quality**: Ensuring high-quality, accurate, and reliable data through rigorous cleaning and validation processes.

- **Privacy Concerns**: Protecting sensitive user data with robust anonymization, encryption techniques, and regulatory compliance.

- **Diverse and Representative Datasets**: Collecting data that reflects diverse user behaviors and demographics to avoid bias and ensure fairness.
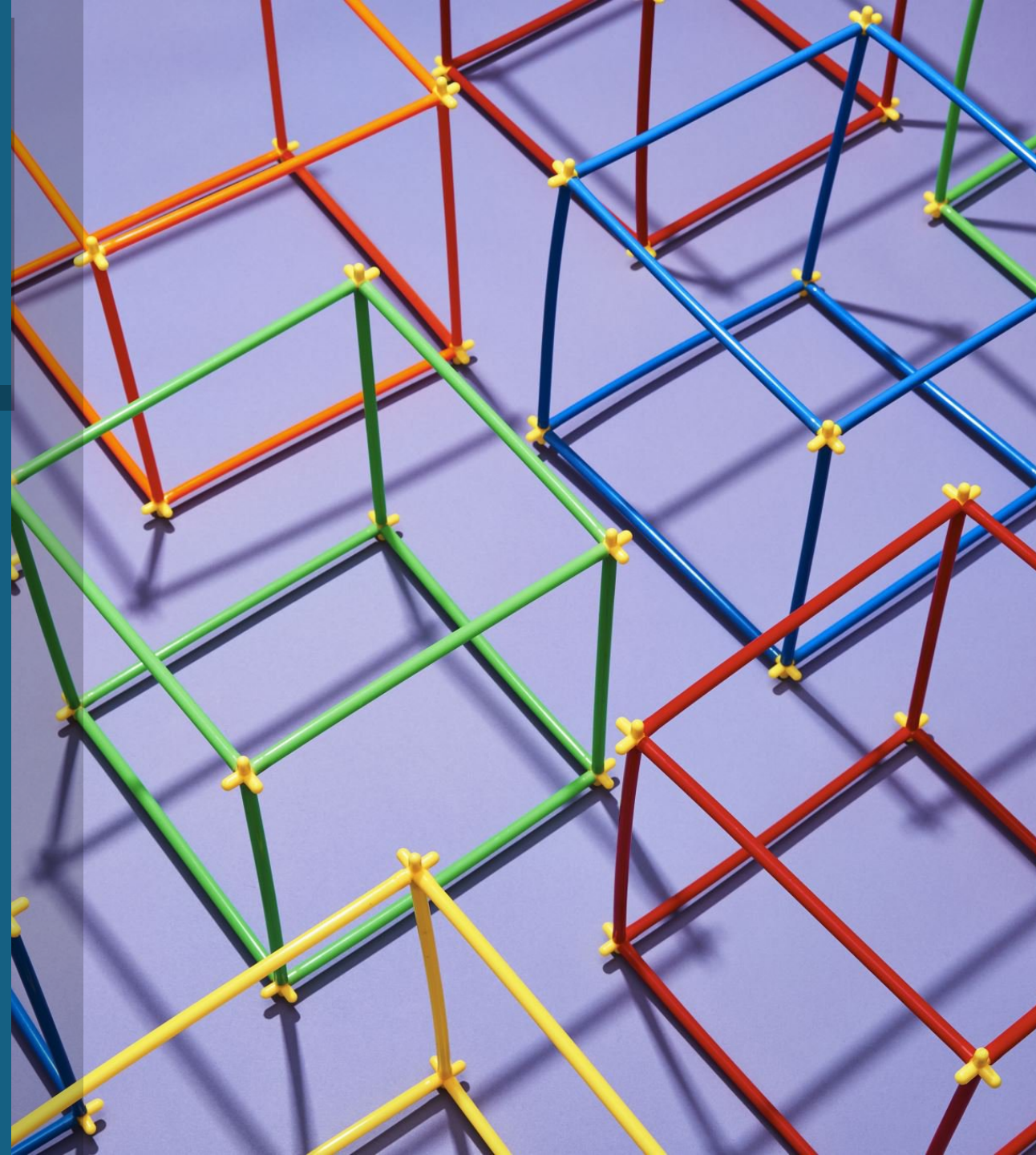
Box 1.1. Real and potential risks associated with AI systems

The OECD has worked to identify real and potential risks associated with AI systems, including generative AI, across its workstreams. Some risks are listed below:

- The amplification of mis- and dis-information at a large scale and scope, particularly through creation of artificial content that humans mistake for real content;
- AI model "hallucinations" that give incorrect or non-factual responses in a credible way, or the generation of illicit images such as fake child sexual exploitation material (e.g. "fake nudes") ;
- Harmful bias and discrimination at an increased scale;
- Risks to privacy and data governance, at the level of training data, at the model level, at the intersection of data and model levels, or at the human-AI interaction level;
- Challenges to transparency and explainability due to the opacity and complexity of large models;
- The inability to challenge the outcome of models; and,
- Privacy breaches through the leaking or inferring of private information, among others.

Sources: (OECD, 2023[13]); (OECD, 2023[14]); (Lorenz, Perset and Berryhill, 2023[12]).

Case Studies and Success Stories

- Leading Brazilian telecom provider implementing AI-driven network optimization.

- Standards Adherence - Followed ITU-T Y.3172, ISO/IEC 27001 and 8000-51 for governance, interoperability and security.

- Positive Outcomes - Reduced network congestion and downtime, improved operational efficiency, and enhanced customer satisfaction.

FPS: 119.96, Frame time: 8.34 ms
NVIDIA RTX A6000: 2.2 GiB used, 41.8 GiB available
Host Memory: 17.3 GiB used, 108.3 GiB available
1669x892
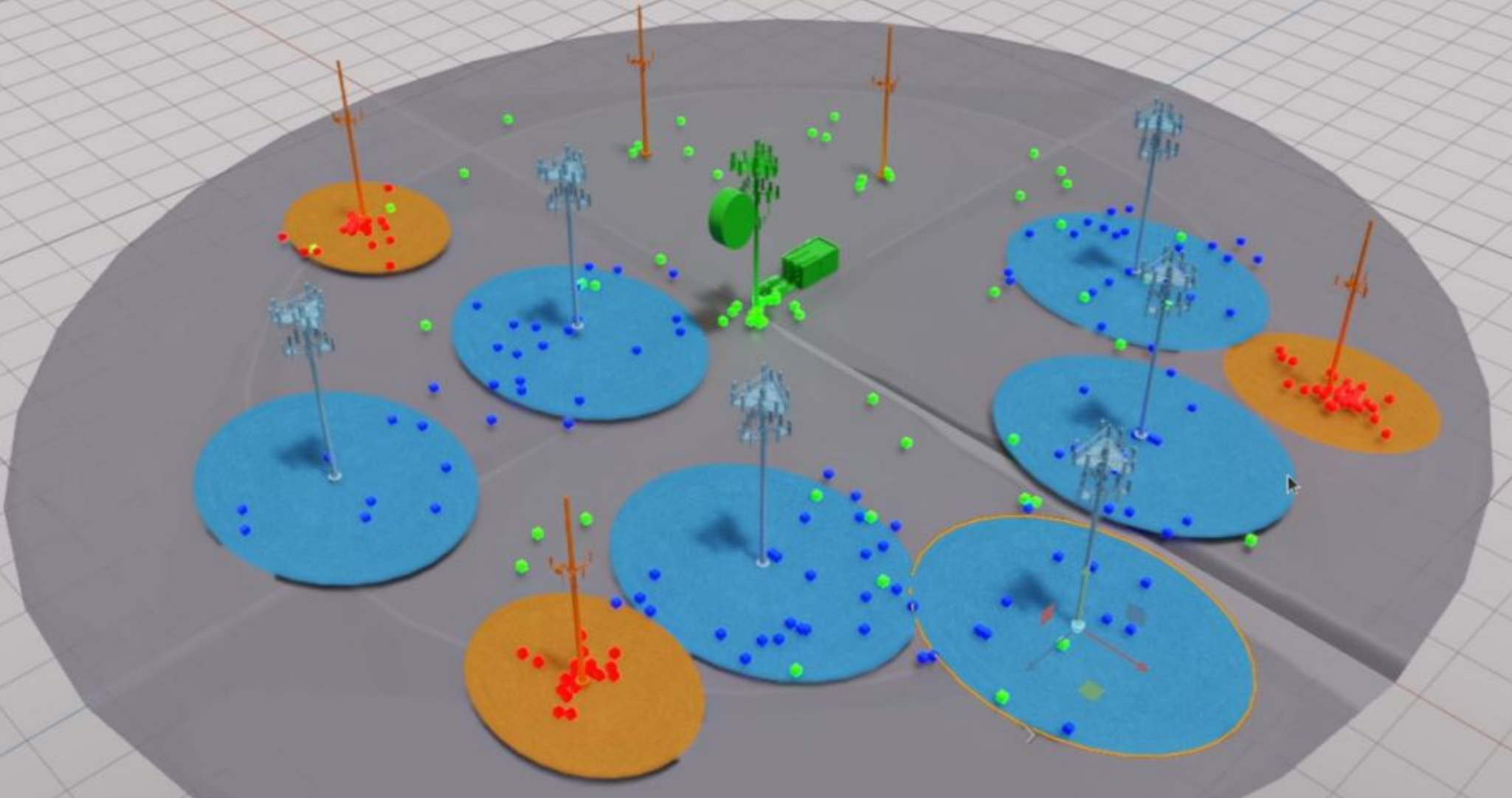
Looking Forward: Future Directions and Innovations

- **Autonomous Networks**: AI/ML enable self-optimizing, self-healing networks, reducing human intervention and costs.

- **5G and Beyond:** AI optimizes 5G and future 6G networks, enhancing spectrum allocation and user experience.

- **Collaborative Research:** Essential for developing and updating standards, ensuring interoperability, security, and reliability.

Conclusion

- **Revolutionizing Telecommunications:** AI/ML technologies enhance network performance, security, and user experience.

- **Need for Robust Standards:** Continuous evolution of standards is crucial to address emerging challenges and opportunities.

- **Essential Collaboration:** Ongoing dialogue between researchers, industry, and regulatory organizations ensures standards remain relevant and effective.

Key Takeaways

- AI/ML technologies are rapidly evolving, profoundly impacting telecommunications.

- AI/ML optimizes network operations, enhances security, and improves user experience.

- Standards ensure interoperability, reliability, and security in AI/ML applications.

- Creating, managing, and utilizing AI/ML datasets involves complexities.

Regulatory Sandbox?

- Issues include data quality, privacy concerns, and the need for diverse datasets.

New Study Group Item?

- The need for ongoing collaborative research to keep standards updated.

Centre of Excellence: AI in Telco?

- Importance of continued dialogue between researchers, industry, and standards/regulatory organizations.

Obrigado, أركش, 谢谢, Gracias, Merci, Thank you, пасибо, Danke

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