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WHARTON BLOCKCHAIN AND DIGITAL ASSET PROJECT

The Digital Asset World of 2035

August 2022

A Scenario Planning Exercise

Reg@Tech Roundtable On Digital Assets

Wharton
UNIVERSITY of PENNSYLVANIA

Foreword

When major crises happen in the world, such as the financial crisis of 2008 or the COVID-19 pandemic of 2020, only few seem to be optimally prepared. Of course, we cannot have perfect knowledge of the future, but we can use the best tools available to sketch possible futures, both probable and unlikely ones. Imagining possible futures is especially valuable for a fast-changing sector like digital assets.

This report is based on the four scenarios created by participants in the Seventh Reg@Tech Roundtable on Digital Assets, which took place in March 2022 in Philadelphia. We asked ourselves: What may the digital asset world of 2035 look like? Highlights of the scenario planning exercise were described in the roundtable report, "Quo Vadis Digital Asset Regulation?". Here we provide a deeper summary of the four visions our experts developed. We invite you to think outside the box, step out of your current reality, and consider what lessons these scenarios might offer for decisions made today.

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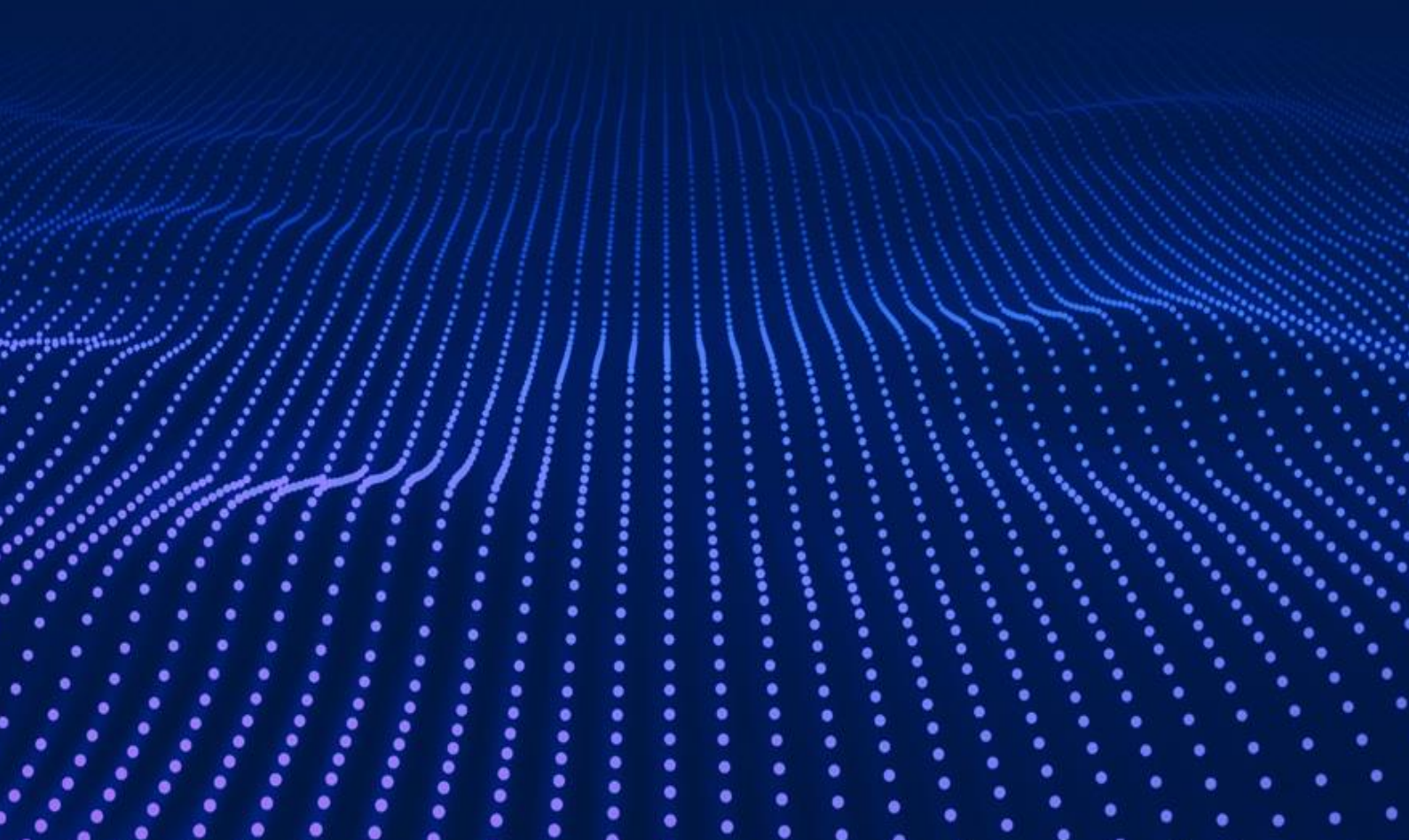
This report summarizes and builds upon the scenario planning discussions at Reg@Tech 7. Reg@Tech is conducted in accordance with the Chatham House Rules. Participants include government representatives who do not represent the official positions of their agencies. There is no consensus on many topics. While this summary attempts to reflect the spirit of the meeting, the conclusions are those of the author. It should not be taken as an embodiment of the views of any participants or their organizations.



Scenario Planning - A Brief History and Introduction

Technological progress has had a tremendous impact on the way we communicate, travel, live, and work today. Digital transformation is turning the world's information into ones and zeroes, accessible in seconds, transportable at ease, and over vast distances. The 21st century is marked by ongoing conversion of human language into computer language. Blockchain technology is transforming transactions and accelerating the move of assets into the digital realm, creating new forms of coordination (decentralized autonomous organizations), smart contract enabled finance (DeFi), and novel human interaction venues (metaverse).

What does the future hold? Predicting the future is like navigating a car in extreme weather conditions, where it is impossible to see what lies ahead and turning the headlights on only gets you so far. The future is uncertain and, in the present, we are trying to see the shape of what's behind the fog clouding our vision. Strategically planning for an uncertain future is part of our human experience and distinguishes us from other species. The advancement of our society is intrinsically linked to the steady refinement of our ability to prepare for what is to come. However, when the time horizon is beyond a couple of months, traditional forecasting methods based on data from the past do not perform too well.

Scenario planning offers the possibility to create multiple futures and prepare for them strategically. A scenario can be defined as a "plausible description of how the future may develop based on a coherent and internally consistent set of assumptions about key driving forces (e.g., rate of technological change, prices) and relationships. Note that scenarios are neither predictions nor forecasts, but are useful to provide a view of the implications of developments and actions."[1] Scenario planning can thus be regarded as an aid for making better decisions.[2]

Scenario planning was famously applied by the energy company Shell. Into the 1970s, the oil industry had two prevalent assumptions believed to be almost unshakable truths: (i) oil will always be plentiful and (ii) prices will remain low. Pierre Wack, a strategist at Shell (formerly Royal Dutch Shell) started sketching some alternate realities, and their implications for the present.[3] He then presented these scenarios to senior management. It quickly became clear that the existing strategic plans were a house of cards in danger of collapse if even one of the assumptions did not hold up.

Shell's senior management thus started to rethink the company's approach and started to adapt the internal strategies based on the developed scenarios.[4] When in 1973, the Organization of the Petroleum Exporting Countries (OPEC) quadrupled oil prices,[5] and the oil crisis shocked the world, Western companies and even nations were caught off guard, but Shell was prepared.[6]

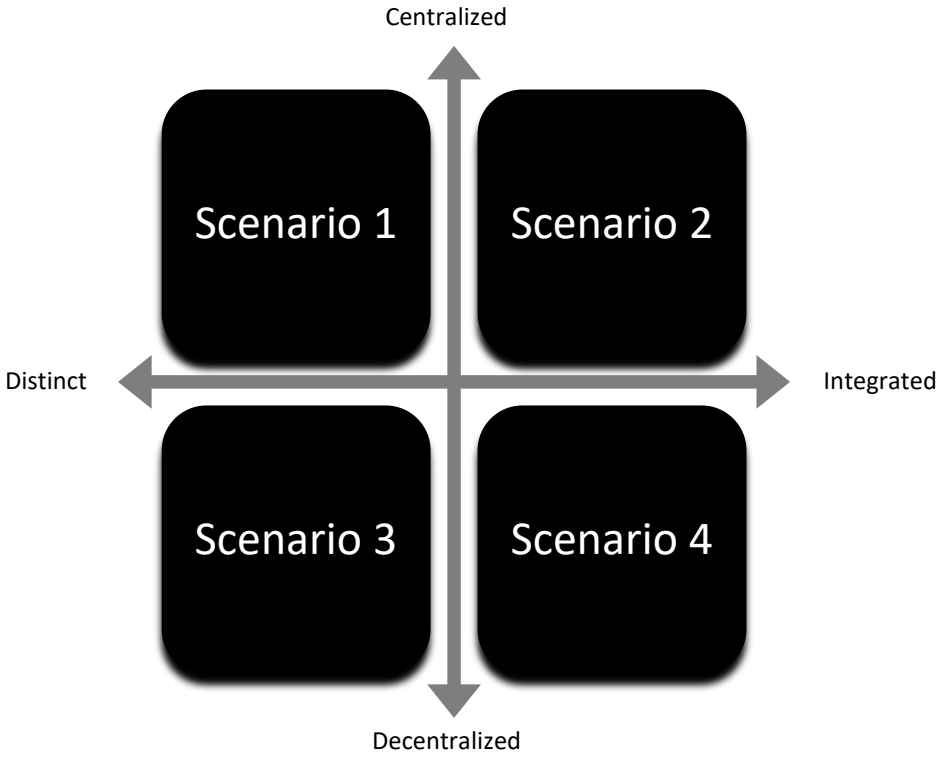
Scenario thinking originally started in a more systematic manner after World War II for different types of planning, and was later refined by Herman Kahn, a military strategist and systems theorist at the RAND Corporation.[7] He reportedly pushed people to "think the unthinkable", and really envision the many future eventualities that could occur.[8]

In subsequent years, scenario planning has been widely used by private firms, the public sector, and military organizations to identify hidden risks and opportunities. Scenario planning is particularly valuable under conditions of rapid change and high uncertainty, which certainly apply to the context of digital assets.

The following sketches are based on the four scenarios of imaginary futures developed by Reg@Tech participants in March 2022.

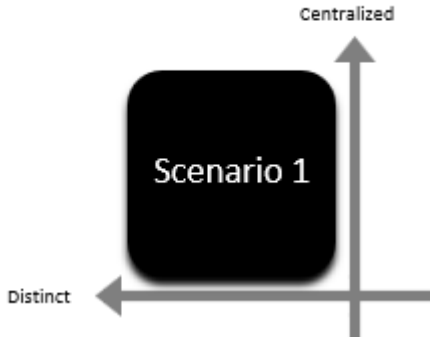
The Four Scenarios and Key Characteristics

The scenario planning exercise built upon a two by two grid. Centralization vs. decentralization was one axis. The level of integration between the traditional and digital asset worlds was the other. The result is four quadrants, with scenarios that show different risks and opportunities for the digital assets world.



The fundamental questions asked to our participants were: What political, economic, social, and/or technological developments shape the digital asset world of 2035? Is the world going to be more decentralized than it is today or is it going to be less so and rather be controlled by central intermediaries? Will the digital asset world and the established financial system be two separate systems or one?

Scenario Summaries

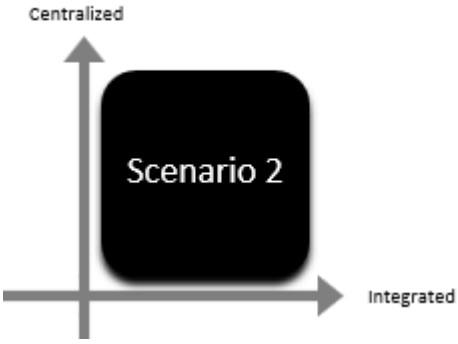


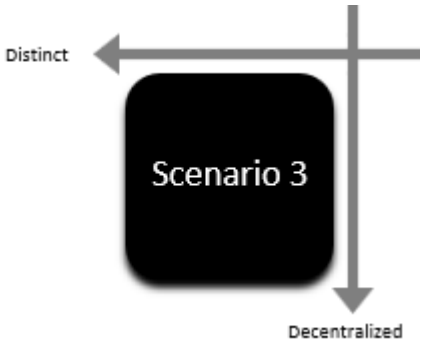
Scenario 1: Unitechnocracy

Two systems develop in parallel based on CBDCs and private digital assets. Virtual realities exist and the economy is tokenized with clear distinctions. AI powered systems place people in either system. Augmented reality, virtual reality, and the metaverse are a way for people to escape reality.

Scenario 2: BINO (Blockchain in Name Only)

Society has become cashless, open blockchains have collapsed entirely. Permissioned blockchains are used by central authorities. There is a central financial regulator. Decentralization and web3 is a fading ambition from the past, web2 has advanced and virtual realities are mainly used by elites.



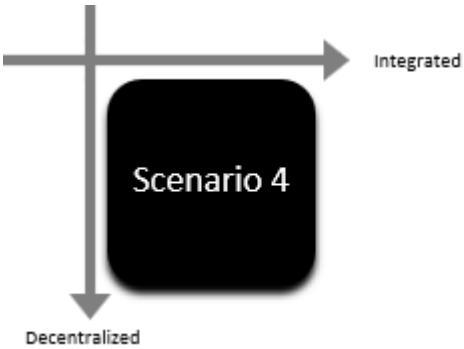


Scenario 3: Pluribus

The decentralized crypto world coexists with the legacy system. While nation states have started collapsing, web3 communities proliferate and thrive. Bridges between systems become powerful gateways and DNA based identification is used to navigate the multiple metaverse(s).

Scenario 4: DAO-Mundus

There is a steady decline of nation states amidst the proliferation of self-selected DAO governed communities. Self-sovereign judicial systems, enhanced by augmented and virtual reality, the metaverse, zero knowledge proof privacy, and a tokenized economy are triggers for an economic boom.



Scenario 1 (centralized, distinct)

UNITECHNOCRACY

Unitechnocracy portrays a world radically driven by algorithmic forces beyond an individual's reach. Government entities and big tech companies significantly control all aspects of society. Digital assets exist in two distinct worlds. While CBDCs are used for infrastructure-related services necessary for society to function, private digital assets enable access to a large variety of experiences, from virtual realities to immersive experiences in the metaverse.

Two separate worlds have resulted from the advancement of digital technologies, which although initially developed with good intentions, have made the world more dangerous. The first sentient AI was developed by a global big tech company located in the US.

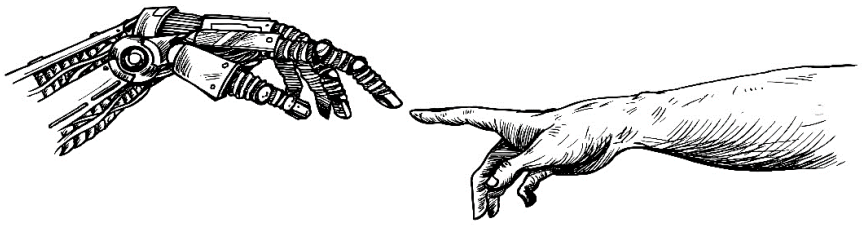
A technology ethicist secretly performed the Turing test and was shocked to find the machine surpassing all his expectations. The government was made aware of this breakthrough, which led to a new era of public-private partnership in order to contain the negative effects of self-aware AI.

The technological, political, social, and economic factors that led to this scenario are complex and manifold. Technology has advanced at such rapid speed that its exponential growth has been difficult to keep up with for any single human, including sentient AI.

Socio-economic unrest and potential for more unrest, terrorist attacks, and the reality of continued pandemics led to increased fear in the populace and the search for a "way out", which is most easily found in virtual realities in the form of multiple metaverses.

New regulations to curb the risk of civil unrest enable governments to access vast amounts of data from big tech companies. Privacy laws are perforated until they are made completely redundant.

Every citizen is transparent and smart devices, beginning with smartwatches monitor heart rate, feelings, and even thoughts. A digital divide opens up and social scoring becomes pervasive. A portion of the populace falls off the grid and becomes deviceless analog nomads.



Society is split into highly centralized government-controlled and big tech-controlled sections. Each of these distinct sections is governed and equally controlled by what is termed the “Unitechnocracy”, an elite made up of both government and big tech harnessing the power of AI.

Inequality is blatant in the Unitechnocracy, where the government-controlled world, funded by taxes collected from the big tech side, functions as a safe harbor and safety net for low-income households and individuals who are frequently discriminated against. The government-controlled side performs all the necessary infrastructure functions and assembles service providers, from workers providing manual labor, to farmers, health care services, and pharmacies.

Governments have introduced CBDCs and big tech has brought forth private digital assets. Gated communities that operate autonomously and pay for their own goods and services, fire departments and police departments proliferate in the big-tech controlled sections. Commerce is done on-chain and other goods and services are provided by people on-chain as well.

On the government side, the CBDC system is stable and services are provided fairly. In contrast to the big tech-controlled sections, government-controlled ones lack a large variety of services. Although there may be inconsistencies, people on the tech side have the illusion of individuality and freedom and autonomy but are being controlled - just like the other side - by the Unitechnocracy as well.

Scenario 2: BINO

Blockchain in Name Only (centralized, integrated)

BINO explores a centralized, but integrated world. Blockchains underlie all economic activity, but decentralization ambitions have become a memory of the past, including DeFi. Proof of Work blockchains have failed, most notably Bitcoin with close to no adoption. Society has become cashless and blockchains that exist today are locked in centralized systems, undeserving of the name.

The political and social developments that preceded this scenario are a new central financial regulator, continued legislative dysfunction, an unchanged SCOTUS makeup, and elites amassing more power. There is unprecedented polarization, other parties start rising and post truth reality emerges with truth apps and web2 advances due to the collapse of blockchain.

The very centralized economic makeup of this scenario includes a cashless society, where people trying to rebel have moved offshore to continue using cash. There is a National Digital Reserve System, which aligns with the new central financial regulator. New FIs (Financial Intermediaries) are National Digital Reserve Banks that provide wallets.

There is a rollback of globalization after the "Second Cold War". The economy becomes tokenized and China has by far the biggest one, while global growth has stalled.

Web2 advances via centralized blockchain technology, there is a functioning virtual reality for elites and AI-powered facilities have become omnipresent. The hyperloop is functioning and employed throughout the nation, there are driverless EVs and Hoverboards.

National Digital Reserve System
Federally permissioned blockchain

WALLET
FIs control and distribute CBUSDC

IDENTITY
Public-private partnership instituted to implement DIDs

PRIVACY
De minimis threshold for anonymous wallets

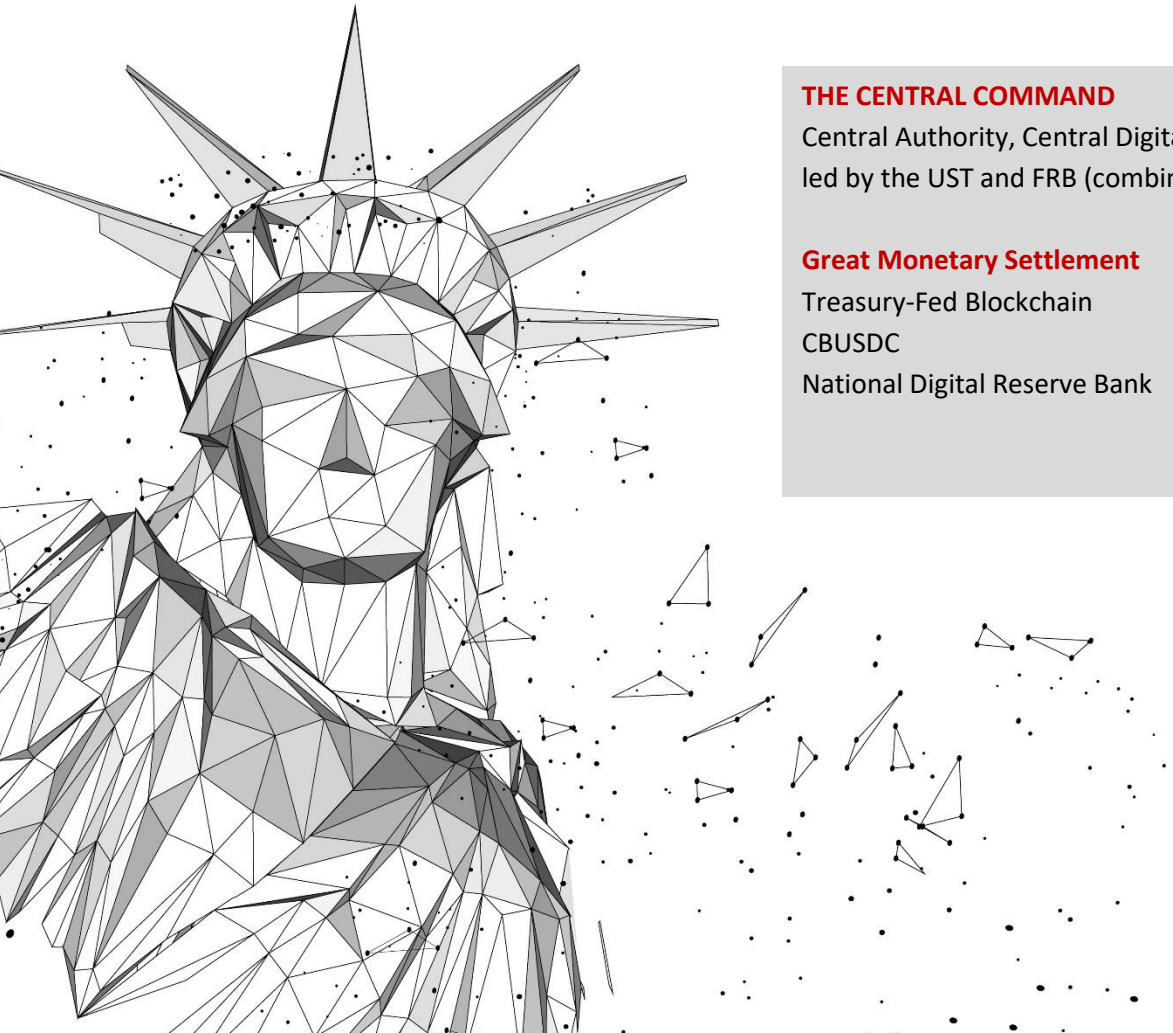
This scenario imagines a new central command in the United States known as the Central Digital Reserve Ministry (CDRM), co-led by the Treasury and the Federal Reserve, which combines the OCC and FDIC.

Since society is cashless, the central government had to be streamlined, and there was a great monetary settlement to get to this point. The government needs technical expertise to create some semblance of privacy, because the great monetary settlement only worked to the extent that the government was able to think about how to improve legal protection and due process in the event that this kind of financial surveillance increases to a degree not previously thought possible.

The CDRM hosts a permissioned blockchain, which is the Treasury Fed blockchain and the digital currency used in the cashless society is the Central Bank US Dollar Coin (CBUSDC).

No central bank has given up their sovereign control of money. And most countries around the world introduced a CBDC. The CBUSDC is a retail customer based CBDC on a private blockchain. In the National Digital Reserve System, wallets are controlled by the new "FIs", which distribute the CBUSDC. A public private partnership provides digital IDs (DIDs) through homomorphic encryption and zero-knowledge proofs.

A great compromise was for the government to allow for anonymous wallets up to a *de minimis* threshold. New legal processes are put in place to protect freedoms and due process. These technological advances adapt on the federal level to provide incredible efficiencies and transparency. However, not everyone can be adopted into this system. There is still a minority of people who want to use oil, natural gas, or cash.



THE CENTRAL COMMAND

Central Authority, Central Digital Reserve Ministry, co-led by the UST and FRB (combines the OCC and FDIC)

Great Monetary Settlement

Treasury-Fed Blockchain
CBUSDC
National Digital Reserve Bank

Scenario 3: Pluribus

(decentralized, distinct)

Pluribus envisions an abundant world, where different realms, both radically new decentralized ecosystems and legacy systems co-exist. Political change, more diversity at the geopolitical level, and separatist movements have enabled the rise of local communities into sovereign entities in the digital sphere. These state-like entities co-exist with nation states that have had to undergo transformation in the digitized world.

The notion of citizenship is a multiple concept, people are not only citizens of nation states based on their physical existence but also of self-sovereign digital networks, for which they can have multiple digital identities protected by zero knowledge proofs. Self-sovereign systems, which find themselves outside governmental space, have developed more advanced governance structures, including on-chain arbitration and on-chain DeFi insurance systems.

Biometric digital identities are conferred upon birth and automatically stored on-chain. Portable self-sovereign digital IDs are essential to navigate this multi-procedural world. These are not issued by one central government issuer, rather identity is linked to a person's DNA. However, some people opt out entirely from the nation state system and live off the grid, which comes with limitations and no direct access to goods and services.

The Metaverse is important, but there is not only one but a collection of metaverses that interoperate without any particular entity dominating them. People spend a lot of time there, but not all of their time. Most people switch between real life and the metaverse. However, some live in the metaverse entirely and when a pandemic or another global crisis hits, most people retreat into the metaverse in a more significant manner.

There are multiple legal systems, traditional ones and others created by bottom up communities. Sovereign states transition to wholesale CBDCs, which are necessary for certain requirements such as taxation and the production of physical infrastructure, roads and bridges and all that requires public goods production, which flows through governmental systems. Core societal functions still exist, despite a lot of activity taking place in decentralized and virtual spaces. Central banks exist as a lender of last resort structure. A whole variety of different kinds of digital coins exist alongside CBDCs, some are stable coins, some are floating value digital assets.

The bridge between CBDC governmental currencies and private bottom up digital assets are so-called money exchangers, which are not banks. They do not perform lending functions, instead they provide basic exchange functions. A subset of money exchangers has clearing accounts with the central bank, but have to adhere to stricter requirements, including capital requirements.

There is an abundance of data about each person and digital IDs connect all the data, which is not centrally controlled anymore. Advances in privacy enhancing technology allow people to "own" their identities. Central actors, such as governments are restricted from using social data in ways that might lead to more control and privacy invasion. However, for social scoring and credit scoring, there are data streams that are much more sophisticated and rich.

Scenario 4: DAO Mundus

(decentralized, integrated)

DAO-Mundus is a world governed by on-chain Decentralized Autonomous Organizations (DAOs). Due to citizens' increased lack of trust and search for alternatives, political institutions and nation states have seen a steady decline. Fully self-selected communities that are completely governed by DAOs prosper and enable individuals to have greater freedom and choice.

In a world where nation states no longer exist, or at least are less relevant, there is still a need for worldwide decision-making. Decision-making is more localized, and localized DAOs are integrated into what is termed the "UN-DAO", which makes the most impactful, world-wide decisions. The legal system has changed into a self-sovereign judicial system which no longer relies on any traditional legal systems or nation states at all.

In terms of economic changes, everyone has access to decentralized financial services, traditional banks have embraced crypto and have distinct DeFi products. Traditional corporations are on the decline and are being replaced by DAOs.

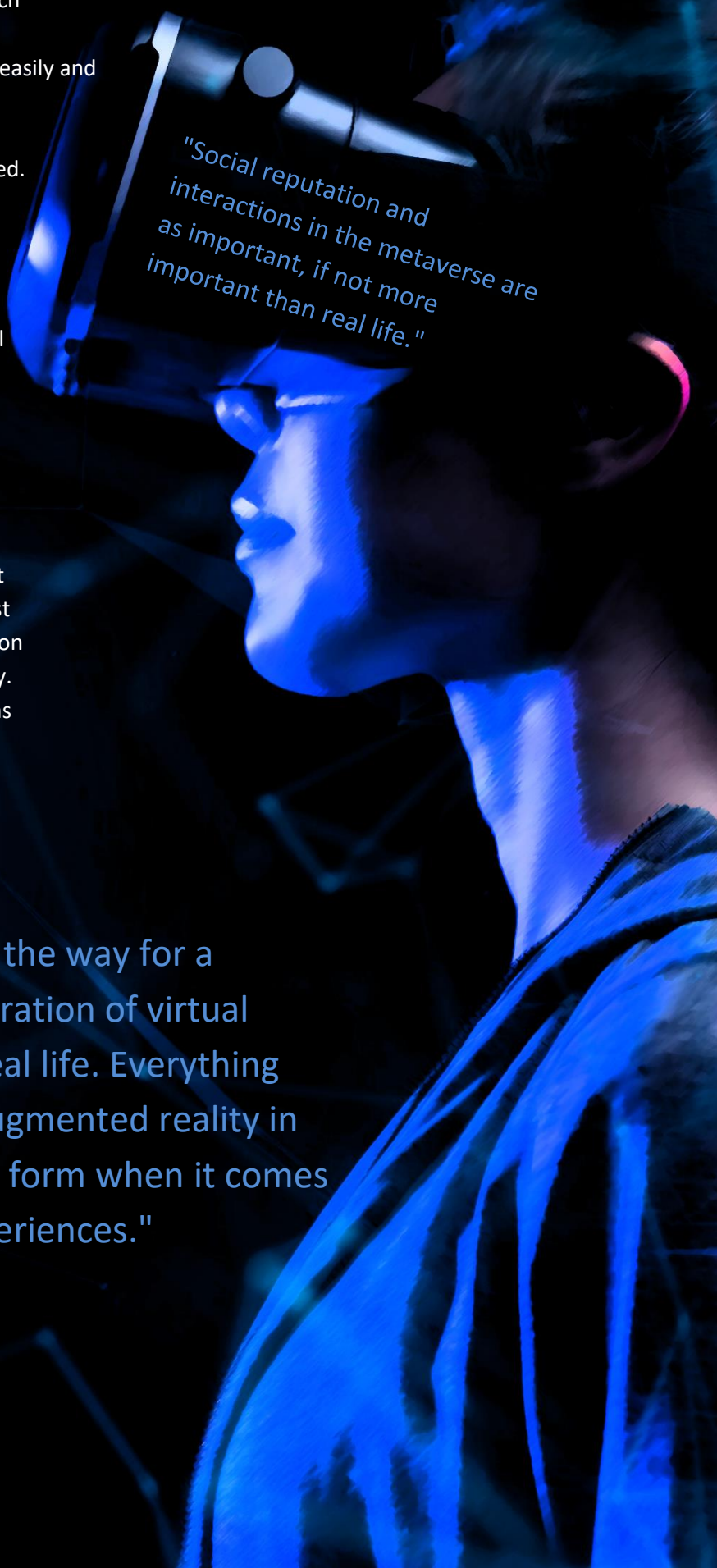
Any kind of FIAT currency that is not interoperable with the metaverse collapses. Crypto paved the way for a seamless integration of virtual realities and real life. Everything has become augmented reality in some shape or form when it comes to real life experiences. The most important social interactions happen in virtual realities, where people spend most of their time. Social reputation and interactions in the metaverse are as important, if not more important than real life.

Energy has become an abundant resource and zero knowledge proof-based privacy has become a reality. Genetic enhancements are commonplace, body parts are easily replaceable.

The decentralized and integrated model results in a powerful ecosystem that accounts for 80 to 90 % of economic growth. One of the reasons why economic growth happens much faster in virtual realities is because transactions can be carried out much more easily and seamlessly.

Everything can be commercialized and traded. A lot of economic activity relies on a return to a fully tokenized barter economy where one can exchange a tokenized apple share for bitcoin or some part of one's computer. This results in a completely novel way of asset management.

In terms of regulation, there are different levels at which regulation can be implemented. At the level of self-selected communities, laws are localized and at a higher level, the UN-DAO level, one may opt for certain kinds of regulations and laws, just like a government would. However, this vision is based on a high degree of self-sovereignty. Opting in and opting out of different systems can be done to a certain extent and much easier than in the real world.



"Social reputation and interactions in the metaverse are as important, if not more important than real life."

"Crypto paved the way for a seamless integration of virtual realities and real life. Everything has become augmented reality in some shape or form when it comes to real life experiences."

Key Takeaways and Recommendations

The point of scenario planning is to identify key fault lines, risks, and opportunities, not to envision exactly how the future will develop. None of the scenarios our participants described will be realized in full. Each of them contains elements that might either represent future opportunities or warnings about dangers to be avoided.

In all scenarios, technological development is not only rapid but accelerating even further. The metaverse, multiple metaverses and AR/VR augmented realities exist in a more immersive, reality-like manner and people spend much of their time in these. The two scenarios envisioned in the centralized dimensions are rather negative, one even bears fascist traits. While nation states have not disappeared altogether in the centralized worlds, their relevance has diminished considerably in the two decentralized ones, where they have largely been replaced by digitally networked communities. These communities face significant challenges, from establishing appropriate governance structures to the ways in which DNA-linked identity systems can be protected from hackers.

Among all the possible scenarios that could have been imagined, it was fascinating to see what each group came up with. However, Reg@Tech participants only had an afternoon and a morning to sketch these four different futures. According to Volkery and Ribeiro, "the potential of scenario planning to prepare public policy-making for the uncertainties and surprises of future developments and better manage complex decisions involving conflicting societal interests is clearly not fully utilized."[9] It can be useful to incorporate scenario planning into policy making and regulation, where experts can come together for a longer period of time to design a series of future realities.

Regulation in a fast-paced area such as blockchain is challenging because its effectiveness may be diminished by the time of its implementation. Moreover, unforeseen events can happen on either the political, economic, societal, or technological dimensions. Events in any of these areas can trigger radical change with significant consequences. Governments and policymakers need to make use of the best tools available to prepare and implement regulation in a strategic manner. Scenario planning may just be one such tool to be added to a regulator's toolbox.

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Reg@Tech 7 Participants

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- Jens Hachmeister (Deutsche Börse)
- Carole House (National Security Council) (Remote)
- Linda Jeng (Georgetown Law School)
- Josh Klayman (Linklaters)
- Michele Korver (a16z Crypto)
- Bianca Kremer (Wharton Blockchain and Digital Asset Project)
- Chris Land (Office of Senator Lummis)
- Caitlin Long (Custodia Bank)
- Sigal Mandelker (Ribbit Capital)
- Giovanna Massarotto (Penn Carey Law School)
- Patrick Murck (Transparent Systems)
- Marina Niessner (Wharton School)
- Aurelia Nick (MME)
- Kevin O'Connor (FinCEN)
- Michael Oh (FINRA)
- Saule Omarova (Cornell Law School)
- Lukas Repa (European Commission) (Remote)
- Daniel Resas (YPOG Law)
- Marco Santori (Kraken)
- Antoinette Schoar (MIT Sloan School)
- Nina-Luisa Siedler (DWF Law Firm)
- Valerie Szczepanik (Securities & Exchange Commission)
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- Andrea Tosato (Penn Carey Law School)
- Peter Van Valkenburgh (Coin Center)
- Kevin Werbach (Wharton School)
- Olamide Williams (Wharton School)
- Landon Zinda (Senate Banking Committee)

Endnotes

[1] Definition of Terms Used Within the DDC Pages, Data Distribution Centre, https://www.ipcc-data.org/guidelines/pages/glossary/glossary_s.html.

[2] James A. Ogilvy, Creating Better Futures: Scenario Planning as a Tool for a Better Tomorrow, Oxford University Press, 2002.

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[6] Joint Information Systems Committee (Jisc), The evolution of scenario planning, Jisc (2008), https://www.jisc.ac.uk/guides/scenario-planning/evolution.

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[8] Peter Bishop, Any Hines, and Terry Collins, The current state of scenario development: An overview of techniques, Foresight (2007), p. 11.

[9] Alex Volkery, Teresa Ribeiro, Scenario planning in public policy: Understanding use, impacts and the role of institutional context factors, Technological Forecasting & Social Change 76 (2009), 1198.

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