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SPECIAL REPORT

**Global Overview: The Milken Institute
Global Conference 2023**

**Shifting Tensions, Divergence, and
Convergence**

By: Jim Altenbach, CFA

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Shifting Tensions, Divergence, and Convergence

by Jim Altenbach, CFA

The 26th Annual Milken Institute Global Conference kicked off live in Los Angeles in May 2023. Over 170 panels and 500 speakers participated. Speakers included tech titans Eric Schmidt and Reid Hoffman, former NIH Director Francis Collins, former FDA Commissioner Andrew C. Von Eschenbach, historian Niall Ferguson, and other luminaries.

We present topics of interest to those with an eye toward growth, technology, and innovation.



The State of the Global Financial System | Part 1: A Conversation with IMF Managing Director Kristalina Georgieva



Video: <https://milkeninstitute.org/panel/14584/part-1-conversation-imf-managing-director-kristalina-georgieva>

Global Conference 2023 kicked off with a discussion of the Global economy between IMF Managing Director Kristalina Georgieva and Stephanie Flanders, Head of Economics and Government, Bloomberg News.

Crisis in Regional Banks:

Asked about the crisis in regional banks such as First Republic, Georgieva said she "expects more weaknesses to be exposed in the banking sector." Only hours before her Milken appearance, First Republic Bank was rescued by JPMorgan Chase.

(Update: Indeed, more weakness surfaced in November. On November 17th, Reuters discussed BofA's challenge with \$131.6 billion in unrealized losses, much of it in long term US Treasuries. Also, all the large New York banks have significant unrealized losses in their commercial real estate holdings.

*Similar to First Republic and SVB earlier this year, they all have significant unrealized losses in their long-term US Treasury holdings; enough to even render BoA insolvent. BoA, in a statement, minimized this risk by stating they are holding the bonds to maturity (Like we heard First Republic and SVB argue. **They don't state what they will do if depositors withdraw funds! It happens!**)*

Depositor withdrawals can happen fast as pointed out by the IMF's Georgieva. *Georgieva said what was **"noteworthy in the latest rescue was how quickly deposits moved away from First Republic and said the speed was partly due to the power of social media."***

The Path to Bank Weakness:

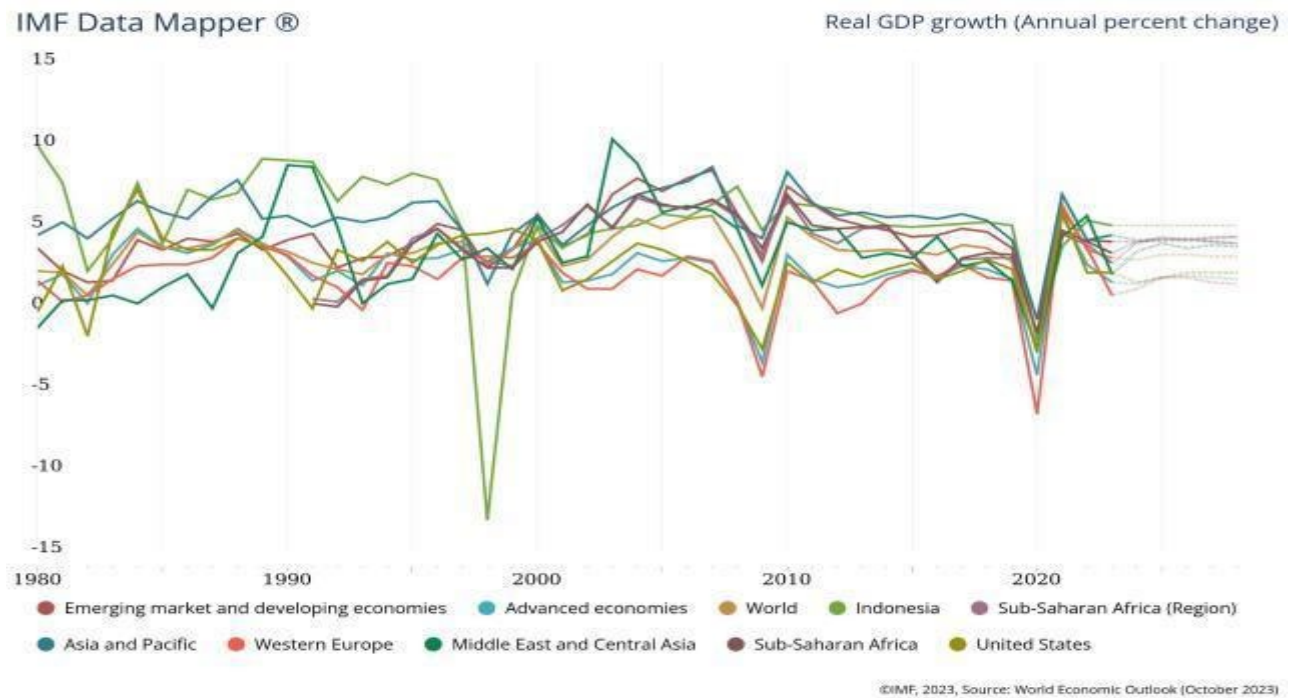
Georgieva said the quick transition from low to much higher interest rates played a role in uncovering weaknesses at certain banks. (For an extensive discussion on the cause of the banking crisis, see my interview with Dr. Bill Lee below. Lee argues the cause is a crisis in supervision by regulators and management.)

The IMF Director welcomed quick action by U.S. regulators to seize First Republic and find a buyer but noted that the resilience of the global financial system continued to be tested, with strains evident across several institutions and markets.

"Recent events continue to remind us of the challenges posed by the interaction between tighter monetary and financial conditions and the buildup in vulnerabilities in the global financial system."

IMF's Economic Outlook:

Regarding forecasts for the global economy, the IMF in April warned that the turmoil in the banking system will likely be a drag on economic growth, and that financial markets remained fragile and stressed.



The IMF lowered its growth outlook to 2.8 percent for 2023, and warned of further downside risks as stresses in the financial sector adds to pressures from tighter monetary policy and Russia's invasion of Ukraine.

(Post Global Conference in July, the IMF expects global growth of around 3% for next five years.)

Covid and Post Covid policy:

Asked about policy makers' response during and after the pandemic, Georgieva commended the banking and regulatory forces behind the global financial system, saying everyone should "think of the unthinkable."

She also noted the **role of resiliency** empathizing: *"In 2020, we were anticipating depression, but it did not happen. Resiliency is for real."*

"However, the policies still have consequences. There's more fragmentation in the world economy," Georgieva said. "Growth is slowing down but inflation is not going down as fast as we want it to go."

Global Inflation:

The IMF Director was blunt about the current state of global inflation and where it's heading.

"This year we expect inflation at 7 percent, whereas globally it was 8.7% last year. By next year we would still have inflation uncomfortably above target,"

Georgieva added: Like it or not, central banks have to sit tight and keep interest rates in a place where they can ultimately bring inflation down.

A China Decoupling?

Asked about trade relations between Western Group of Seven (G7) countries and China, Georgieva observed: "A complete decoupling might not be the direction China and the rest of the world seek," adding that she believes that "China does not want to self-isolate. They actually see the need to sit at the same table with the U.S., with everybody in the G7."

Economic Update:

(Update: Since Global Conference, we have seen market events discussed at Global Conference unfold. On October 30th, David Ranson, Director of Research, HCWE & Co. wrote in a Synopsis:

"Evidence for output growth in the US is ambiguous. Global prospects for higher inflation have increased in the last few months, over both a longer-term and a shorter-term horizon. First, the US dollar has accelerated its rate of depreciation relative to gold priced in distant forward

markets, the most stable of all monetary standards. Second, the price ratio between crude oil and forward gold is substantially below its historical norm, and has begun to close the gap."

Ranson explained, although there's no shortage of economic anxiety, market pricing for investment-grade debt still signals confidence that the US economy will not enter a downturn anytime soon. The yields on Baa and Aaa corporates have risen proportionally.

Regarding Inflation, Ranson added: "Month-to-month US inflation rates have accelerated as oil prices have risen.)"

The State of the Global Financial System | Part 2: Global Capital Markets



Video: <https://milkeninstitute.org/panel/14582/part-2-global-capital-markets>

Policymakers and executives are striving to make sense of how the financial sector will differ in the coming decades. Business models and behaviors of key market players will evolve and determine future directions of global capital markets. Digital asset policy, regulation, supervision, and enforcement will also continue to be top of mind. How are industry leaders priming themselves for change and continued growth? With the current market facing higher and more volatile inflation and interest rates, along with smaller central bank balance sheets, are we seeing market fragilities and asset bubbles? How do we see the financial sector evolving in response?

Evolving Financial Sector:

The panel explored how policymakers and executives are striving to make sense of how the financial sector will differ in the coming decades, asking questions such as, how are industry leaders priming themselves for change and continued growth?

Panel moderator was Stephanie Flanders, Senior Executive Editor for Economics at Bloomberg News.

Places to Safely Invest:

Flanders asked the panel if the rest of the world looks safer to invest in, rather than the in the U.S.

Robin Vince, President, and CEO of BNY Mellon responded, pointing out the importance of “getting through the debt ceiling” issue. He also pointed out the upside of inflation.

“Inflation is also a magnet for people to invest in the U.S. We have the deepest capital market in the world, a huge economy, and energy independence. Certainly, for the transition, it’s an incredibly attractive thing,”

Vince added, “If you’re a European manufacturing CEO right now, where do you want to make your investment in your next marginal plan? Diversify in Europe, go further east or invest in the deepest capital market?”

Global Bright Spots:

The panel identified the global bright spots, which included the Middle East.

“Japan, India, and the Middle East are in a dynamic change. It’s a big shift coming out of pandemic. Some of the flow dynamics are changing,” said Jane Fraser, CEO, Citi.

David Hunt, President and CEO, PGIM, echoed that sentiment saying, “globalization is entering a different, new phase.”

“We are going to have one where regional flows (originate from) many sources of capital like the Middle East, India and Japan. We are seeing momentum behind services and a more stable globalization picture,” Hunt said.

China Decoupling: An even better Hedge?

Flanders asked about China, directing that question to **Karen Karniol-Tambour, co-Chief Investment Officer at Bridgewater Associates.**

Some investors think decoupling has made China even more attractive.

Karen Karniol-Tambour, co-Chief Investment Officer at Bridgewater Associates explained: "For most investors in this room, the reality is our portfolios are U.S.- and Europe-dominated. China is the biggest possible source of diversification that's available to anyone in this room."

"And the more the conflict hardens, the more China actually becomes a little bit of its own universe with its own monetary policy and own fiscal policy," she added. "So, the diversification benefits, will keep being appealing to people, as where else can you put your capital and get something different?"

However, she agrees with the consensus that a complete decoupling would not be the direction China and the rest of the world seek.

China:

Karniol-Tambour's views echoed a discussion from a China panel at Global Conference.

On another panel, the issue of Beijing's tightening control over foreign businesses' data was posed to Yichen Zhang, who is Chairman and CEO of CITIC Capital and a four-term member of the National Committee of the Chinese People's Political Consultative Conference, the country's top political advisory body.

"Most of the global economy, especially in the West, is in lockstep with the U.S. economic cycles, and that's clearly cooling off right now," Zhang said. "But China, on the other hand, because of COVID, and because of the trade war, China is at a different point in the cycle."

"China doesn't have inflation, the interest rate is actually moving down, and it is the second-largest economy in the world," he said. "And this is going to be the biggest source of uncorrelated returns to the West."

(Update: On 11/27/23, UAE announced it will officially stop using dollars for oil trades. The dollar has been under assault as a reserve currency for a while. This was the latest country to make such an announcement.

Although there is a lot of global financial infrastructure that only the US controls for now, BRICS is expanding its commitment to offering an alternative to the dollar.

This challenge to the dollar's hegemony is accelerating. This movement away from the dollar is driven by Washington's abuse of the US dollar's seigniorage.

Policy makers must respond in earnest, otherwise it will become difficult for the US Treasury to finance its debt. Net Federal Spending must come down.)

Global Overview: Shifting Tensions, Divergence, and Convergence



Video: <https://milkeninstitute.org/panel/14465/global-overview-shifting-tensions-divergence-and-convergence-invite-only>

The history of the global political-economic order is one of constant change; sometimes this change is imperceptible. At other times, this change is abrupt. Over two decades into the 21st century, the world has experienced a global pandemic, heightened tensions around re-globalization, a land war in Europe, and increasing political polarization, which threatens to accelerate international divergence. Panelists examine these tensions and challenges and look to the opportunities that will shape our world in the decades ahead.

Panelist's top concerns:

Moderator Nicholas Kristof, Columnist, The New York Times, opened the session by asking panelists what worries them.

Michael Froman, Vice Chairman and President, Mastercard Strategic Growth; Incoming President, Council on Foreign Relations, remarked: "I worry about an accident in the US-China relationship, whether it's over Taiwan or the South China Sea or any number of other issues and the lack of communication and ongoing dialogue necessary to avoid those kinds of problems."

Kristof turned to Niall Ferguson, Milbank Family Senior Fellow, Hoover Institution, Stanford University, and asked him his thoughts.

Ferguson explained: "I worry about a **deliberate escalation** in the US-China relationship, **not just an accidental one**. I have been arguing for some time that we are already in Cold War II. We just don't quite know it. I asked Henry Kissinger about this, whose biography I'm in the

midst of writing, and he said to me late last year, the second Cold War will be more dangerous than the first because the technologies are even more dangerous than the technologies of the first Cold War. And we've moved beyond a simple nuclear arms race into domains that were unthought of, which of course artificial intelligence is the one that everyone talks about. But when I come here and have conversations about AI, it's mostly about all the awesome things it can do. There's much less discussion of its potential application to weapon systems."

New World Disorder?

Kristof asked Jane Harman, Board Chair, Freedom House; former US Congresswoman, what her concerns are. Harman commented:

"I wrote a book called "Insanity Defense" in which I argue with the erosion (or maybe implosion) of the Liberal World Order, we don't have a "next act" and the logical leader or co-leader of the next act is the United States. And ***what I worry about most is the United States harming itself with our dysfunctional politics and our total inability to innovate in government. Although we're innovative in the private sector, we need to be innovative in the government sector.***"

Tensions over Energy Transition:

Kristof turned to Mark Carney, Chair, Head of Transition Investing, Brookfield Asset Management Inc., who commented:

"From a global economy perspective, ***what I worry about is actually one of the consequences of what my colleagues on this panel just raised, which is this new world disorder or these tensions and in the world of the energy transition, two-thirds of the emissions come from the emerging and developing world.***

If I carve China out of that, that part of our world needs about a trillion dollars extra a year of external financing to make the transition. I worry about where that is going to come from. It only ultimately can come from the private sector, but it needs a world order which provides some de-risking and some base for that."

Fragility of Developing Countries:

Kristof then asked the Minister of Investment in Saudi Arabia, Alan Lan, what is it that you are concerned about?

His Excellency H.E. Khalid Al-Falih Minister of Investment, The Kingdom of Saudi Arabia, explained:

I am "***concerned***" about developing countries and the fragility of lower income countries. ***The World Bank has said that 91 countries are in debt distress already or thereabout. The lowest income countries are going to pay 16% of their government revenue this year just to service the debt. We've already seen some countries fall victim to rising interest rates, which are emanating from the USA, but are being felt around the world.***

We have seen that Sri Lanka, Lebanon, Pakistan, and Egypt have not defaulted, but they're in distress. Turkey, of course, and the list goes on.

"Most of the African countries are in need. The global community needs to be aware of this. Saudi Arabia has been helpful within the G20 framework. The IMF and World Bank need to be aware of this global risk that's emerging."

E.g., Climate initiatives, "I think the Developing South* adaptation is not getting enough funding and attention. All that attention or most of it is going to funding mitigation."

Countries in the Developing South are experiencing a lot of distinct types of emergencies. Some of them are significant portions of their GDP just to react to them.

And when you have to put 16% of your revenue to service your debt, it's a double whammy at a very critical time." *The Global (Developing) South is seen as home to Brazil, India, Pakistan, Indonesia, and China, which, along with Nigeria and Mexico, are the largest Southern states in terms of land area and population. The overwhelming majority of the Global South countries are located in or near the tropics."

Ukraine:

Turning to Ukraine, Moderator Kristof stated:

"Niall Ferguson, you write not only about global history, but you have actually been very engaged in Ukraine yourself. And so, I wonder how you see this?"

Ferguson observed: "I've been going to Ukraine every year for the last 10 plus years except 2020. I was there last year, and we will be going again this year. And there is nothing, frankly, more inspiring in the world today than the courage of the Ukrainian people. We write a lot about the heroic leadership of Vladimir Zelensky."

But Ukraine would not have survived the initial onslaught had it not been for the fact that ordinary Ukrainians, not just the professional soldiers, but the reservists held the Russians off on the outskirts of Kiev and there was a great deal of heroism. It strikes me very forcibly when I'm there and see ordinary people who had planned civilian lives for themselves who are now in uniform and they're fighting for their independence and democracy."

Ferguson continued: "But I'm also a historian, and when I step back and think about where we are, it seems to me that this fits in rather uncomfortably to my **Cold War II** framework. This war is the first hot war of Cold War II and the equivalent in Cold War I was the Korean War."

Now, in this case, ***we're not as directly involved as we were in the Korean War. However, the United States is absolutely crucial now to the Ukrainian war effort. If you just line up all the country's contributions, both financial and military, the US is overwhelmingly the most important source of support.*** And that means that Ukraine's ability to sustain the war is highly dependent on public opinion and the political elites in this country. ***And that is not a***

particularly great place to be historically reliant on the sustained commitment of the American political class and voters.

Ferguson added: ***"If the Korean War is the right analogy, this thing is going to run for a considerable length of time. By and large. Historically, if a war has lasted a year, the probability is that it will last more than one more year, and it will probably take at least two years to negotiate even an armistice, never mind a full peace agreement."***

"So this war will have to keep going well beyond the standard attention span of American politics. I mean, the American Media's attention span is measurable in weeks. I'd say the political class can maybe get to two years. So this is my great concern."

This is not an even fight. And remember, although China is not supplying lethal aid to Russia, China is supplying a lot of dual use support. China's extraordinarily important to the sustaining of the Russian War effort. And just as we now can't really afford to have Ukraine lose, I don't think China can afford to have Russia lose.

And in Cold War terms, that ensures that the war keeps going and it keeps going at a very destructive level because the hardware that's being supplied is extraordinarily destructive. There's a much, much more deadly war than anything we've seen in the last 20 years.

Ferguson warned: "And I'll end it there. With that note of caution, I'm wholly emotionally with the Ukrainians, but as a historian, I feel uneasy about how this is going to be dragged out and the immense destruction and loss of life that will continue to take place week after week after week."

Update:

Since the global conference panel, on 10/7/23 Hamas attacked Israel inflicting substantial loss of life. Israel declared war on Palestine with the objective to rid it of Hamas. Global tensions are rising with Iran and its proxy Hezbollah being blamed for supporting Hamas. China and the U.S. sending naval assets to the Middle East near Iran.

From European Dream to Reality



Video: <https://milkeninstitute.org/panel/14487/european-dream-reality>

The prospect of joining the community of European nations has always served as both a stick and a carrot for political and economic reform in Europe's near abroad. EU membership can help propel a modernizing agenda for politicians, while the prospect of entry to the European single market has often inspired reforms in candidate countries that would have been politically difficult otherwise. As Ukraine and others look forward to realizing a dream of becoming a "normal" European country, what lessons can be learned?

Remarks by NATO Deputy Secretary General Mircea Geoană:

"History – and Europe's history is no exception – is built between ideas, like the Schuman and Monnet idea, and shocks and moments of inflection of history. That's what human species, human history, and human geopolitics have always been produced by.

In February last year (February 2022), when Russia decided to invade Ukraine - and NATO knew they were about to do that - it was a huge shock.

It may not have been as much of a shock for Eastern Europeans because they knew that the imperial instinct in Russia never dies. But it was a shock especially for the Western European

friends and allies and members of the European Union and NATO and our German friends. It was a sort of a brutal awakening to a new reality."

"It was remarkable that this huge shock, this awakening in European nations - and across NATO and across the world - led to unprecedented unity among the Western alliance. Something Mr Putin never believed: He really believed his own propaganda that the West is weak and decadent. We proved to be strong and resilient."

He believed that Ukraine doesn't exist as a nation. And we have seen today a brave nation forged under war and becoming a beacon of freedom.

The Centre of gravity in Europe is moving Eastward:

There is also something that is happening in Europe. ***That the centre of gravity in Europe is moving Eastward.*** That's a complex statement. Because geopolitically, indeed, with Russia decoupling herself from civilised Europe - because they opted out. ***Ukraine is coming closer to us, Moldova and Georgia are coming closer to us, and so is the Western Balkans.*** In fact, the centre of gravity in Europe is moving Eastward. ***It's a new geopolitical geography in Europe as we speak.***

Transformation of Europe's Economic Model:

"But there's also a *much more profound transformation, it's of the economic model of Europe, not only the strategic model.* The fact that in Vilnius at the Summit, we hope that all Allies will accept to spend at least 2% of GDP for defence. And what Germany has been doing with this huge fund to re-constitute the Bundeswehr and your great nation's capabilities is nothing short of formidable."

What happens with the economic model? The fact that ***we are now out of the dependency on Russian gas, there is a strong operation for economic resilience in Europe, on supply chain reconsideration, on clean and green energy,*** on this realisation in Europe that we are not that doing that well on microchips and AI and quantum, the next generation of innovations.

"It's not only the geopolitical shock reshaping the architecture of Europe in security terms, with a stronger Europe with a stronger EU, which is good for NATO. This is not a zero-sum game: If the EU gets stronger, it's good for NATO, and the other way around."

New Balance of World Affairs:

"But I would say the most important consequence is the huge competition for a new balance in world affairs that is coming from this war in Ukraine. So for America - and in centuries for Europeans - we are seeing a superpower, which is China, hooking up to a declining power – Russia - and with a revisionist power like Iran and proposing to the world an alternative model of organising human societies from the one that we have built together in Europe and in America for the world, which is liberal democracy, and free markets, and capitalism."

"So, what we have today is just the tip of the iceberg. The war in Ukraine is an epic fight for which proposition will be successful and dominant in the 21st century: Between freedom and dictatorship, between free markets and the fusion between state and business."

"The way in which we address Ukraine and incorporate Ukraine in the political West will very much depend on the success of this broader operation."

"Ukraine is very important for Europe and the world because China and others are watching. And they are looking into how resilient the support for Ukraine is from the political West. And if the lesson they will learn - that the cost of doing something similar, let's say in Taiwan, is too expensive on the cost-benefit analysis, - they will probably refrain from doing this." If we stop or don't do a good enough job for Ukraine, the lesson they will learn is that force and aggression and military conflict pays. And this is something I believe would be bad for the rest of the world, not only for Europe.

Disengaging Authoritative Regimes:

Other panelists commented as well. During Q&A, the question was asked which related to the Secretary General's comments on disengaging authoritative regimes:

Question from the audience: There's been a lot of conversation today about Taiwan and China, and that one of the reasons why the US should be investing now in Ukraine is to send this message of deterrence to Xi. But there's a lot of concern, among DC lawmakers, about where our European allies really will be, when it comes to the unthinkable of China invading Taiwan. What conversations are happening within Europe and plans being made if something like that happens?

Benedikt Franke, Vice-Chairman and CEO of the Munich Security Conference responded:

There is not a common European position on China. However, Europe is waking up to the Chinese threat and challenge. Look at the language in the security documents that have been coming through the last couple of months.

"States are realizing that we must not make the same mistake with Xi's China, as we've done with Putin's Russia." I come back to this realisation of dependencies.

"This is now and will be an enormous change for investors and corporations.

For example, BMW is a great German company, and is making 47% of its profits in China. There is nothing wrong with making money in China, but not 47%.

If Taiwan is invaded, BMW will make less profit there, and it will endanger the entire company, with hundreds of thousands of employees in Germany and in Europe.

So all these companies are changing the risk calculus, and the government is trying to help find new markets in places like Africa and Latin America easier. This is happening, but it won't go overnight."

And I think ***the US assistance is crucial to cover the time between Europe getting its act together and Xi moving.*** I implore you and your Congressman to keep doing what you're doing. Surely Europe, including Germany, needs to provide even more, but if you fail to continue to contribute, we're in a really bad place.

A Conversation with Dr. William Lee, Chief Economist of the Milken Institute

By Jim Altenbach, CFA

June 01, 2022

The 26th Annual Milken Institute Global Conference 2023 kicked off live in Beverly Hills on April 30th to May 3rd. This year, we present a RealClearMarkets exclusive interview with Dr. William Lee.

Dr. William Lee is Chief Economist of the Milken Institute. Previously he was head of North America economics for Citigroup and was deputy division chief responsible for analytical chapters of the IMF's flagship publication "The Global Financial Stability Report." Before the IMF, Lee was senior economist and division chief of the financial markets division at the Federal Reserve Bank of New York.

I interviewed him on the sidelines of the Global Conference. We discussed the recent turmoil in the banking sector as well as capital access, health care economics, and the changing role of China in the world.



The interview was published in RealClearMarkets. I share it below with RedChip readers. For the original https://www.realclearmarkets.com/articles/2023/06/12/a_conversation_with_dr_william_lee_chief_economist_of_the_milken_institute_939829.html interview see:

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The Milken Institute

Altenbach: I attended the first Milken Institute Global Conference in 1998. It was much smaller then, with less than 1000 people. To kick it off, Mike Milken gave his iconic keynote speech "The Democratization of Capital." He explained that prosperity is a function of access to financial, social, and human capital. The Institute promoted policies that enhanced capital access.

Much has changed in 26 years, as the Institute grew. The Global Conference has 150 sessions and almost 3500 attendees. The Milken Institute has added several more research centers.

Will you bring my readers up to date on the current focus of research the Milken Institute pursues, and the research centers it supports?

Lee: The mission really has not changed, although it has expanded since 1998. We are still based on the **three pillars** that Mike has always emphasized: ***Financial access, healthcare, and philanthropy.***

His first love is financial markets and providing funding for businesses, using a unique form of finance, the way he did back in the days of Ted Turner.

The ***second pillar is healthcare.*** Mike has done a phenomenal amount of work creating the Prostate Cancer Foundation and the Milken Center for FasterCures. In fact, Mike just authored a book summarizing his recent thoughts on the need for accelerating the approval of drugs and encouraging medical technology to focus on the needs of a growing and aging population, not just in the United States, but around the world.

Altenbach: Mike has often noted that for just cancer, the discounted present value of an all-in cure would be worth \$30 to \$50 trillion. This includes the avoidance of all the shadow costs.

Lee: Yes, the costs associated with diseases are tremendous.

And ***the third pillar is philanthropy***. People who want to give money often ask the question; how do I know my money will have the desired effect? And how can I measure the impact I'm having?

The Milken Institute Center for Strategic Philanthropy designs a framework for people to be able to maintain accountability for the dollars they contribute to worthy causes.

Altenbach: What is your role as Chief Economist?

Lee: The Milken Institute has many good experts to do internal research. Mike likes to refer to us as an action tank. We bring the right set of people together from government, academia, industry, and finance, and sit them down at tables at events like this and ask the question, “so what's the problem?”

For example, why can't we get money to go from the places where people have the money to people who need the money? Is it government regulation stopping it like it does with the approval of drugs, or are there difficulties with financial markets where rates of return are not being measured properly?

“Getting people together to talk about problems in order to find workable solutions is really the magic behind the events that we hold.”

My role as Chief Economist is to promote the Milken Institute by providing commentary and analysis about developments in financial markets and economic policy at home and abroad. I have been interviewed by a wide range of business media including Bloomberg, CNBC, Business Insider, MarketWatch, and more general media platforms like the BBC, CNN, and CBS. As with all experts associated with the Milken Institute, all views are my own and do not necessarily represent those of the Milken Institute.

Bank Runs: Crisis in Banking Supervision

Altenbach: On March 13th you tweeted:

“This is going to be another example of ‘examining the open barn door after the horse was stolen.’ Regulators should have been calling out SVB's risk management incompetence and calling for executive firings long ago.”

Do you think the regulators did not know of the problems and were just incompetent, or do you think they knew and were just - for whatever reason – not willing or able to act in time?

Lee: *We don't have a banking crisis at all. We have a crisis in banking supervision.* I want to make it very clear to your readers that there's a very big difference between a regulator and a supervisor. Bank rules and regulations are enacted by Congress, regulating agencies, state regulating agencies, the Federal Reserve, FDIC, or the OCC. The supervisor's job is to not only enforce the rules to make sure that banks are functioning properly, but also to make sure that banks are truly operating soundly.

The case of Silicon Valley Bank is a good example where supervision failed to enforce adequately existing rules and regulations: Silicon Valley Bank was allowed to operate for nine months without a Chief Risk Officer. They were notified by the Federal Reserve supervisors that they did not have the right governance structure in place. Risk management was inadequate, and the organizational structure of the bank allowed this and other deficiencies to continue unaddressed.

Fed Vice Chairman Barr had said in testimony, "We gave them three written notices for taking action." One of those notices was for immediate action. Later, it was discovered that they had 31 open claims. So there, you have an example of the regulator saying, "I told them they were not doing the correct risk management." **Why didn't the regulators say "shut down" or get these incompetent executives out of their positions and put in capable people?**

Lee: *"After three notices, allowing SVB to continue to operate is unforgivable. And that is a crisis in supervision."* The Federal Reserve did an internal review of what happened; Why did they allow SVB to go on like this and do you know what the conclusion was?

They said that the atmosphere created by the Trump deregulatory legislation caused the supervisors to feel that they did not have the right incentive to enforce the rules strictly. "I'm sorry: That's ridiculous. That is conflating someone else's problem with yours. In other words, the fact that some banks were deregulated should mean that you had to be more vigilant in supervising those banks. Not less."

Altenbach: What is the role of the small medium banks and what risk do these failures create?

Lee: The bulk of American industry and manufacturers, get their financing through the capital markets by selling bonds and equities. The majority of the banking assets are in the big banks like Citibank, Bank of America, and J.P. Morgan Chase.

But the role of the small and medium-sized regional bank is very important even though only 11% of non-financial corporate financing is done through banking. "Commercial and residential real estate, as well as small and medium-sized businesses are highly dependent on banks to raise money. Banks are very important for these and other segments of the economy."

Lee: The American banking system is not like that in Europe or Asia, where banks account for the bulk of the transfer of financing funds between households and companies. Banks play an important role in the U.S., but a limited role. ***"The banks that have failed, failed because they were poorly managed. Their failure was not representative of a systemic problem. These specific bank failures do not jeopardize the banking system, nor do they jeopardize the US economy."***

Private Market Surveillance:

Altenbach: On March 16th, you followed up, commenting:

"A key part of bank supervision relies on **"market surveillance" by bank depositors**: Customers must scrutinize and hold bank management accountable because supervisors cannot be relied on to catch everything." E.g., the SVB Collapse.

It appears you believe there are other factors beyond regulatory failure. Can you explain the role of "market surveillance" by bank depositors? Isn't this function distorted by "moral hazard" on the part of the depositors?

Lee: That's right, moral hazard is a concern. When I was at the IMF, I worked on a report that they published semi-annually called the "Global Financial Stability Report." It was an assessment of overall financial risks in the global financial system. One of the fundamental principles of public-sector supervision and regulation of not only banks but also financial markets is that when people have a lot of money at risk, they will try to make sure that the institutions they deal with are safe.

People may have a tough time assessing whether the management at the Bank of America or JP Morgan is doing its job properly. But there are experts around who can help provide the required expertise. Equity analysts and fixed income analysts scrutinize the efficacy of company management and publish ratings of various banks. Many depositors and investors depend on such ratings to make sure banks are safe to deposit money.

Now, the FDIC has relieved us of having to do a lot of that job by insuring accounts that are under \$250,000.

But when you are a large company, that's a whole different story. You ask yourself, "Should I be doing all of my banking with this one bank?" You are responsible for doing the due diligence to assess whether, or not, the managers of that bank will be able to keep your money safe and are able to function the way a safe and sound bank should operate.

That is the role of what we call ***market surveillance, people doing due diligence, whether it's with their own expertise or buying the expertise to do the assessment for them, or to buy assessment reviews by Fitch, Standard and Poor's, or Moody's.***

When it comes to Silicon Valley Bank, how is it so many venture capitalists say, "Oh my God. I can't meet payroll because Silicon Valley went down." Why were they doing banking with that bank if they didn't know how badly it was run?

Altenbach: I thought a well-managed and well-hedged financial institution should be able to weather pretty much any economic environment.

Lee: Let's go back to "Banking 101." The very first thing you learn is asset-liability matching and duration matching. Banks make money by borrowing from depositors, and lending it out to people for mortgages, business loans, and so on. And the spread between the deposit rate and the lending rate is where the profit margin is.

Business loans are often three to five years duration, although some are for shorter periods like one-year inventory loans. However, mortgages are closer to 30-year loans. When you have many categories of loans on your books - on your asset side - you must match the duration of your book with liabilities that are of similar duration.

If you have a lot of short-term deposits funding long-term loans, that mismatch is a signal of something wrong with the risk-management system in place.

In the case of Silicon Valley and First Republic, the banks had an additional problem of having depositors who were wealthy clients who were very sensitive to interest rates. They would yank their deposit if they got a better return someplace else, like the bond market. And yet these banks continued to issue very low-rate mortgages and other low-rate loans to try to hang on to these customers. And that model just does not work.

Altenbach: And they invested in the long end. So, when the Fed started raising rates they got shellacked.

Lee: Exactly. And that's the basis of the mismatch in assets and liabilities. They just got caught flat-footed when rates went up. They said, "Oh my God. My money's locked in. I'm illiquid even though my credit is okay. All my assets are still worth face amount when the Treasuries mature."

But the market-to-market loss and the resulting loss in liquidity is what got the banks into trouble. As more and more depositors at these and other banks withdraw their money because they worry about the viability of small regional and specialty banks the Fed created a blanket lending facility to ensure these banks can get liquidity on demand in order to forestall a systemic problem. They said, "Look, you can take your treasuries that are underwater, come to us, and borrow money and you can repay the money once your treasury bond matures."

Regional and community banks:

Altenbach: I want to expand more on regional and community banks. Those have been important in that the business model of the larger banks is not set up to do the type of loans of smaller banks.

Lee: Yes, regional and community banks are really at the heart of the US banking model. It's the community bank and the regional bank that services small to medium size businesses. And so, your friendly neighborhood banker is like Jimmy Stewart in the movie "It's a Wonderful Life." He's the guy who's able to lend money to the barber shop, the bakery, and the dry cleaners when they want to buy extra machines, expand their facilities, or buy some inventory. That's where you (middle America) and many of your neighbors go to the bank.

Altenbach: Yeah, I remember that movie.

In the panic after Silicon Valley Bank collapsed in early March, some small and medium-size businesses, and individuals yanked their money from regional banks and deposited it with the biggest ones, seeking the security of their gigantic balance sheets and the government's implicit backstop of lenders deemed too big to fail.

Pertaining to small-medium banks, on March 19, you tweeted:

"Deposit runs on medium-small banks demonstrate the failure of "private sector market surveillance conclusively": this is a key supervisory premise bank regulators and the IMF rely on to cap deposit insurance and requirements for small banks."

Altenbach: What else could regulators and bank executives do to create long-term stability in regional and community banks?

Lee: That's a great question. No one's ever asked me that before and I'm glad you did. I said it was easy to check up on the larger banks because the rating agencies like Fitch, Standard & Poor's, and Moody's, would have published many reports on these large banks, but the smaller and medium-sized banks have less coverage by these experts.

There's a very limited amount of information available out there for smaller banks, and for people who don't have the expertise to do this assessment, how do we figure out whether the neighborhood bank is sound?

Well, the information is there. Every bank supervisor, whether a state supervisor, or the Federal Reserve has what they call **CAMELS** ratings. It assesses a bank on six standards: **C**apital, **A**ssets, **M**anagement, **E**arnings, **L**iquidity, and **S**ensitivity. Each bank is rated from 1 (Best) to 5 (Worst).

Unfortunately, **those ratings are considered confidential.** Now, ***“I think this is a place where the supervisors can help the public assess the quality and safety of their neighborhood bank if they release the CAMELS ratings to the public.”***

Some people object to this idea and say that if the CAMELS ratings are released and the bank has a bad rating, people will take the deposits out and by doing so induce that bank to be in distress. “Well, that’s the purpose of the supervisory work behind the CAMELS rating, to make sure that banks achieve a high rating with high quality management, adequate capital and liquidity.”

Re-Regulating Banks?

Altenbach: Some commentators have indicated it would help to re-regulate the banks, and to re-evaluate the "bail-in" provisions of Dodd Frank, as it creates an incentive for depositors to exit smaller banks at the faintest hint of trouble. Others say we need to reinstate Glass-Steagall, or at least the 're-separation' of investment and commercial banking. What do you think?

Lee: No, that is ridiculous. Regarding re-regulating the banks, the reason smaller banks were given easier treatment in terms of the degree of regulation is because it's very costly for these banks to answer all the questionnaires to all the stress tests demanded of their much larger and more complex peers.

Many of the banks are operating on very thin margins. More reporting and other regulatory burdens will limit their ability to service small businesses. **However, easier regulations on these smaller banks means it is even more important for the supervisors to do their job to keep an eye on these banks.**

Lee: Again, ***these banks did not fail because of a loss of confidence in the basic regional or local banking model. It was a failure of the managements of these banks to execute their business model in a viable way.***

Regional banks are important because they service the small and medium sized businesses and communities. That basic business model is successful, but it can only

work if the banks have the right risk management in place. **And we have failures when banks don't have risk management.**

“It is a failure of management, a failure of supervisors, and a failure of all depositors to perform due diligence. Making public CAMEL ratings will help the public be able to do market surveillance.”

Monetary Policy: Inflation vs. Recession

Altenbach: Regarding monetary policy and the risk of recession versus inflation, do you view inflation as being more sinister than a recession?

Lee: The Fed has a dual mandate of price stability and full employment. I spent 12 years at the Federal Reserve Board, another five years at the Federal Reserve Bank of New York as division chief, and 18 years at the IMF. Most of my attention was focused on how financial markets react to policy changes—especially changes made by the Fed.

The mandate of every central bank around the world is price stability. In the United States, it has an additional mandate of full employment. The United States Federal Reserve treats both objectives equally – although sometimes one gains in importance over the other. The key consideration at any moment is what are you most afraid of?

A recession is like having a heart attack. It's a sudden shock to the economy where a lot of people are thrown out of work. The economy is disrupted, and you must resuscitate the patient quickly.

The case of inflation is like having cancer that slowly erodes the ability of everyone to make ends meet. It reduces your ability to feed your family. Inflation makes it difficult to just be able to live a normal life.

So, getting rid of cancer and resuscitating a heart attack are two very important things. And the Fed must do both.

Right now, we don't have a recession, but we are suffering from a growing cancer of high and surprisingly persistent inflation. And what the Fed must do is prevent inflation from getting higher.

Both disinflation and deflation occurred during the 15 years before Covid-19. Then suddenly during Covid-19 supply lines were cut off. Then the war in Ukraine occurred and completely messed up the economies of the world. That caused prices to shoot up like crazy.

Also, we (the economies of the US and Europe) put in so much fiscal spending and fiscal stimulus that even when the supply lines came back in line again, there were not enough goods and services for people to buy. That's why we're suffering from inflation because of policy errors in terms of shutting down the economy too quickly and putting in too much fiscal stimulus that pushed up prices.

China:

Altenbach: You do a lot of research on China. What is China's role in the global economy and what is China's new policy? What are the implications for Western investors?

Lee: That's a great question. China has been a miraculous engine of growth for the world economy. For almost a decade, China has grown substantially and became the manufacturing hub and source of low-cost goods for computers, electronics, t-shirts, and automobiles for the world.

But now China has shifted its policy focus. President Xi Jinping has announced that China no longer will be a source of low-cost manufacturing. They want to move up the value chain. They want to be the leaders in artificial intelligence, pharmaceuticals, and biotech.

China's policy toward Western investors has also changed: Foreign investors are welcome to invest money into China, but it must be used to develop China's own national companies, so they can be at the forefront of these fields. China no longer welcomes foreign companies just selling goods to their domestic marketplace without developing domestic companies.

Western investors are reassessing whether China is still the best place for manufacturing. Many conclude it has become too expensive to produce many products there. So, many companies, including Chinese companies, have moved to other parts of Asia like Vietnam and Malaysia.

And the Chinese have put in place policies that encourage focusing on boosting domestic consumption of domestically produced goods and services.

So, the source of Chinese stimulus for the rest of the world, including parts of Asia and the United States, will come from the consumption by the Chinese of numerous services. The rest of Asia will be benefiting from the exodus of a lot of the Chinese manufacturers into those economies. And that's where a lot of American investments are going to have to refocus on. We are at an important crossroad with China. Western investors have to decide whether they want to invest in advanced Chinese companies that may become competitors in the US and other Western countries. Competition is generally a good thing—but sometimes national security and other factors must be considered.

Altenbach: Okay. Thank you very much. It's been a pleasure.

Lee: Alright, thank you. Jim. Good talking to you.

About the Author:

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Advancing A Thriving Future in Health | Part 1: FasterCures: Accelerating the Future of Health



Video: <https://milkeninstitute.org/panel/14559/part-1-fastercures-accelerating-future-health>

To mark the occasion of FasterCures entering its third decade, join the organization's current and founding leadership to look back at how far medical research has advanced—and to look forward to what's ahead as we continue to break down barriers to progress and accelerate medical solutions.

Esther Krofah is Executive Vice President, MI Health, Milken Institute. She served as panel moderator. She opened with sparking a conversation about medical research and advances in public health with Michael Milken, Chairman, Milken Institute, and founder of FasterCures, and Andy Von Eschenbach, President of Samaritan Health and former FDA Commissioner and former Director of the National Cancer Institute (NCI).

Faster Cures: Accelerating the Future of Health:

She and Milken discussed Milken's new book, "Faster Cures Accelerating the Future of Health," where he describes his work over 50 years to eliminate barriers, create team science and accelerate progress for all life-threatening diseases, but also touches on the accomplishments of FasterCures.

Milken observed: We have all but eliminated Polio. We have eradicated smallpox and greatly reduced the burden of heart diseases. But unfortunately, the system that made all that progress possible in the last century is still stuck in the last century.

"If you had picked up somebody from 1960 and dropped them into America in 2003, they wouldn't know they made the trip. Nothing had changed. Faster Cures was the first organization that was here to serve all the other foundations. We were here to help everybody else save lives. The way that we like to solve problems is by bringing people together, and we do that in a variety of ways."

We bring together different stakeholders to collaborate policy initiatives to bring about solutions to medical challenges. We have it in our power to have better hypotheses from the get-go if we use everything that we're learning together today.

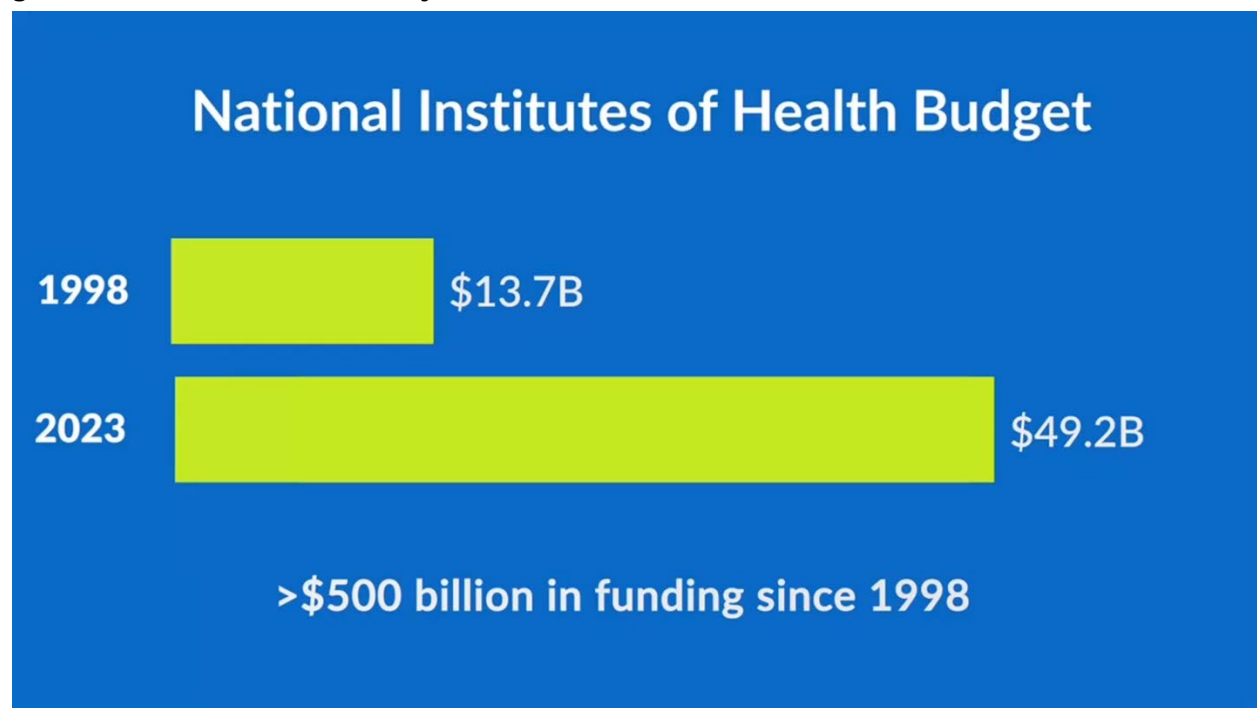
"Putting patients first is behind everything else we did. We finally got all the foundations and medical institutions to come together. ***Now medical institutions put all patients first too, not just their own. This is not a zero-sum game.***"

Recommendations for medical research and funding:

Esther Krofah observed: We've developed hundreds of reports over our decades that provide very specific recommendations on key challenges in the medical research ecosystem.

Funding is critical (although it not the only thing that matters, as we'll see below.)

Michael Milken emphasized: "***It's quite possible that the investment in bioscience in the United States has done far more than all the foreign aid that the United States has ever given out in the last hundred years.***"



As we've increased the quality and length of life for every single person potentially on this planet. We're all impacted by disease, and we all want to find a cure. This had bipartisan support."

Sense of Urgency:

Krofah noted: when you or a loved one is dealing with serious illness time is against you.

Milken personally experienced this sense of urgency as he had different members of his family diagnosed with disease, whether it was his mother-in-law with breast Cancer, his father with Cancer. It was epilepsy with his children. That sense of urgency came across as Milken decided he was not going to wait for medical research to come to him. He was going to create the research that his family needed.

Krofah noted during this period Milken met Andy Von Eschenbach. She asked Andy Von Eschenbach, President of Samaritan Health and former FDA Commissioner and former Director of the National Cancer Institute (NCI) how he met Milken and how they started a journey to change the medical research landscape.

Eschenbach responded: Around the early 1990s, "on a Sunday afternoon, I got a phone call, and it was Mr. Milken. I had a series of patients at MD Anderson that were doing exceedingly well with prostate cancer that had spread to lymph nodes. And Milken said, can I come and see you? I said I'd be delighted to see you, but it's not a very good time because I have this international conference on prostate cancer and I'm going to be preoccupied. He asked, can I come? And I said yes."

Mike intensely took copious notes.

"When the conference came to a close, I was pretty elated. I thought it was one of the best conferences on prostate cancer.

I asked Mr. Milken, 'what did you think of the conference?' And he said, ***'That was an absolute disaster. if that's just the way you do things, patients are all going to be dead before you ever get to the point of solving this problem.'***

Reinventing and Restructuring Medical Research Processes:

"And from that moment on, I know what he (Mike Milken) did." He left and then went to every other cancer center, Hopkins, Sloan Kettering, et cetera, and then I got a phone call from him and he says, I'm going to fix this. I'm going to start a foundation and we're going to call it CapCure. Will you help? And that began a relationship in which this man not only changed my life but changed the life not only of prostate cancer patients, but as you'll hear, it's now prostate cancer led but not prostate cancer centric."

As for Mike Milken, he was able to relate to the frustration with the slow pace of progress and he knew it didn't have to be like that. He could sense the urgency as he had been diagnosed with advanced stage prostate cancer. He also related to the time when his father was ill with Cancer.

Krofah probed into *Milken's critique of Eschenbach's conference that day they first met. **What was wrong with the research processes Milken observed?***

Milken replied: That experience with my father "**was ingrained in me that this existing system could not move fast enough.**" And that's what I told Andy. There was not one person from Memorial Sloan Kettering at this meeting that **Andy had brought the greatest people from all over the world to. And I asked Andy, why isn't Memorial Sloan Kettering here? Andy told me the people at MD Anderson think they're a competitor. I told him not to a patient and the idea that we're going to have major meetings around the world in any disease category and you're not going to write research going on at different academic centers because you think of them as competitors was going to be history."**

As we hinted above, money is critical but it is not the only thing that matters. Poor research processes can consume vast amounts of capital with little yield. Concise research processes can magnify the yield from precious research funding. Milken advocates both increasing funding and streamlining processes starting with the grant application process

Streamlining Research Processes

Krofah interjected: "Andy, regarding that conversation that night with Mike when he said this meeting was a disaster though from a scientific perspective, you were excited about that meeting.

How did that for you transform how you thought about changing medical research with your time at NC I? How did this change the landscape in the last 30 years in cancer and medical research?

Andy Eschenbach responded: Mike analyzed our research processes. The way research was being conducted and carried out, scientists applied to the NIH and to the National Cancer Institute with applications that were usually a couple feet in thickness.

"Most of the work had already been done in some way. You were ready for the grant, and it was things that your peer's thought were consistent with conventional thinking. So, they would approve it and then you had to sort of use some of the money for your next idea."

Michael looked at that and said, "we need to reverse that. We need ideas and we need them quickly. So instead of big thick applications, months to prepare, months to review, I want five pages. Five pages of your best idea. We're only going to give you the money for one year. You're going to have to come back and tell us what you've done and what you've accomplished and then we'll continue that cycle."

"So, what Milken put in place with CaP CURE (now known as The Prostate Cancer Foundation, was formerly known as CaP CURE) was at the time revolutionary. And it did change the whole trajectory and accelerated our ability to bring forward innovative new ideas and also at the same time continue that momentum. And so, what evolved from Cap Cure was a profound change in the way we think about research."

Now we're seeing organizations like ARPA-H come into play to compliment what goes on at the NIH. (The Advanced Research Projects Agency for Health (ARPA-H) supports transformative research to drive biomedical and health breakthroughs.) That all began with Mike Milken's vision of how we need to do things differently.

Idea Sharing

Milken added: "It was interesting when I went around, people told me they couldn't divulge their work, because it was going to be published in Nature or Cell.

I told them that was fine if they couldn't share their work, because if it was so groundbreaking, they would've no trouble raising money.

We were only giving money to people that wanted to share with everyone else so we could get what was going on at the beginning out to a whole group. And within six months, everyone decided they could share. In 1995, the first ever real meeting we had was focused on cancer.

Increasing NIH Funding:

Milken continued: "I stayed up almost all night with Dr. Lee Hood to try to think how could we change the paradigm here? And Cap Cure stood to cure all cancers including prostate cancer as well as all Life-Threatening Diseases."

"Everyone had been trying to increase the size of the NIH budget, with thousands of very talented people working on it unsuccessfully. What I saw was that you had these hundred thousand different disease groups all out there talking. And so, what we did is we told everyone we're going to double funding. Our commitment is we will work to double the funding for every disease, whether it's Parkinson's, whatever it might be. But we're going to focus on cancer because in the early nineties, if someone heard you were diagnosed with cancer, they assumed you were going to die.

We focused like a laser on members of Congress in both the House and the Senate, as well as the Administration. *We put on this march in Washington DC - the MARCH TO CONQUER CANCER RALLY on September 26, 1998 - that brought **half a million people from around the world, to DC to push lawmakers to commit to "no more cancer."***

The other organizations understood that they would all benefit. And a couple months after the march, the President Clinton signed into law the doubling of the NIH budget and the next year we enhanced ability for cancer research. So, more funding and enhanced research capabilities for all diseases.

The next year 'quick fast track' approval was passed, that is if something was working in phase two, you didn't have to go to phase three for certain cancer treatments.

National Center for Advancing Translational Science

We advocated and secured a half a trillion dollar increase in medical research that's accrued since then.

However, it wasn't forever. We needed to jumpstart it again. We did that with the creation of the **National Center for Advancing Translational Science** with Francis Collins. (Note: While basic research in the biomedical field seeks to 'understand', translational research seeks to 'fix'. **Translational research, or 'use-inspired' research, *builds upon basic scientific research synthesizing knowledge to design a new or improved drug, device, diagnostic, or behavioral intervention.***)

Francis Collins said we needed this new center at the NIH. It was slowing it down with basic research here and clinical there, and we needed to create this translational center. Because of the enormous confusion in the country on healthcare at the time, we concluded we really needed to target the Senate majority leader Harry Reid and the majority leader in the house, Eric Cantor to get support from the President.

The National Center for Advancing Translational Science was created and subsequently played an extremely important role during Covid-19. We proved it is possible to mobilize change.

The Future of Medical Science:

Esther Krofah asked about the future of medicine. She asked Andy, "What are you the most excited about in the direction that science is taking us in the next five years? What are you the most optimistic that we can see differently than that we do today?"

Andrew Eschenbach replied: *"I think one of the most important things we're seeing is the fact that discoveries in one disease can really shed a lot of light on mechanisms that are operative. And it turns out what are seemingly very different diseases at a phenotypic level, when examined at the mechanistic molecular level, are very much the same. You can see the development of a drug to stop the growth of blood vessels for tumors turns out to be one of the best drugs for wet macular degeneration of the eye. So, I'm excited about one of the things that Michael is driven by is this idea that progress in prostate cancer can be a catalyst for progress across not just other cancers but all other diseases."*

Michael Milken observed he is excited that by using technology we can cure people of advanced life-threatening diseases in our own lifetime.

Advancing A Thriving Future in Health: Part 2: Global Trends in HealthCare: The Challenges of the 22nd Century, Today



Video: <https://milkeninstitute.org/panel/14552/part-2-global-trends-health-care-challenges-22nd-century-today>

Remarkable innovation in the last several years has addressed many healthcare needs around the world. Technology platforms and scientific breakthroughs are enabling improvements in the development of medical products, public health measures, and the delivery of health systems and interventions. However, far too many people are still left behind. What's the most efficient way to break down barriers and accelerate biomedical research? How can we strengthen public health? What are the most innovative solutions proposed to advance a healthy society? Leaders in health care will discuss these topics, challenging the status quo and predicting likely progress for the coming decades.

Michael Milken, Chairman of the Milken Institute opened, "Anyone in the shower can have a vision, but it takes people to execute those visions. Today we will hear from people on the front line of executing what is needed in global healthcare in the 21st century."

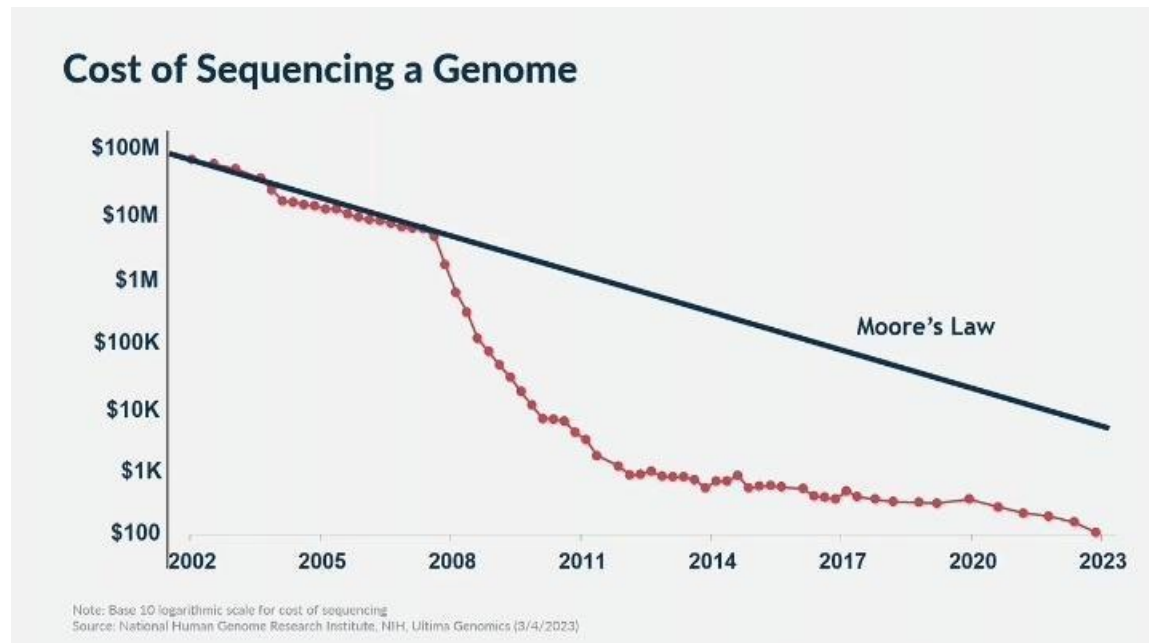
Healthcare is the largest driver of the economy in the world, the extension of life and the improvements and the quality of life that it offers. We've seen more than a doubling of life expectancy in a century, and for some countries in Sub-Saharan Africa, we're going to see a doubling of life expectancy in one generation."

Human Genome:

Francis Collins is Head of Molecular Genetics Section, National Human Genome Research Institute and the Former Director, National Institutes of Health.

In the early 90's, Collins had been working on an assignment that was supposed to take 15 years to sequence the human genome that would change the world as we knew it. He finished a couple of years early.

Sequencing the human genome used to take decades and cost billions of dollars and now takes only hours and costs less than one hundred fifty dollars.



Sequencing the Human Genome



2003:

- **13 years**
- **\$3 billion**

Today:

- **A few hours**
- **Less than \$150**

Milken stated: "Francis, can you touch on two areas to start, one, Hepatitis C and two, the potential in Africa. The 20 countries in the world with the highest birth rates are all in Sub-Saharan Africa. Two thirds of everyone that had AIDS or HIV is in Sub-Saharan Africa.

The UN is projecting an increase in population of two and a half billion in this part of the world and these people hold the key in many ways. If we can get them engaged into the system of data collection and implementation and bringing care to this part of the world, we can have an enormous effect on all our future.

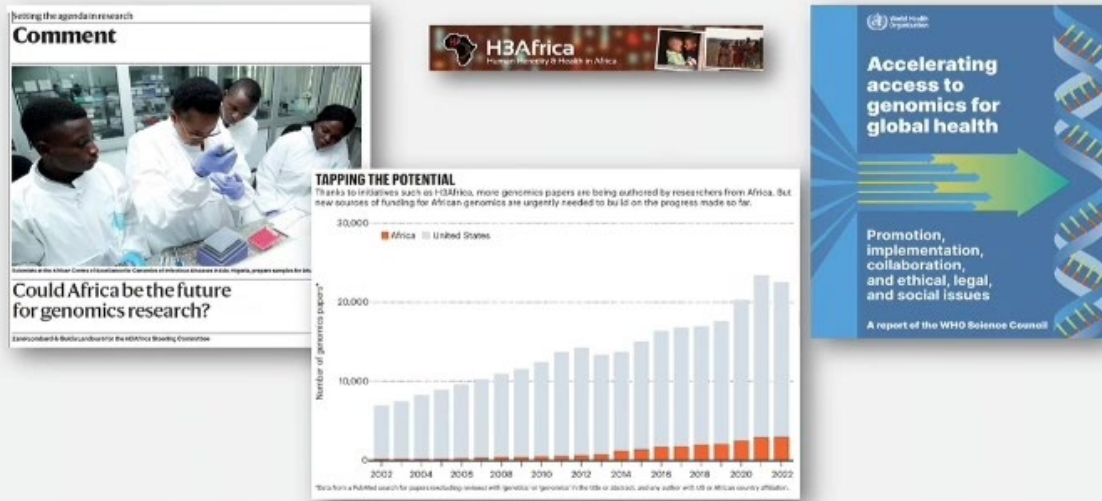
Milken then asked Collins, you can talk about any topic you want, but I would love you to just touch base on those two in your talk. Francis. "

Africa's Unique Role:

Collins responded: "Africa is where most of the young people on the planet are going to be in the coming years. We want to be sure we're taking advantage of that talent, providing the kind of workforce opportunities to drive the health of Africa forward. We know that's the best thing that can happen for their economics."

"Some people say Africa is not well positioned to jump into something like genomics. Collins then showed this chart:

Africa is growing in strength in genomics



They would be wrong because over the course of the last 12 years with projects like Human Health and Heredity in Africa (H3), it has in fact been the case that there is a rising tide here of capabilities across the continent. The article you see there was in Nature a couple months ago."

The graph you see there is publications in genomics. while you can see most of those publications are not from Africa, the rate of rise of the Africa red bars is steeper than the United States. And the capacity that is now there in 30 countries that have genomics capabilities became really important during Covid-19.

Genome experts in South Africa are way ahead of the rest of the world in terms of determining what was going on.

The capacity has been growing there quite rapidly, so it's time to take that to the next level.

"Genomics is after all so central to everything that we would like to do, not just for pandemics, but also for common diseases, such as Cancer."

"I want to tell you about the Genomic Centers of Excellence (GenCoE). It is primarily, driven by African scientists saying what they think would be appropriate here. The idea is to have eight to ten centers. Those are the leaders who are primarily driving this. I'm a cheerleader, but these are amazing visionary folks with a lot of experience in this space."

Going to the next level...

Proposal: an African genomics “moonshot”

Genomic Centers of Excellence (GenCoE)

8-10 Centers, competitive across Africa

“Hub and spokes” model

Coordination Center is in the Africa CDC

Create capacity for multiple projects, data sharing, training, use of common standards

Require host country support/cost-sharing

“From donorship to ownership”



"In terms of the applications that could go in this space, certainly pandemic preparedness is one of them (See slide)."

Potential Applications

Pathogen genomic surveillance network

- Pandemic preparedness
- Vaccine development
- Vector control

Genomics to inform precision public health

- Newborn screening
- Therapeutics – sickle cell disease
- Genomics of non-communicable diseases
- Pharmacogenetics
- Drug discovery
- Achieving an AIDS-free generation

Workforce recruitment, training, retention



As Mike was saying earlier, we are going to be deeply sorry if we slip from panic into complacency about pandemics because this one isn't even over yet, and others are lurking out there. So, you need to have that preparedness. These centers would be a wonderful place to anchor that.

"Vaccine development could certainly take place in a center that has these kinds of skills and vector control. But genomics on a broader scale beyond infectious disease, can be used for

newborn screening, which we're now doing in the US and finding it possible to make diagnosis in 48 hours sometimes for a newborn that has a puzzling circumstance with immediate therapeutic implications.

Sickle cell disease, a passion of mine, the first molecular disease for which we now have a cure, but it is very complicated and very expensive, Collins explained.

Collins continued: **Let us figure out how to make that something in a low resource setting and with a single outpatient clinic visit. I think that's achievable.** That is something we're doing with the Gates Foundation right now.

Applications of genomics:

These centers would be a place to **bring into reality cures and treatments using genomics of non-communicable diseases, certainly cancer, and also cardiovascular disease and stroke.**

There are many opportunities in ***pharmacogenetics figuring out how to adjust the choice of the drug for the individual by taking full advantage of the fact that genomic variation in Africa is different than in Europe. Africa is the cradle of humanity.***

There is more genetic variation in Africa than anywhere else. We need use that effectively as this will help with drug discovery. And finally, let's just say PEPFAR has done an amazing thing, saved 25 million lives in Africa by making antiretrovirals available and people still must take them for the rest of their life.

In addition, there are ideas on the table about how to cure HIV-AIDS, even using CRISPR to find those particularly well-hidden viruses in a reservoir somewhere and zap them and make it possible.

"The infrastructure for H3 Africa has made it primed and ready to go. And this could be one of the most transformative things we do for the whole planet with implications that would not just benefit Africa but have all kinds of benefits around the world."

Milken interjected "**we also have a cure for prevention for Hepatitis C.** Where do we stand on this issue?"

Collins stated: "This is one of the great achievements of biomedical research. Seven years ago, **the FDA approved a simple oral medication for the most common cause of liver cancer, Hepatitis C. The medicine is one pill a day for 12 weeks and has almost no side effects. The cure rate is 98%. And when you are done with your 12 weeks, you're done. The virus is gone, you are cured.**"

But the cure is not reaching everyone. "*A lot of people don't know they have this. It's a silent killer. You would not know you had symptoms until it's already been in your system for a long*

time doing really a lot of damage to your liver fibrosis, cirrhosis and liver cancer. It's clunky making the diagnosis.

We need a point of care test so that you can have a test done on the spot and if you're actually in need of the treatment, here's your bottle of pills." **Currently, testing takes multiple visits and is very expensive, initially \$90,000.** A pharmacist, with a little bit of training could readily do that test and treatment protocol. Until then, many members of the populations who need this are often underserved.

ARPA-H:

Renee Wegrzyn is Director, Advanced Research Projects Agency for Health (ARPA-H).

Milken asked her: "Following on the concepts of DARPA, you are the first person to ever lead this group. What attracted you to it? What were you doing before and what do you need from us to help make sure you're as successful as possible to change the future for medicine?"

Wegrzyn explained "We really have a chance to get this right and take these big bets. And we started to talk about what this could look like. What organization could launch moonshots for all diseases be? And how is this different? How is it similar to DARPA? I was very excited to take on the challenge of building an organization inside of government. The way that we're structured, we are housed inside of NIH, so we have the advantage of all of that infrastructure that we can leverage, but also of course the subject matter experts."

"We're here to catalyze the entire ecosystem. So, when we take those big bets, they are transactional. ***We are here to fund something that's so big, so audacious that the commercial sector won't take it on because it's too risky. The rest of the federal funding ecosystem also won't take it on. And so, we're there to kind of create that spark, show that something is possible, and then transition it out of ARPA. So, success for us is when something actually graduates and goes into the real world and delivers on our mission, which is to accelerate better health outcomes for everyone.***"

ARPA-H: The Mission

ARPA-H accelerates better health outcomes for everyone by supporting the development of high-impact solutions to society's most challenging health problems.

-  **Open BAA** - calling for proposals to outline breakthrough research and technological advancements
-  **RFI**: Accelerating Innovation through ARPA-H and FDA Collaboration - to encourage and incentivize public-private partnerships in the health ecosystem
-  **ARPA-H Dash** - launching to identify revolutionary evidence-based ideas to transform health.
-  **Site Selection** - ARPA-H seeks to establish sites in three geographic locations across the United States through the pursuit of a hub-and-spoke strategy.

Our top priority is to **hire the Program Managers** that will bring well-defined problems to ARPA-H and build the teams to solve them.



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In the last six months, we've been busy building the organization. I tell my team we have achieved minimum viable agency status. What this means, we have the contracting teams, we have our legal teams, we have all the pieces in place to serve our program managers.

And so that is a really important part about our model for you to understand is that I don't set a technical agenda of these are the programs we're going to fund. These are the diseases we are going to tackle. Instead, we look for highly motivated people from outside of government, outside of the organization who have a big problem in health that they want to solve. These people are doers. They think and act like CEOs, they pitch us their idea, and they want to come for a term appointment to ARPAR to make that a reality. When they pitch this idea, we go back and forth a little bit, shape it to make sure that we're going towards deliverables that we think we can really impact very clearly health outcomes. This can be a cancer project; it could be a tools and technology or platform that could touch a number of diseases.

Wegrzyn added: "We are agnostic, but we're looking for those exciting ideas. And so, I hope to hire 20 program managers this year."

Global Fund to Fight AIDS, Tuberculosis and Malaria

Peter Sands is Executive Director, The Global Fund to Fight AIDS, Tuberculosis and Malaria.

Milken asked him to discuss issues relating to AIDS, Tuberculosis, and Malaria.

Sands responded: There are a lot of new lessons we have learned from the COVID-19 pandemic, but actually most of those lessons are essentially a refresh of what we learned in responding to the HIV AIDS crisis. The Global Fund was created primarily in response to that. It was then we decided to pick up what were then the two other biggest infectious diseases, malaria, and tuberculosis.

Sands emphasized: **"one of the lessons that was learned is that no one country or no part of society can solve these big infectious diseases on their own. You need countries working together. You need the private sector, you need civil society, you need governments, research institutions, and so on. We learned that all over again with COVID-19. It doesn't work if you don't bring together the full power of society."**

"Global Fund got very involved in the global Covid-19 response. Obviously, the spotlight was on vaccines, and that was led by our colleagues at COVAX. We facilitated deployment of billions of dollars' worth of diagnostics, PPE, therapeutics, and oxygen to support countries in their response."

"A second thing I want to highlight because I think it gets lost a little bit **sometimes when we're talking about all the sort of wonderful new biomedical tools, is that *you actually need the underlying systems as well. Vaccines or treatments don't get to the people who need them by themselves. They get to people through a system.***"

And, in most countries, health systems, both rich and poor, didn't exactly do a great job in responding to COVID-19. There are real lessons to be learned there about how we make systems more resilient, more able to cope with changes in the disease threats.

"Sands observed *that in many other countries in the world, particularly the poorer countries in the world that have had to deal with diseases like HIV, TB, and malaria, there is this notion of community systems of health. The notion that beyond the formal biomedical system, there are arrangements of civil society communities, often faith-based organizations that play an absolutely vital role, particularly in preventing disease.*

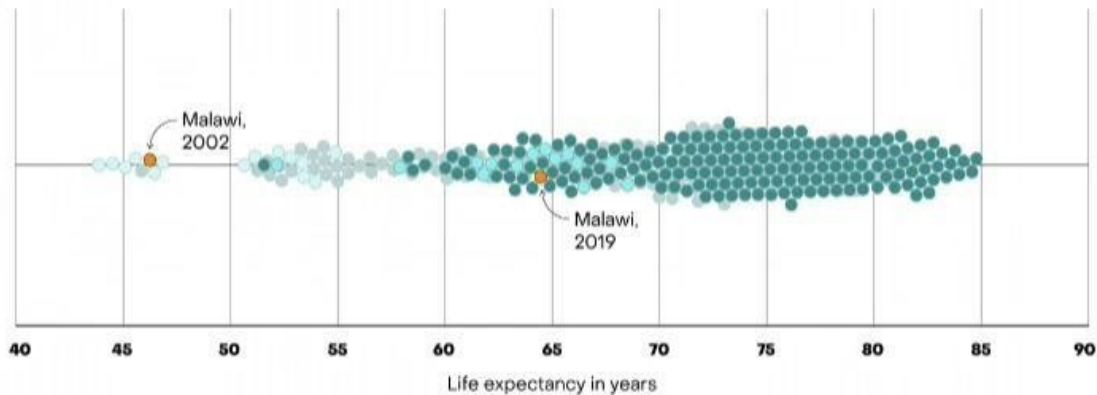
And what we saw in COVID-19 is actually that those countries that had vibrant community systems for health actually did better on some of this, partly because they could reach the people the formal systems couldn't, and partly because they had trust and trust was something that was a massive asset or a massive gap in many of the responses to the pandemic.

A **third point** I'd make is around **equity in response to infectious diseases**. We need to address what do we mean by pandemic?

"Total global spending on malaria, which is a disease that infects 270 million people a year kills 600,000, that's most of them children under the age of five. So that is a child every minute in 84 countries. We do not talk about it as a pandemic.

Total global spending on Malaria is \$3.5 billion dollars a year. And also, these problems are solvable. Malaria is curable, it is preventable, and we can make fantastic differences to people's lives and communities. So, if I could go to the next slide, which picks up on a point that Mike was making earlier.

In countries like Malawi, life expectancy has increased by 18 years since 2002



2019

This progress is mainly due to reduced mortality from HIV, TB and malaria



"Okay, this was 'life expectancy in years' in 2002, and this is how it moved. It is quite cool between 2002 and 2019. Look at Malawi in 2002, life expectancy was forty-six. In 2019, it was sixty-five. That's an 18-year difference, and two thirds of that was due to reducing mortality from HIV, TB, and Malaria."

As Mike said, 'this isn't just about saving lots of lives. This transforms society. People have grandparents. It makes sense to stay in university until your mid-twenties because you have enough of your life left to reap the returns of the investment you've made in yourself. It's transformational in its nature.' So, we face big challenges. We've made remarkable progress. The death toll from Malaria, for example, is half what it was a decade ago.

US Energy Markets in Transition: Who Will Invest the Smartest?



Video: <https://milkeninstitute.org/panel/14463/us-energy-markets-transition-who-will-invest-smartest>

Over the past two years, all eyes have been on energy. The US government and regional utilities are pouring in billions to shore up the country's energy generation and distribution networks, and major investments are being made in new climate technologies and resilient infrastructure. While there has never been a more exciting time for organizations to invest in this sector, approaches vary dramatically. Hear from leaders across oil and gas, clean tech, and government to better understand where the opportunities lie.

Transformation or Evolution?

The panel Moderator was Brian Sullivan, Anchor and Senior National Correspondent, CNBC.

Sullivan opened the discussion by asking panelist Rebecca Kujawa, President and CEO, NextEra Energy Resources LLC, "Are we transitioning or are we evolving, because from all the data I see, no matter how many windmills we build, the need for electricity generation is off the charts?"

Rebecca Kujawa, President and CEO, NextEra Energy Resources LLC responded: "Absolutely. If you think about the world's energy consumption in totality, whether the electricity is from fossil fuel or another source, electricity is about 20% of total energy consumed. That's a huge opportunity and clearly a key part of what's happening in this transition or transformation."

"But it is something that happens over a long period of time with enormous amounts of capital invested in order to bring it to reality. If you want to think in baseball terms, we're barely in batting practice. I'm not even sure that we're truly in the first inning of what's to come and what needs to be accomplished."

Sullivan pointed out that some very smart people in places like Princeton, New Jersey believe ***the narrative "we're off of fossil fuels in a couple years."*** ***Sullivan always counters with skepticism stating: "We spent \$4 trillion on building out renewables globally in the last 20 years and decreased our reliance on fossil fuels by 1%. That's Goldman Sachs' number. It went from 82 to 81% of power.*** Are we willing to have a hard and real conversation about where we are in that batting?"

Sullivan asked Scott Jacobs, CEO and Co-Founder, Generate Capital, to comment about where he thinks we are in the transition.

Jacobs observed: "The point of the word *transition* means that you're going from somewhere to somewhere else, and I think we can all acknowledge that we are going somewhere else relative to where we've been and that is driven by the economics of the current solutions that are available."

Affordability and Decarbonization:

Customers and communities are demanding decarbonization, more resilience, and cost savings. And the transition is really describing the fact that customers and communities are choosing more decarbonized and more affordable energy than they've had available to them in the past."

Sullivan interjected, "How is it more affordable?"

Jacobs replied, "It's cheaper electricity from solar today for example, than every other power source that you could find."

Sullivan challenged the claim: "But that's once it's built. The *all-in cost* is still much higher. After that solar is extremely expensive?"

Jacobs said, "Everything is once it's built," and argued no, that's "not true that solar is very expensive."

Sullivan delved deeper asking "So the production cost of wind and solar is low, but that doesn't include the \$10 billion to build?"

Jacob said "In effect. If you take an asset and you think about it living for however long it's going to live, solar assets tend to live for 30 years."

Jacob continued: **"The price of power that consumers have to pay for those electrons is cheaper from a solar asset today than any other asset you could build in the world. That is just the way it is. It's 2 cents a kilowatt hour for a central station solar plant."**

Compare that to "If you want to build something with fossil fuels, the lowest priced fossil fuel based option, which is usually coal, although sometimes natural gas, depending on where you are. Wind generation is in between solar and fossil. It'd be great if nuclear were cheaper. It's a wonderful low carbon or zero carbon source of power, but nuclear is too expensive to build today in the United States and that's why we're not building it."

Brian Sullivan stated, "If we could just find a way to harness the Sun?"

Doug Kimmelman, Founder and Senior Partner, Energy Capital Partners commented: "I spend a lot of time in California. I have a home in San Diego. My electric bill is very high. The marginal rate is not 2 cents, it's 55 cents a kilowatt hour. So, for a 5,000 square foot home in August, our electric bill might be as much as three or \$4,000 a month.

I put solar panels on the house. I received subsidies for that. Germany and California are in a battle for the highest electricity prices in the world. So, I'm like, where's all this cheap free electricity? I think there's a lot of other stuff in the bill, including thousands of miles of transmission lines, all the backup generation because of the intermittency around this you got to put in."

Nuclear power:

Kimmelman continued: "Then we only have one nuclear plant left in California."

Sullivan expressed concern for where California is headed.

Kimmelman added: "Energy Capital Partners is the largest generator of electricity in California. We've supplied 35% of the renewables. We've got dozens of natural gas fired plants. If Diablo Canyon shuts down that is a problem as it is a very significant source of electricity; Nine and a half percent, on a daily basis.

It is baseload which means it runs all the time. There are major reliability problems with alternative energies that we tend to forget about when talking about decarbonization:

There are three other things. Reliability is number one, then affordability. And then there is energy security, which we learned from events in Europe.

But there's another legislation that was passed in California that's going to make it very tough to not shut that down. A lot of power plants along the coast. California passed a law that states if you take water from the Pacific Ocean, you must return it at the same temperature. The amount of money that it would take to build chillers to get that water back in there."

(Update: As Sullivan lamented, there was not much discussion on nuclear power for reasons explained by Jacob and Kimmelman. RedChip readers should note that on 10/27/2023, the Department of Energy has awarded the eVinci Microreactor by Westinghouse a prestigious

Front-End Engineering and Experiment Design (FEEED) contract, which will help to deploy the company's nuclear test reactor at Idaho National Lab (INL).

The nuclear microreactor marks a significant energy breakthrough, providing safe, carbon-free energy that is easily scalable and highly portable. It can be used to provide heating and electricity to everything from data centers and defense facilities to mining operations, remote communities and eventually the surface of the moon.

What sets it apart from other solutions is its low number of moving parts, which enables it to act like a battery while providing up to 5 megawatts of electricity around the clock for more than eight years without the need to refuel. It does not need water for operation or cooling and spent fuel can be sent to the manufacturer for long-term storage. It is also capable of providing high-temperature heat for a range of industrial applications, such as the production of alternative fuels like hydrogen fuel.

Hopefully, future Milken discussions hopefully include this innovative solution.)

The Role of Fossil Fuels:

Sullivan turned to **Colin Parfitt, Vice President, Midstream, Chevron** and asked him:

"What is the role and the responsibility of Chevron in the fossil fuel industry in the transition? The reality is even the most bearish estimates of oil and gas show tens of millions of barrels a day being used in 50 years."

Colin Parfitt commented: "Yes. Doug described it quite well as the world thinking about affordable, reliable, ever cleaner energy. And Brian, talking about the transition.

People must recognize that in the current energy system, just how much fossil fuels are consumed. It's 80% oil and gas is north of 50%. So, it's not the tail we're dealing with. It's really the majority of supply."

Parfitt continued: What does demand for energy look like? The world's population is 8 billion people going to 10 billion. There is increasing affluence in the world, particularly in the less developed parts. All of that takes more energy."

"There are two issues here. One is how do you meet the energy needs of the world going forward, which are still growing?"

The second thing is how do you then transition?"

"And our view is that two things need to be done. Take the oil and gas system that we've currently have and decarbonize it. We can produce less carbon when producing oil and gas, but the world will need oil and gas for decades to come.

And then how do you think about a new energy business and trying to grow a new energy business? We're starting to get new energy businesses up, but they're nowhere near as mature as the existing businesses and frankly they're just going to take a lot of time to come to fruition. So essentially you need to do all things, reduce carbon intensity on existing business and then figure out how to grow new businesses."

Brian Sullivan made a good point: "if I was running an oil and gas company, the goal of the company is to continue the company. You have a fiduciary responsibility to shareholders. So I wouldn't care if I was Chevron and solar or wind or whatever it was the best place for me to be.

Fisher Body, which makes bodies for cars used to also make bodies for buggies in horse and buggy days and somebody, and I'm sure they had 20 competitors who didn't move and are now gone, but Fisher made the move from the horse to the automobile. I'm sure you guys are looking at where the hockey puck is going."

Parfitt said "We do. However, we had a conversation here about electricity earlier and so there will be part of the new energy system which will be electrons.

We as a company decided not to play in electricity because we have people like Rebecca and her company who will do it better than us.

There are what we call "hard to (carbon) abate sectors." (In other words, to decarbonize.) These are parts of industry, and the industrial world such as steel and cement, and marine and aviation that don't lend themselves to electrification. You've got to figure out a different solution for that. "

"We are thinking about things like hydrogen, and carbon capture. How can you make a difference in those sectors? Chevron's view is to play to our strengths."

Hydrogen

Sullivan turned to Rebecca Kujawa and asked "Why do people get all excited over hydrogen. It's expensive and dirty. Why does hydrogen have so much passion around it?"

Kujawa replied: "I think because it's such a flexible fuel. We first started talking about hydrogen about five years ago, although it's been around for a very, very long time, including as a source of energy.

The exciting part is not just about hydrogen and what you do directly with it, but it's what you can turn it into in terms of molecules. I think the exciting thing for Chevron, Shell, BP, and Exxon is to utilize hydrogen as a source for the other molecules that will ultimately be dropped in fuels so that you can decarbonize the hard to abate sectors."

The exciting thing about the Inflation Reduction Act (IRA) is it provided some incentives to jumpstart that evolution and innovation that is so required in this industry, whether it's blue hydrogen or green hydrogen.

"We can significantly decrease the decarb intensity of these fuels and turn them into the fuels that you drop into the natural gas system for example or use in aviation for jet fuel that is currently really difficult to change out."

Brian Sullivan commented "hydrogen didn't do so well in a blimp. There was one in the thirties. We got to be careful with this stuff.!"

Kujawa explained: "Anytime you deal in electricity or any sort of fuel, there are issues that you need to protect against.

There are many issues with safety that need to be designed around. Don't bet against the engineers. We have a lot of smart innovation and smart investment across a wide variety aspects. They are working on the issue of decarbonization. They are capitalizing on the opportunities that we have today deploying capital economically and solving some of these challenges in ways that make a ton of sense for the environment."

Tech Titans: A Conversation with Reid Hoffman and Eric Schmidt



Video: <https://milkeninstitute.org/panel/14542/tech-titans-conversation-reid-hoffman-and-eric-schmidt>

Reid Hoffman, Founder of LinkedIn, and Partner at Greylock, and Eric Schmidt, Co-Founder, Schmidt Futures; Former CEO & Chairman of Google, sat down for a wide-ranging conversation on the future of technology. Where have we come from, where are we going, and what does the world look like with technologies at the tips of our fingers?

Stephanie Ruhle, Senior Business Analyst and Host, The 11th Hour, MSNBC opened the discussion: "I decided to ask Chat-GPT what I should ask you.

Transformation, opportunities, and Threats:

"What are your thoughts on the current state and future of artificial intelligence and how do you see it transforming various industries in the coming years? What are you excited about? What are you afraid about?"

Reid Hoffman, Partner, Greylock; Co-Founder, LinkedIn commented:

"I wrote a book which I published with GPT-4 to demonstrate **human amplification because part of what I think artificial intelligence is, is actually amplification intelligence.**

Steve Jobs said the computer was a bicycle for the mind. I think with AI we're now moving to the automobile for the mind. And part of the thing is that in *every professional activity that we do, including journalism and everything else, within the next few years, we will have a personal intelligence assistant* to help with that. I think that's actually exciting and good.

And in terms of worries, ***just as you have human amplification for legitimate endeavors, you will have human amplification for bad actors***, whether they're criminals or other folks."

Eric Schmidt, Co-Founder, Schmidt Futures, Former CEO and Chairman, Google was asked for his views. Schmidt observed:

"Change is happening faster than I've ever seen in the industry by an order of magnitude. And because we're working with intelligence and it's not human intelligence, it's a different kind of intelligence. And the promise of this intelligence is extraordinary. AI doctors, AI tutors, solutions to problems that bedevil all of us, think about climate change, drugs, healthcare, etc. We're going to see a fundamental acceleration in solutions in everyone.

And then the *negative is equivalent*. ***We're going to see the empowerment of asymmetric actors who are evil and doing bad things and 'we need to get organized around that.'***

"For example, in the media world where people actually trust you, they believe you, they think that's who you are. They think that is what you said. Imagine a world where you as an individual are so well-documented in the media.

Now Imagine there's a likeness of you, which is a perfect rendition of you, which is saying awful things. What would that do to your audience? Imagine what that does for Governor Newsom or any political leader. We're taught to believe what we hear and what we see. It's no longer going to be true. This is a fundamental issue."

Moderator Stephanie Ruhle probed Schmidt: "when you say we need to organize around that, that sounds really good, but what does that look like?"

Schmidt expanded his argument explaining: "when these new technologies come along, everyone opines about it. But look at the history of new technologies. Ultimately, a collection of the people who invented it and the people who will regulate it along with socioeconomic thinkers, political science thinkers and so forth, get together.

E.g., take the Asilomar Conference of 1975. The scientists agreed that research with recombinant DNA should proceed, but that appropriate safeguards should be outlined. We largely adhere to that. We're at one of those moments and I think we're going to see those meetings this year and we'll sort it out. What it means is a certain amount of restraint. And if you look at GPT-4, there was a whole safety program. There was a whole team that tried to make

sure it did not do anything too dangerous. Now, wacky is fun and annoying. And dangerous - is dangerous.

"These systems have the ability, for example, to answer horrific questions like how to " plan military and cyber-attacks. The system is stopped from answering because humans prevented them from answering those questions."

Guardrails, Safety and Alignment Teams:

Ruhle commented "Look what social media has done to our politics. Look how people have become radicalized. What guardrails are there to prevent going right down that path again, but in a more dangerous place?"

Hoffman responded: "many of the groups such as OpenAI and Google Inflection are Silicon Valley based. They all have been working very intensely on what are called **"Safety and Alignment Teams."** **These are hundreds of people whose jobs are to ask 'how do we make devices that have productive interactions and productive outcomes and not destructive ones?'** There is a huge amount of attention on this.

Hoffman added society needs to figure out "what kinds of policies, potentially regulations, et cetera should be put in place to maximize the good outcomes and to minimize the bad ones."

AI Poses Risks to Democracies:

Schmidt interjected: "You are too optimistic. At the moment, there are three very large frontier AI language models. Everybody knows about GPT4. All three are based in California (thus subjected to US jurisdiction.)

These are exceptionally large and have a lot of people watching them, so they're going to ultimately be regulated or otherwise constrained by law lawsuits and regulation. I am not too worried about them.

What I worry about is everything else. The underlying technology is there, it diffuses out, and goes to China, to Russia, and to Iran, and to non-state actors who want to make democracies not work."

Schmidt continued: "I worry this technology can damage our democracies by people who don't like democracies."

"I don't think the industry has a good answer to the diffusion problem." We're going to get it roughly right in the US because we're already talking about it. However, "I do not have confidence that we'll get it globally. And all it takes is one bad actor globally, one bad country, and we can think of a whole bunch who have an agenda against us and they can really cause harm."

Slowing down AI?

Stephanie Ruhle asked, "Should we slow down?" Elon Musk said we need to slow down the advancement of AI because of these risks.

Schmidt responded, "slowing the US down would simply advantage our opponents."

Hoffman agreeing with Schmidt added **"we should NOT slow down, as the people who slow down are the people who have a concern of impact on society. The people who don't slowdown, which includes China and many other people across the world, don't have that concern."** He noted that "Elon Musk, while signing that letter (advising a slowdown), is trying to hire a whole team for his AI programs."

Regulating AI

Ruhle interjected "How do we regulate around something like this that is so technologically advanced and that is moving so quickly? Our lawmakers don't understand this."

Hoffman noted various state governors such as California's Newsom and the Federal Government are calling experts such as himself and Schmidt.

Ruhle interjected "But can they trust you? You're going to make a ton of money in this thing."

Schmidt candidly replied "of course they can't trust us. That's the point."

Schmidt continued: **"The important thing is the people in the industry are getting phone calls from the Administration and from Congress. The way American democracy works is we start large conversations.** And what you're doing, Stephanie, is exactly correct. You are asking what are your motivations? What are your principles? And that's why you need to have a group of people, not just the industry doing this."

Schmidt noted that he coauthored a book with Henry Kissinger titled "The Age of AI: And Our Human Future." In it, they go deeply into the details of AI, how it behaves, how it affects human life, and where it may lead us. The book Schmidt coauthored shows how AI already is affecting social media in major ways, showing us how it can change human behavior, and achieving exponential feats of intelligence.

Schmidt stated: **"The conclusion of the book is don't leave it to the tech industry to run it. And that is speaking as a person from the tech industry!"**

Ruhle observed that nobody understands AI so how can they regulate it?

Hoffman explained **"a lot of people understand how Google search works. A lot of people don't understand how the iPhone works. The question is to say, what are the concerns?"**

When people start conversations on policy and regulation, I recommend they define which objectives they want to see more of and which you want to see left out. And then set those objectives to people, such as engineers, who know how to build.

"I think in terms of trust. Obviously, you have to pay attention to where there's misalignment of interests. If there is misalignment of interest it's going to create a lot of damage, then that's a problem. LinkedIn has aligned all of its incentives with its users, so it's aligned with society at large. The folks to trust are the people who are transparent in communication. I think the tech industry, generally speaking, is moving more in that direction."

Schmidt commented "one of the things that we haven't talked about is the reason that our industry has gone literally crazy over this technology is ***this is the first-time computer people have built systems where the inputs and the outputs are different.***

"The term is called "emergent behavior." "Emergent behavior" is "something that is a non-obvious side effect of bringing together a new combination of capabilities—whether related to goods or services. Emergent behaviors can be either beneficial, benign, or potentially harmful, but in all cases, they are very difficult to foresee until they manifest themselves.

"And it appears that as these systems get larger, they begin to get capabilities that we don't expect, and we can't predict. And they occur at unpredictable points in the training. And this emergence allows you, for example, to get insights. It's almost polymathic across fields. So, there's a feeling of the arrival of something very powerful, and that's what we are collectively worried about. When I talk to political leaders, they're still on social media because every day they deal with the consequences of problems in social media."

Revenue Models:

Schmidt continued: "***The real issue here is you're developing a form of intelligence. It's not human intelligence. And it's certainly not conscious. It's completely or partially unpredictable.***

One executive in the industry said 'you can't know what this thing will do until it has a million users. That's obviously not going to work. So, we're struggling with this as an industry. I think that's the way to frame this.

"So, the real issue is how much more powerful can these systems get? There is a race to build larger and larger systems because people sense that this will ultimately be worth a great deal of money."

Schmidt noted: "***Most of the products that are currently in use that we're discussing don't have revenue models yet.*** But there's a sense that generative AI and what are called "distillation models" will allow you to do very different things. Why do I have to generate the ad? Why doesn't Google generate the ad for me? Why do I have to generate Tweets? Twitter should

generate tweets for me. Why do I have to make the video for TikTok? TikTok should make the video for me, the principle of generative AI is why do I have to do the work when the computer should be able to do a better job? That's a very powerful concept and it is widely thought in our industry that will transform most businesses."

Transformation and of Industries:

Ruhle, then asked: "What industries do you think will be transformed or helped the most and what will be hurt the most?"

Hoffman responded: I believe "all professionals are being amplified, and ultimately all industries will benefit. I think the industries that have more knowledge work, more information work, more creativity will benefit the most. ***One of the recommendations I give people is there are well over a hundred million users of Chat-GPT. Go play with it. See how Chat-GPT works. And you will realize that it's an amplifier.***"

For example, we're having a writer's strike, what about writing? Have AI write a first draft and then make it better. ***You can accomplish the same kind of work now in 15 minutes that used to take you three hours. You can use the next hour or two to make it even better.***

Schmidt added: "I always start with doctors because doctors are very harried. The field has become incredibly complicated. No doctor, as brilliant as they are, can know everything.

This system is a fantastic helper to a doctor. We have a shortage of doctors in America. They're going to learn how to use these tools to take care of you better (and implicitly they can handle treating more patients.)

Same thing for teachers. There's a teacher shortage in America. Teachers are going to become more effective because of AI tools.

Jobs disappearing?

Schmidt continued: What everyone wants to talk about, is whether AI is going to take their job away.

"I don't think so because clever people will use these tools in the same sense that they use the previous tools to become more successful, more effective, and have a larger reach. That's how the economics of this work. It's all positive.

The negatives and my list is pretty straightforward. I think there's issues in biology we must worry about. There are issues in cyber-attacks we have to worry about, and there's issues in democracy and misinformation at work.

"But if you define it that way, then the costs in terms of dealing with the frustrations that we have highlighted during this discussion is very legitimate, given the enormous payoff. Every business has some aspect of education, knowledge generation, advertising, marketing, branding, reaching, and inefficiency. This is the natural next step and it's huge."

Survival of the fittest?

Moderator Ruhle opined: But when you say the clever people, does that not imply a level of survival of the fittest? What about all the people who are employed who might not be the cleverest? What happens to them?

Schmidt expanded: **"Everyone says jobs are going away. There's lots of demographic reasons to think that there will be a shortage of workers for jobs, at least for the next 30 years. And this has to do with the loss of people in jobs. And frankly, the fact that we're not having enough kids as a society. It's true in most Western, it's true in China, and in many other countries."**

As such, **"I think that the race to automation is a race to keeping the productive people productive enough to take care of the elderly who are not working. That's the way to understand the economics. And in that framing, these tools make everyone more productive."**

"There's lots of evidence that people who are not as well educated as we would like benefit from using these tools. When you take someone who's not educated and you add a sophisticated tool, their salaries go up. Their job does not go away."

AI and Manufacturing: The next Offshoring?

Ruhle asked: How do you compare AI to manufacturing in the US when we realized it would be much more efficient, and much cheaper to move everything offshore. That was a great idea at the time. And now we see the ramifications, in terms of what it's done to our economy, our culture, the American psyche, and we're trying to bring those jobs back.

Do you think we run the risk, that just because we can get rid of those jobs that humans don't need to do those jobs? We should do that?

Hoffman responded: I think the best chance we have of completely amplifying the manufacturing industry here is to run artificial intelligence and robotics. So, in terms of bringing those jobs back, I think that's the best plan in order to be able to be productive, globally competitive, et cetera.

The most comparable technological change is the steam engine. ***You want to be adopting that into your economy and into your industries, and then creating those industries of the future and then the jobs of the future.***

And there's strain in the transition. We need to help people with a transition. One of the fortunate things about AI is AI can also be a helpful tool. You do need to learn a new skill. AI can help you if you don't have the educational credentials for and new job. It can be part of the solution for any of these things.

Schmidt emphasized: "**The strongest position America can have is to be the innovator in new industries that matter. The first company to innovate tends to end up with an unfair share globally of the outcome. The economics of the United States depend on this over and over again. Every previous wave has made us more efficient, created more wealth and so forth.** There are all sorts of issues around job dislocation and inequality. Those are addressed through political processes. But to not take the opportunity before us is to let another country win. That would be enormously bad for our nation, for your children and your grandchildren in the future."

Small Businesses:

Ruhle concerned about small business asked: Big business can afford to make these extraordinary investments into AI. What happens to small businesses?

Hoffman answered stating "the more and better strong networks we have, the more **small businesses can get created. They can flourish in various ways. There is a whole set of tools that allow you to increase your productivity 10 times!**

Even as a small business, you can make that work. E.g., imagine now that you have image creation tools, and you own a restaurant. AI can help you with the theming, decor, menu, and many other tasks. You can use Pi (website <https://pi.ai/>) which for now is free.

(Update: On November 17th, 2023 the board of ChatGPT maker OpenAI said it has pushed out its co-founder and CEO Sam Altman after a review found he was "not consistently candid in his communications" with the board.

On November 22, OpenAI announced: "We have reached an agreement in principle for Sam Altman to return to OpenAI as CEO with a new initial board."

Altman's return culminated a days-long power struggle that revolved around differing views of Altman and the Board regarding safety issues of AI and proposed guardrails.

The chaos accentuated the differences between Altman — who's become the face of generative AI's rapid commercialization since ChatGPT's arrival a year ago — and members of the company's board who have expressed deep reservations about the safety risks posed by AI as it gets more advanced.)

The Drive Toward More Non-Invasive Treatments for Patients



Video: <https://milkeninstitute.org/panel/14482/drive-toward-more-non-invasive-treatments-patients>

Non-invasive medical treatments are highly desirable alternatives and supplements to traditional surgery, radiation, drug delivery, and immune therapy, with some having proven safety, efficacy, and effectiveness. They hold the promise of saving time and lives with lower costs and fewer side effects.

However, everyday millions of people suffer from conditions such as Alzheimer's, Parkinson's, obsessive compulsive disorder, depression, epilepsy, stroke, and cancer that prevent them from living full and whole lives.

What has been the progress to date in the application of non-invasive medical treatments? What is the future for these treatments? Innovators and disruptors in the development and use of non-invasive medical treatments will discuss these topics.

Sound Cures

This panel offered some amazing breakthroughs in medical ultrasonics. Ultrasonics are high frequency sound waves and in this case; are high powered and focused like a laser. The advantage is non-invasive surgery is made possible as well as many more exciting breakthroughs.

Ultrasonics: The Science

Amazing breakthroughs in medical ultrasonics are occurring. ***Ultrasonics are high frequency sound waves and in this case; high powered and focused like a laser. The advantage is non-invasive surgery is made possible*** as are many more exciting breakthroughs.

Zhen Xu is a Professor of Biomedical Engineering at University of Michigan.

Zhen Xu explains that ***the ultrasonics technology is "using a focus device, which is a spherically surfaced shaped device to focus the sound to a millimeter spot inside the body in the target tissue"*** and later goes on to describe that ***this energy is used to "either heat up the tissue or to mechanically disrupt the cells."***

Pejman Ghanouni is an Associate Professor of Radiology at Stanford University.

Pejman Ghanouni goes on to further explain the technology: **"Imagine that you're taking a lens and you're focusing sunlight onto a leaf. You can set the leaf on fire. You can do the same thing with ultrasound."**

Later he describes the system where the *patient is in an MRI scanner for "image guidance is you can monitor the focus, so there are mechanisms for essentially watching as the energy is concentrated to the area that you're trying to treat"* and before the actual treatment itself occurs."

"There's a kind of calibration step that we do where we can actually visualize the initial portion where the energy energy's being concentrated, make sure it's being focused at the exact target that we're interested in treating before we actually begin the process of treating."

In this way the directed power of the ultrasound is calibrated to limit damage to surrounding tissue.

Successes of Ultrasonics

Prostate Cancer

Professor Ghanouni explained: "There's a large subset of patients that have disease that's localized to the prostate. After a biopsy confirms how aggressive their disease is under the microscope, we can take a big chunk of those patients and potentially treat their tumor."

Later, he goes on to describe how they can cut out the cancer from the prostate and leave the patient with a high quality of life while still treating the tumor.

Neurological

Chase Koch is the Founder and CEO of Koch Disruptive Technologies.

Chase states "when you look at 4,000 disorders in the brain, focused ultrasound could potentially treat these disorders." We said there's an amazing business opportunity.

Closed Loop Robotic System:

Maurice Ferré is CEO and Chairman of Insightec.

Maurice Ferré summarizes his goal of a **closed loop robotic system**: "If you look at just the way surgery is progressing from open surgery to minimally invasive to robotics, and now we're talking about noninvasive incisionless surgery, the concept of creating an electronic scalpel where you're using ultrasound energy all transformed into one single sub-millimeter micron that you can steer and do Three-D printing in the brain," becomes real.

He continues expounding on the technology "We're in Parkinson's and we're moving into other types of disorders, but we found these other mechanisms that are remarkable where we can open up the brain, do blood brain barrier opening, put drugs in for the first time, and we have these multiple trials. We have two phase three trials that are ongoing on the blood brain barrier."

Now we have the capability of placing medicines where they are needed. Maurice Ferré continued: "Results are fantastic, 70%. So, what that means is in terms of patient satisfaction is in terms of being able to treat that tremor off of the CREST scores, it's a 70% improvement."

Business: Disruptive Technology

Neal Kassell is Founder and Chairman of Focused Ultrasound Foundation.

The technology is early in development but is evolving quickly. Neil Kassell succinctly describes this by stating "*it (ultrasonics) is in its early stage, but it is rapidly evolving, and it will replace a large amount of surgery and radiation therapy. It's a whole new way of delivering drugs more safely and effectively and has a stimulating effect on the body's immune response.*"

"And it is our belief that 10 years from now, focused ultrasound will be a global standard of care which improves the lives of millions of people around the world with a whole variety of serious medical conditions."

Chase Kock remarked on how 20% of GDP is healthcare and Koch Disruptive Technologies (KDT) is focusing on new disruptive technology. He stated, "in the last 10 years alone, we've invested about 35 billion across different technology sectors and 4 billion of that is actually in healthcare."

Things That Will Blow Your Mind



Video: <https://milkeninstitute.org/panel/14516/things-will-blow-your-mind>

Join this compelling session as innovators pitch cutting-edge technologies, inventions, and scientific breakthroughs in the hopes of gaining a glimpse at what our future will look like. Come and explore how these advancements may change our lives for the better. They could blow your mind!

During this panel discussion at the Global Conference, speakers discussed their work in the fields of synthetic biology, augmented reality collaboration software, and digitizing the operating room. Mike Nally, CEO of Generate Biomedicines, talked about using machine learning and advances in biology to discover and create protein-based therapeutics for diseases. Osh Agabi,

CEO of Koniku, discussed using synthetic biology and machine learning algorithms to analyze odors and assess health in real time. Dr. Nadine Hachach-Haram, founder, and CEO of Proximie, explained how their platform digitizes the operating room and enables surgeons to virtually collaborate and collect data to improve surgical care.

Sandler opened the session: Sandler to Michael Nally CEO of Generate Biomedicines.

Mike let's start with you. Tell us a little bit about the work you're doing at Generate.

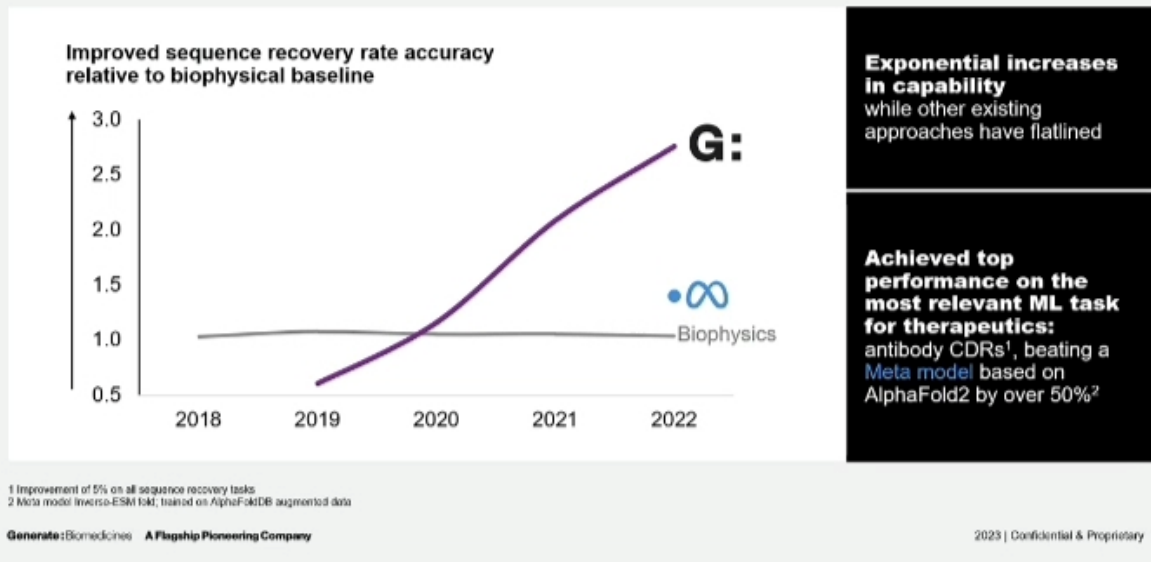
Nally: Generate was a company that was founded four years ago with a simple question in mind. What if we knew how the code of life in the form of DNA dictates protein function? Scientists have been working on this problem for the last 40 years, oftentimes taking biophysical based approaches and building up atom by atom, but unfortunately the results lacked robustness. And so, our team said, is there a different way of doing this? The protein question was an interesting question to us. As all proteins drive about 95% of biology, they are the most amazing machines sensors in the world. And if we could understand how to create new proteins, we could drive biology in ways that we've never had the tools to do.

Our human mind is not good at reading the code of life because of its complexity. There are over 180 million protein sequences and 200,000 catalogs in the protein data bank. So, our team said, can we use some extraordinary data sets to start to learn the principles of proteins by using machine learning to study every amino sequence that has been sequenced across the trio of life? Our approach was to borrow from nature to come up with protein therapeutics that have cured many diseases. But ultimately what we're really interested in is can we actually program for function? Can we design protein sequences to target specific diseases?

About two years ago, the team was tasked with this specific question, could we come up with better alternatives to existing therapeutics? And so, we took the top 50, these are the biggest drugs in the world, the Humiras, the Enbrels, the Keytruda's, the Opdivo's, and we said, could we come up with entirely novel sequences that perform as well, if not better than the comparable and hit the same exact epitope? So, in many ways, we were trying to split the arrow in archery. And what our team of 20 people came up with was 50 entirely novel sequences for each of the different programs and we produced and validated the top 20 of those. And we were able to show we were at least as good if not better than those.

The figure below shows the progress we have made in the last several years.

Our platform is constantly learning, providing cost-efficient economies of scale that have *long evaded the industry*



And having spent most of my career at one of the largest pharmaceutical companies in the world, a team of 72,000 couldn't have done this taking at least 10 times as long, with 10 times the resources.

Sandler: Thank you, Mike.

Sandler to Osh Agabi, Founder, CEO, and Chief Technology Officer, Koniku Inc.

Next Osh, why don't you tell us what you're doing, how it relates to the things that Mike is doing and maybe from a different perspective?

Osh Agabi: We like to think everybody in the United States has access to the same level of healthcare as everyone in this room but there are locations that can be referred to as healthcare deserts where people don't even have access to basic primary care. That is not a problem of money alone. It's not policy alone, it's a technological problem as well. The United States is a very rich country. We spend by far the most amount of money on healthcare of any country in the world.

Most people would like to have you believe that this cost mostly goes into pharma or drugs. For every dollar that we spend on healthcare in this country, 70% of it goes to hospitals and doctors. We are not going to build our way out of this problem, and we can't train doctors fast enough. So how do we solve this? Our goal at Koniku is to give hope and take away worry for

everyone in America and beyond. How do we do this? We have identified four key things. One, we want every individual to be the boss of their own health. Two, we want a convenient system that gives people real options and real targets on how to improve their health. Three, with the advances we've seen across the board, we want to give them closed loop access to data that allows them to make informed decisions. Four, that solution must, I repeat, must be market-based.

The way we are approaching this is as follows. Most of the time when you hear about diagnostics, it's about blood tests or doing a battery of medical tests. ***I want to tell you about a new modality and that is breath and volatile organic compounds. Each one of you in this room is emitting anywhere from 1000 to 3000 different volatile organic compounds from your breath. These are small molecules in your blood that bind to oxygen molecules via the hemoglobin complex in your lungs and pumped out with your breath. It gives us information on the state of function of various tissues in your body.***

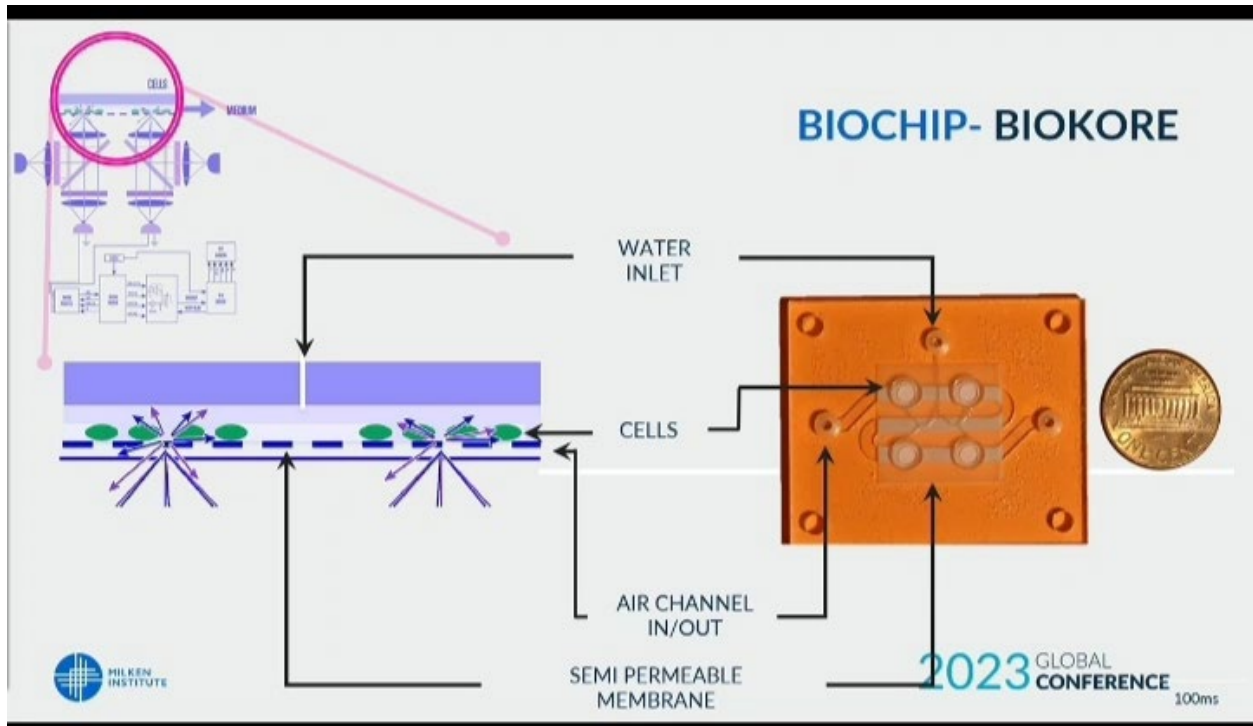
In fact, if you go to PubMed today and you search for volatile organic compounds and diseases, you'll find literally hundreds of articles. The problem has always been the technology to access this data.

In fact, in some countries they use dogs to detect cancer. They're medical detection dogs. Some of you that have dogs at home, you will know that when you're feeling sad, the dog is able to tell. Even animals can detect fear. They're not doing magic. They're going after small molecules and their ability to sniff them.

Even some humans can detect this as well. A 72-year-old woman was found to have the ability to detect Parkinson's disease by smell. This is not an old wife's tale. It has been proven in the lab that she could detect Parkinson's 15 years before it manifests via smell alone.

The way our device works is you breathe on our device; we catch those signals and we are able to tell you exactly what is wrong. And it's not just for saying it. This is something we are already doing. At the height of Covid, we did clinical trials with the University of Southern Nevada where we were able to demonstrate for the first time that we could detect Covid from breath. In the successful first stage clinical trials, we have also been able to demonstrate not only are we able to detect disease from breath, but we are also able to follow drug metabolism. We're able to detect things like amphetamine, cannabis, fentanyl, and opiates directly using our technology.

We have gone ahead and borrowed directly or taken the technology that biology has used to smell and put that on the chip, hence the cyborg. We have taken living biological neurons and genetically modified them to carry these proteins and stick them on a chip.



and manage to keep those cells alive for prolonged periods of time. So biology now is acting as a sensor device. It's acting as a computational unit and it's acting as a reporting unit. And the electronics surrounding it is doing further processing on it and helping us transmit that signal everywhere.

The beauty of the technology is that you can *reprogram the cells to detect one compound or another*. Today we're working with explosives, but we know that the technology is already able to detect other types of chemical compounds, and that's what makes this technology so beautiful and versatile.

It has about four channels. The current architecture is able to go up to about 16 channels, which means we can detect about 4,096 different compounds simultaneously. The next generation of devices will be exponentially bigger than this. We already have the design, we have the pathway to go into this, and we show the data that we can detect explosive compounds at very, very low concentrations. Lastly, we have customers already. So, we've generated more than \$10 million in revenue with more than \$300 million in qualified contracts on the table. We're scaling manufacturing now and looking to put this technology everywhere where it can make human life better because that's what we're put here to do.

Sandler: Thank you, Osh.

Sandler to: Nadine Hachach-Haram, Founder and CEO, Proximie

So, Nadine, I know those are tough acts to follow, but I have every confidence it's not going to be a problem as you take us from where we're going in the future to what you're doing that's affecting us today as well as what will affect us in the future.

Thank you so much for having me. It's great to be here. My name is Dr. Nadine Hachach-Haram.

I'm a reconstructive plastic surgeon working in the areas of breast and pelvic cancer reconstruction in London, England, but I'm also the Founder and CEO of Proximie, a global health tech company that is truly **digitizing the operating room. We are enabling surgeons and surgical teams to virtually scrub into operating rooms all around the world** to really connect, collect, and activate data from the OR to hopefully improve the delivery of surgical care, to reduce variation and to prove democratization of surgery for everyone around the world. As a surgeon for over 15 years now, I've seen firsthand the fundamental challenges that we're facing in surgery around variation access, variation in care, and variation in quality. **Statistics say that any one of us may need anywhere from five to eight procedures in our lifetime**, no matter how minor or major they may be.

And so surgery truly affects all of us. But unfortunately, we're facing a most unprecedented crisis in surgery today with challenges around the workforce, challenges around safety and quality and challenges around productivity. And some of the numbers speak for themselves today, **7 million people around the world experience disabling surgical complications globally of which 1 million patients die every year in the United States. Of the 250,000 medical errors that we see, 30% are tied to surgery. But most striking, I think the one that really hit home for me is that today in the world, 5 billion people lack access to safe surgery. That's two thirds of the world's population, more than HIV, TB and malaria combined.** And so, what's clear to me is that more of the same isn't going to cut it. And as a surgeon working in these operating rooms for those many years, I recognize that more of that same process that we do is not going to help us address this gap.

And so truly the compelling need for digital care solutions became ever more necessary. And whilst we still deliver 330 million operations a year to bridge this gap, we need to deliver another 143 million operations that's going to require 25 million healthcare workers to deliver that. And even if we found those 25 million people that wanted to do it, it would take us another five to 10 years at least to train them. And so, we recognized that this gap is too big to address through the human models of clinical and surgical care that we've been doing for decades. And I started to look at this more deeply having spent many years or all around the world through global health initiatives with medical device companies, and of course within our own programs in the UK as well. And what was clear to me is that this is truly a problem everywhere, not just somewhere.

This concept that this is only a problem of certain parts of the world is just simply not true. Even here in the United States, the stark difference of access to surgical care between our rural and urban communities is staggering. And so, we need to think about a globally accessible solution that fundamentally disrupts how we deliver surgical care for the world. And so, I started to look back into the history of surgery. What was the genesis of surgery? Well, if you looked at this first picture:



The genesis of surgery was the “three Cs”: Communication, Collaboration, and Co-presence. And these are pictures from the archives that really show the birth of surgery being about people being in the same room together, observing, communicating, collaborating, driving change, and pushing the boundaries. And unfortunately, when you look at the picture in the middle, which is not from that long ago, we're still doing more of the same.

We're just putting more people in operating rooms physically present and hoping that that's going to help us scale surgery. And that picture in the middle is from a very famous pediatric cardiologist, Dr. DeBakey in Texas, who is really a world leader in pediatric cardiology. And you can see many people huddled around his table trying to see what's going on during the operation. And I'm sure you'd agree that that's not conducive to scale. But more importantly, **just the amount of variation that's going to come out of that. Each person will adapt and interpret what's happening during the operation and then go and implement it in their own healthcare system perhaps with some variation in it. And that variation is transcending across all of surgery. Even in United Kingdom today, between one hospital and another, you're 14 times more likely to suffer variation complications in colorectal surgery. The OR is analog. It's manual, it's still too archaic, it's unstructured, it's opaque, it's not transparent.**

And so, **we created a new category of the future operating room, the digital operating room**, the one that's connected, collaborative, intelligent, transparent, and data-driven, where we can leverage all the information in a very data rich environment and truly redefined the delivery of surgical care. *We have leveraged existing and new cutting-edge technology to bring this to the fore. Think about AI and machine learning, 5G and connectivity cloud infrastructure, which believe it or not for some hospitals is still a new idea and including space tech as well.*

Proximie is our centralized platform designed to scale expertise beyond the four walls of an operating room.

And today we are deployed in over 800 facilities around the world with tens and tens of thousands of surgical video data sets. We have the largest surgical video data set in the world, which in the future will enable future R&D and development for many labs and many device companies to come.

Proximie has been a game changer. Every time I operate, I can have another [virtual] surgeon in the room.

And so, I truly believe that by bringing innovations and solutions, it's not just about solving the solutions for today, it's about the solutions for the future as well. And there's certain, without certainty, healthcare and technology will continue to be intertwined for the future. And it is through companies like Proximie, we can really leverage machine learning data and AI to really enable us to drive neural networks and benchmarking and surgery, reducing variation, and hopefully making sure that every patient, no matter where they are in the world, have the best care the first time every time.

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