

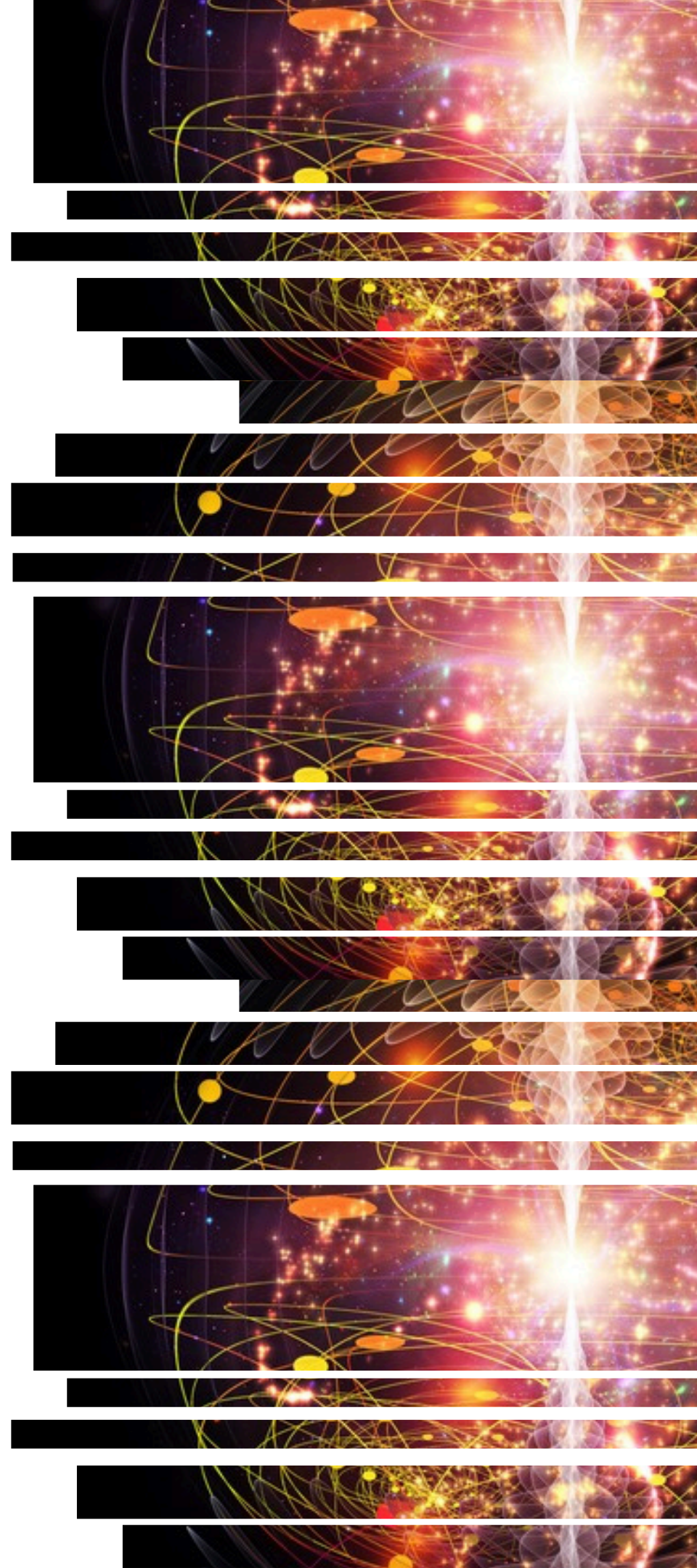
Quantum Futures

A policy and funding simulation
workshop on regional strategies and
synergies

- Quantum Effects 2025 -



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AGENDA

- 1** INTRO
(3 MIN)
- 2** RULES OF THE GAME
(7 MIN)
- 3** WE TAKE A TEAM
POSITION (10 MIN)

- 4** NEGOTIATION ROUND
(25 MIN)
- 5** PACKAGE PROPOSAL
(10 MIN)
- 6** CONCLUSION/DEBRIEF
(5MIN)



INTRO

Our mission

- This workshop examines if **competing allocation strategies** at the convergence of high-performance computing, artificial intelligence, and quantum technologies shape resource distribution, and if governance regimes and funding structures influence its orientation across impact domains

How

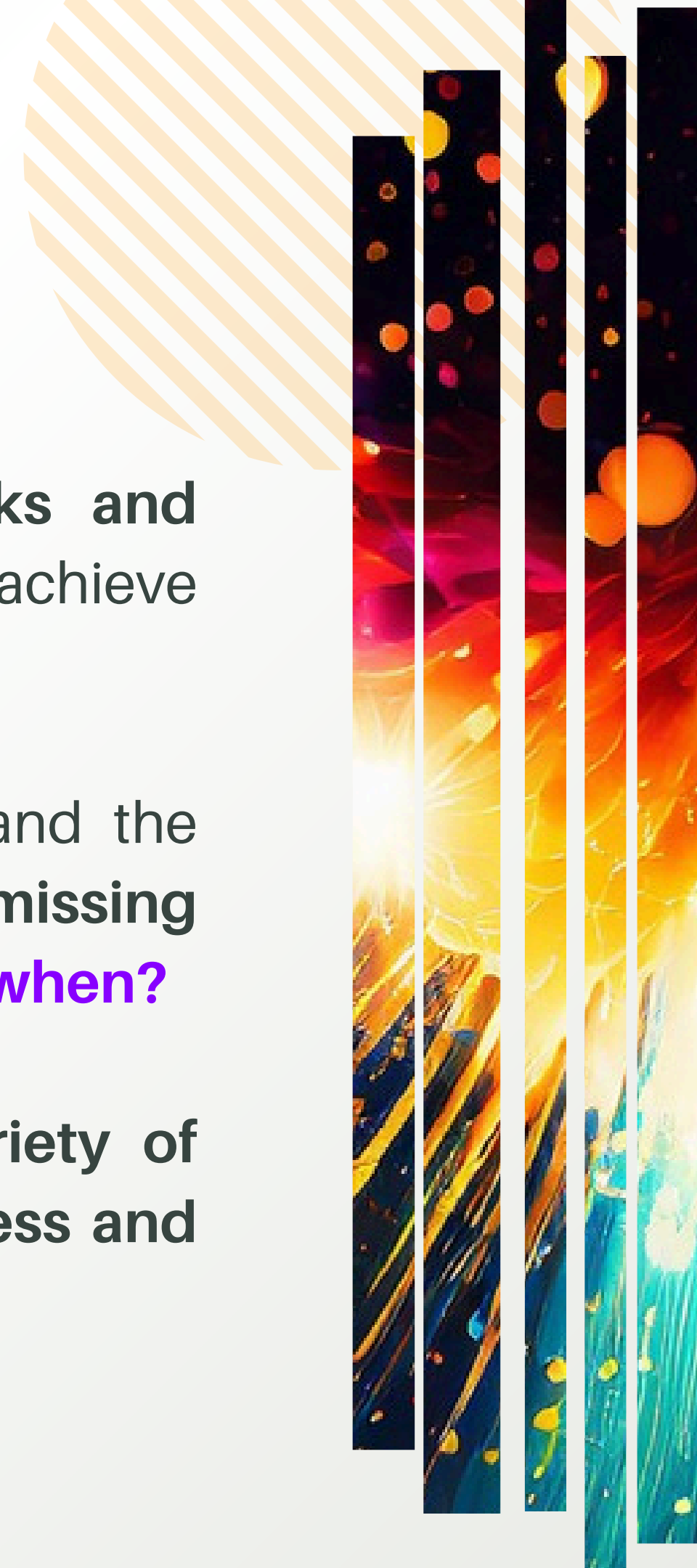
- The participants shall assume roles across sectors and explore feasible pathways despite conflicting goals.
- As participant, you will take a stand, negotiate and propose.
- We don't need to be experts to play, your cards will guide you.



OUR SCOPE

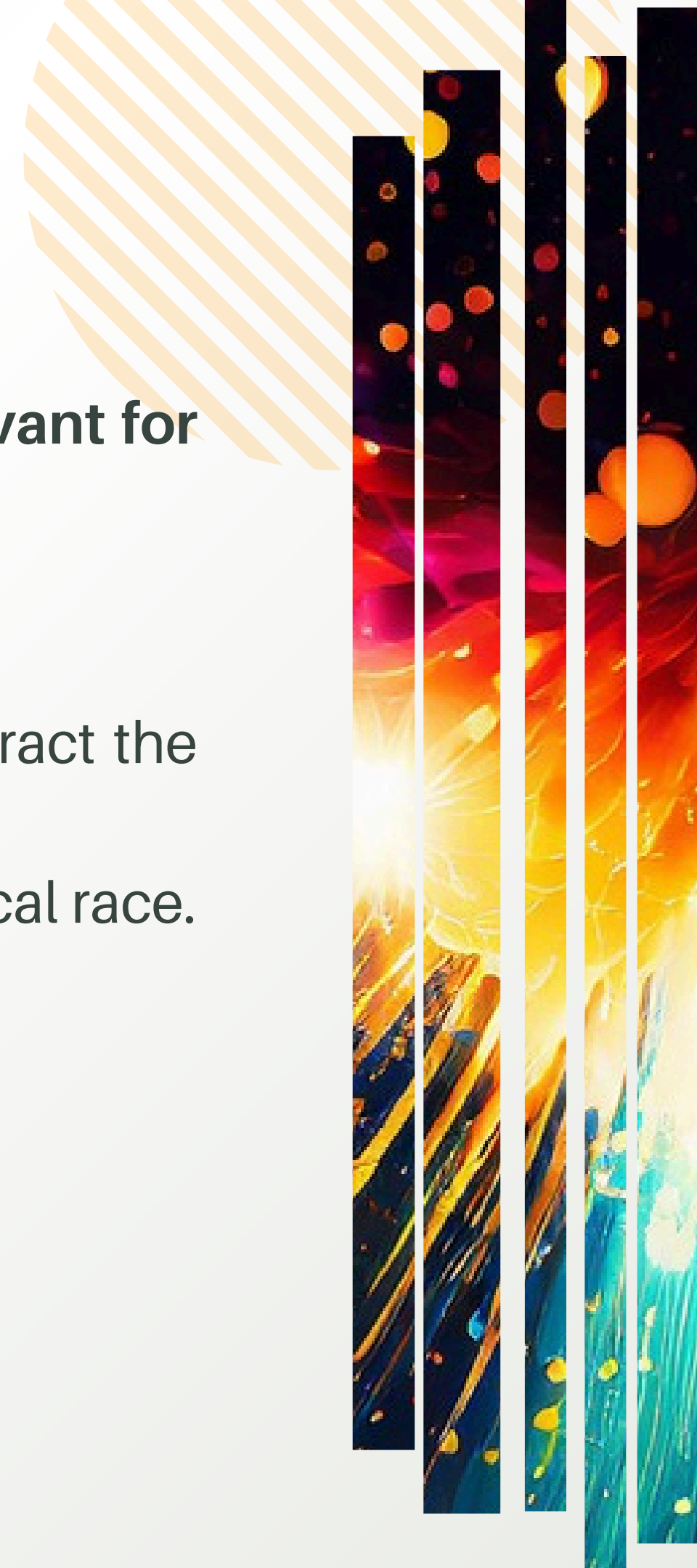
The challenge

- We will consider **end-to-end workflows** where **workloads, tasks and resources** (quantum and classical) are **integrated** to achieve **harmonization and scale**, while optimizing time and energy.
- Within the end-to-end applications, the solutions are fragmented and the **standards for describing and executing quantum workflows** are missing (Saurabh et. al, 2023). **How to prioritize workflows? Who does what, when?**
- Is our hypothesis that this **asymmetric information**, and the **variety of systems architecture** also has an **impact on the governance, access and use** of the technology, therefore **defining its potential impact**.



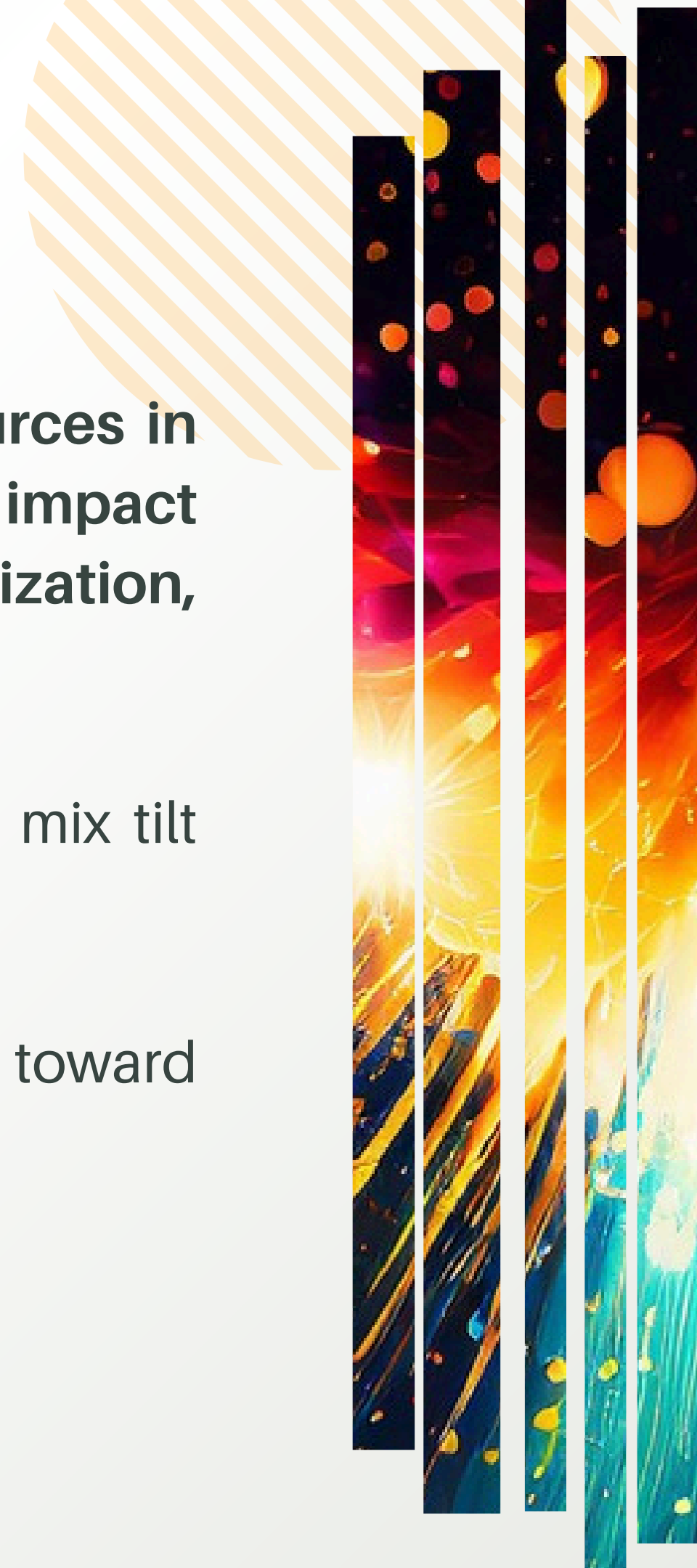
RELEVANCE

- **Why the intersection between HPC - AI - Quantum Tech is so relevant for politics and society?**
 1. It requires high investments and political will.
 2. It facilitates the integration of mutually reinforcing technologies to extract the most potential.
 3. It represents the leadership of regions and countries on the technological race.
 4. It has a potential impact on geopolitical tensions.
 5. It raises questions of digital governance and access.
 6. It is complex enough to be potentially unpopular or misunderstood....



OUR RESEARCH QUESTION

- Do governance regimes and funding structures affect how resources in HPC-AI-Quantum ecosystems are allocated across different impact domains, including social benefit, scientific discovery, commercialization, and security?
 - Do EU stability & stewardship approach and state-heavy funding mix tilt allocation toward public-interest R&D?
 -
 - Do US security-driven or private-capital-heavy mixes tilt toward commercialization or defense?



HOW TO PLAY?

1. We will play in teams, first grouping by type of character and afterwards we negotiate freely. Two profiles: EU and USA.
2. The objective? To come up with a proposal that fits everyone's agenda (public and secret) as good as possible, to say **how do we operate at large scale?**
3. Each type of character team can choose to pick their best alternative option in case negotiations are not favorable for them.
4. **We need to choose a token:**
 - a. Social Impact & Public Goods (climate, health, digital equity).
 - b. Frontier Science (science development as core objective).
 - c. Commercial Innovation (market-driven AI/quantum products).
 - d. Security & Defense (safeness of citizens, export-controlled R&D).

HOW TO PLAY?

1. Every person will get a character among 10 different:

Federal Gov't (domestic) - USA & EU

State Gov't (domestic) USA & EU

Academia / Research Lab

Startups / SMEs

Big Tech (domestic)

Defense / Regulator

EU Partner (Stability & Stewardship)

US Partner (Agility & Security)

Domestic Private Investor

Non-Domestic Private Investor



WE FORM TEAMS AND WE CHOOSE A POSITION



1. Same characters group together and choose within your character's cards the region (EU or USA) that better represents what you believe is best to address Quantum-HPC-AI policy. (Depending on number we make 2 groups USA & EU or 1 mixed group)
1. Each **actor states a stance**: governance preference + funding source + preferred allocation (check your cards to choose).

10 MIN

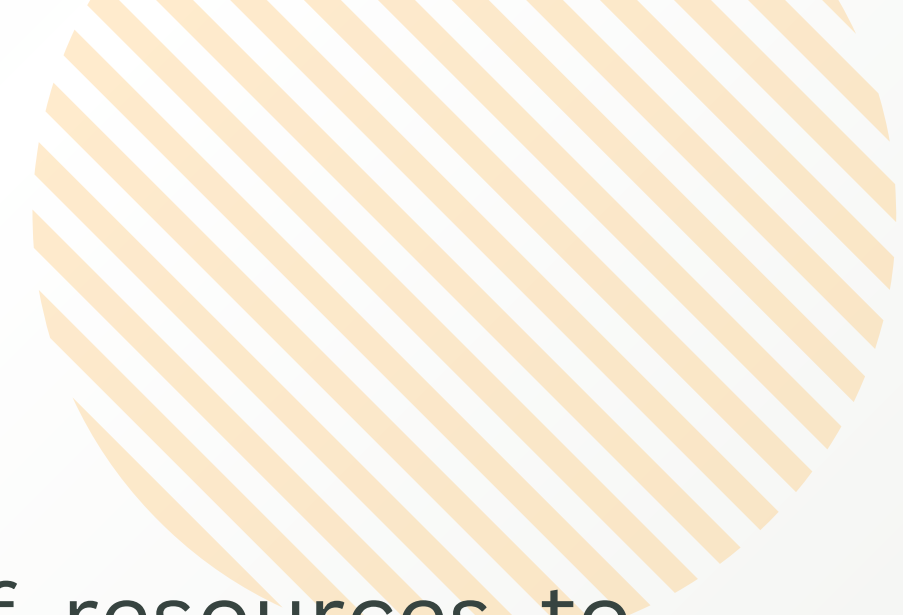
NEGOTIATE TERMS



1. We negotiate: feel free to talk to all actors, trade, form alliances, and **reveal or conceal your alternative option** if there is friction in the negotiation.
2. Unexpected news!
3. Choose what to allocate efforts for and write your commitments and compromises with your allies.

25 MIN

PACKAGE PROPOSAL



1. Coalition presents final allocation ratio (distribution of resources to Social Impact, Frontier Science, Commercial Innovation, Security & Defense). where does the money will come, who accesses the technology, under what conditions, and how scheduling and prioritization of workflows occur?
1. One spokesperson summarizes the governance, funding mix agreed and development objectives (tokens).

10 MIN

DEBRIEF AND CONCLUSIONS

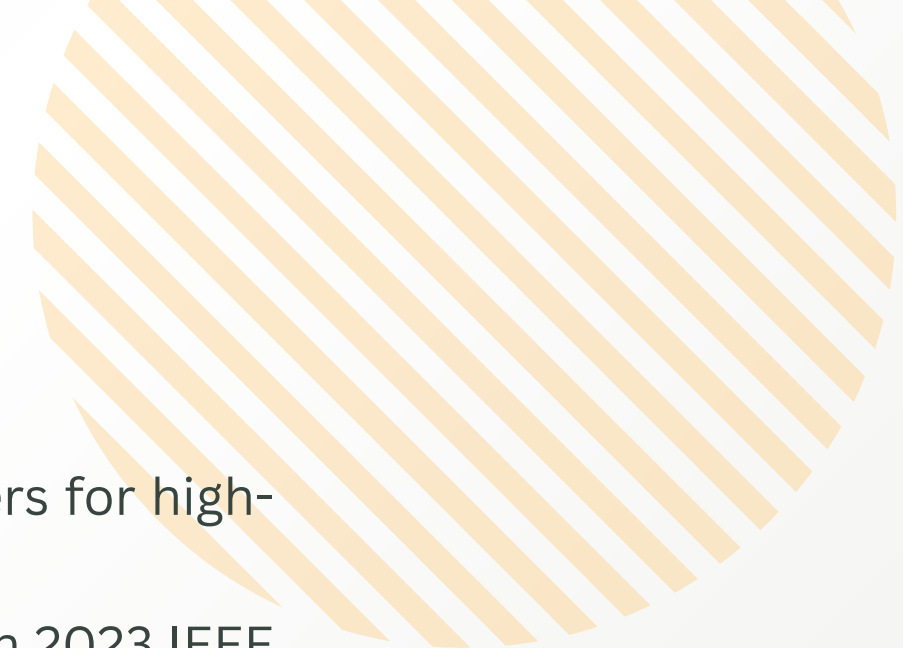


1. What was surprising?
2. Who revealed their secret agenda or best alternative option? why?
3. Who felt left out?
4. Who dominated?

5 MIN

REFERENCES

- Humble, T. S., McCaskey, A., Lyakh, D. I., Gowrishankar, M., Frisch, A., & Monz, T. (2021). Quantum computers for high-performance computing. *IEEE Micro*, 41(5), 15-23.
- Saurabh, N., Jha, S., & Luckow, A. (2023, July). A conceptual architecture for a quantum-hpc middleware. In 2023 IEEE International Conference on Quantum Software (QSW) (pp. 116-127). IEEE.
- Shehata, A., Groszkowski, P., Naughton, T., Meena, M. G., Wong, E., Claudino, D., ... & Beck, T. (2026). Bridging paradigms: Designing for HPC-Quantum convergence. *Future Generation Computer Systems*, 174, 107980.
- Bordone, R. C., & Moffitt, M. L. (2006). "The Handbook of Dispute Resolution." *Negotiation Journal*, 22(3), 489–492.
- Druckman, D., & Ebner, N. (2008). "Onstage or Behind the Scenes? Relative Learning Benefits of Simulation Role-Play and Design." *Negotiation Journal*, 24(3), 319–330.
- Ebner, N., & Efron, Y. (2005). "Using Online Role-Play Simulations to Teach Negotiation." *Negotiation Journal*, 21(4), 487–495.
- Fisher, R., Ury, W., & Patton, B. (2011). *Getting to Yes: Negotiating Agreement Without Giving In* (3rd ed.). Penguin Books.
- Mnookin, R. H., Peppet, S. R., & Tulumello, A. S. (2000). *Beyond Winning: Negotiating to Create Value in Deals and Disputes*. Harvard University Press.
- Wheeler, M. (2013). *The Art of Negotiation: How to Improvise Agreement in a Chaotic World*. Simon & Schuster.





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