

# ***Tech for Good: Securely using LQMs for the Advancement of Healthcare***

**Robert E. Williams**

Head of Global Channels, SandboxAQ



# No Artificial General Intelligence (AGI) yet...



**Yann LeCun**

Chief AI Scientist at Meta

*"Very limited understanding of logic...do not understand the physical world, do not have persistent memory, cannot reason in any reasonable definition of the term and cannot plan... hierarchically".*

**Gartner**

**“Business leaders are beginning to learn that creating and using GenAI is not as easy as they would like it to be”**

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## **FORTUNE**

Hugging Face CEO says he hears from 10 AI founders a week who want to sell their startups



## **Pecan**

LLMs Alone Won't Solve Your Business's Predictive Needs

LLMs aren't the right tool for most business applications. Find out why — and learn which AI techniques are a better match.

# What's making this so hard?



# We've seen this movie before

Cloud Computing Hype 2008-2020



# Next Generation AI: going beyond the surface



Jen-Hsun Huang

*"The potential of AI is limitless, and **we're just scratching the surface** of what it can do."*

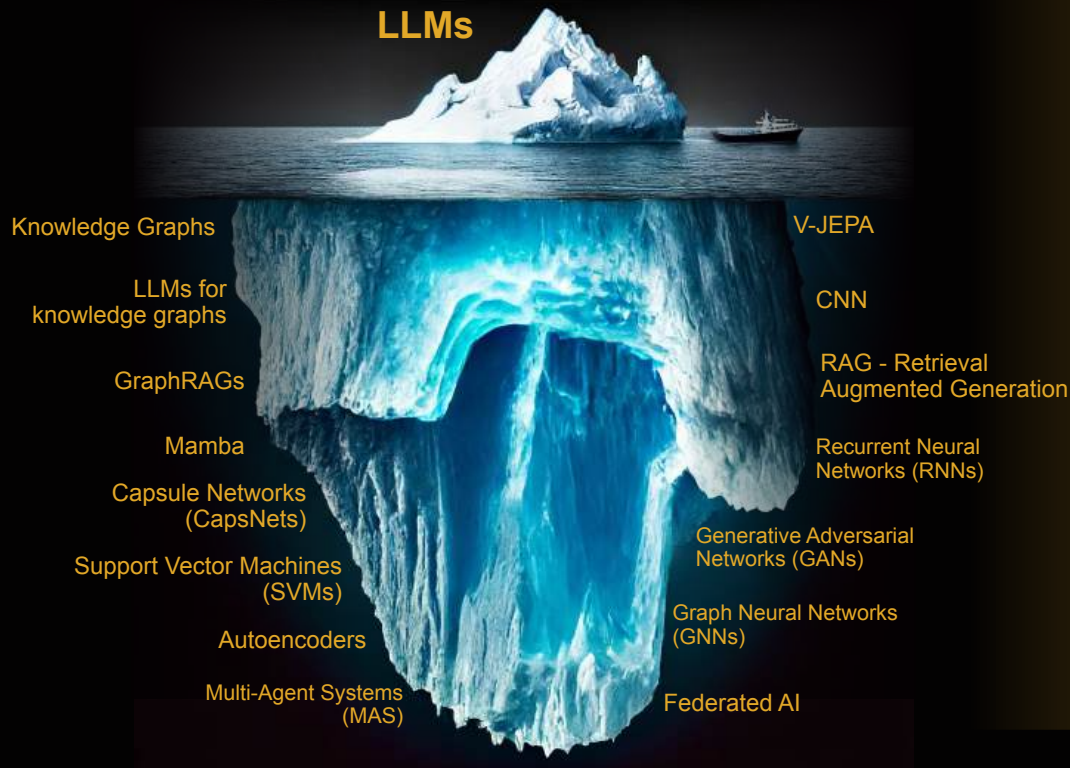
*"AI is not just a technology, it's a tool for **solving some of the world's biggest problems**, like climate change and disease."*

# Beyond LLMs





# Beyond LLMs



Applied to:  
molecular dynamics,  
physics, chemistry,  
biology...

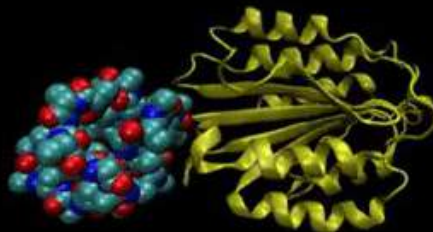
# AI enabling Quantum Technologies TODAY



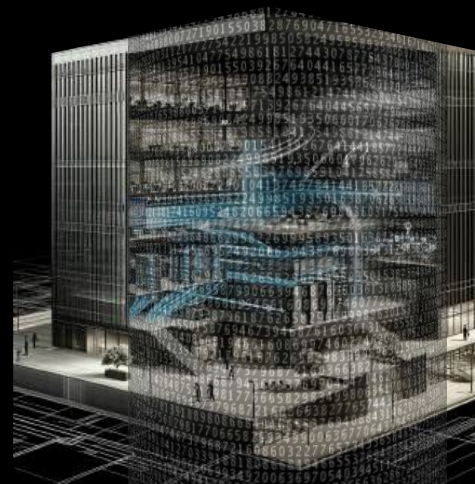
**Sensing**



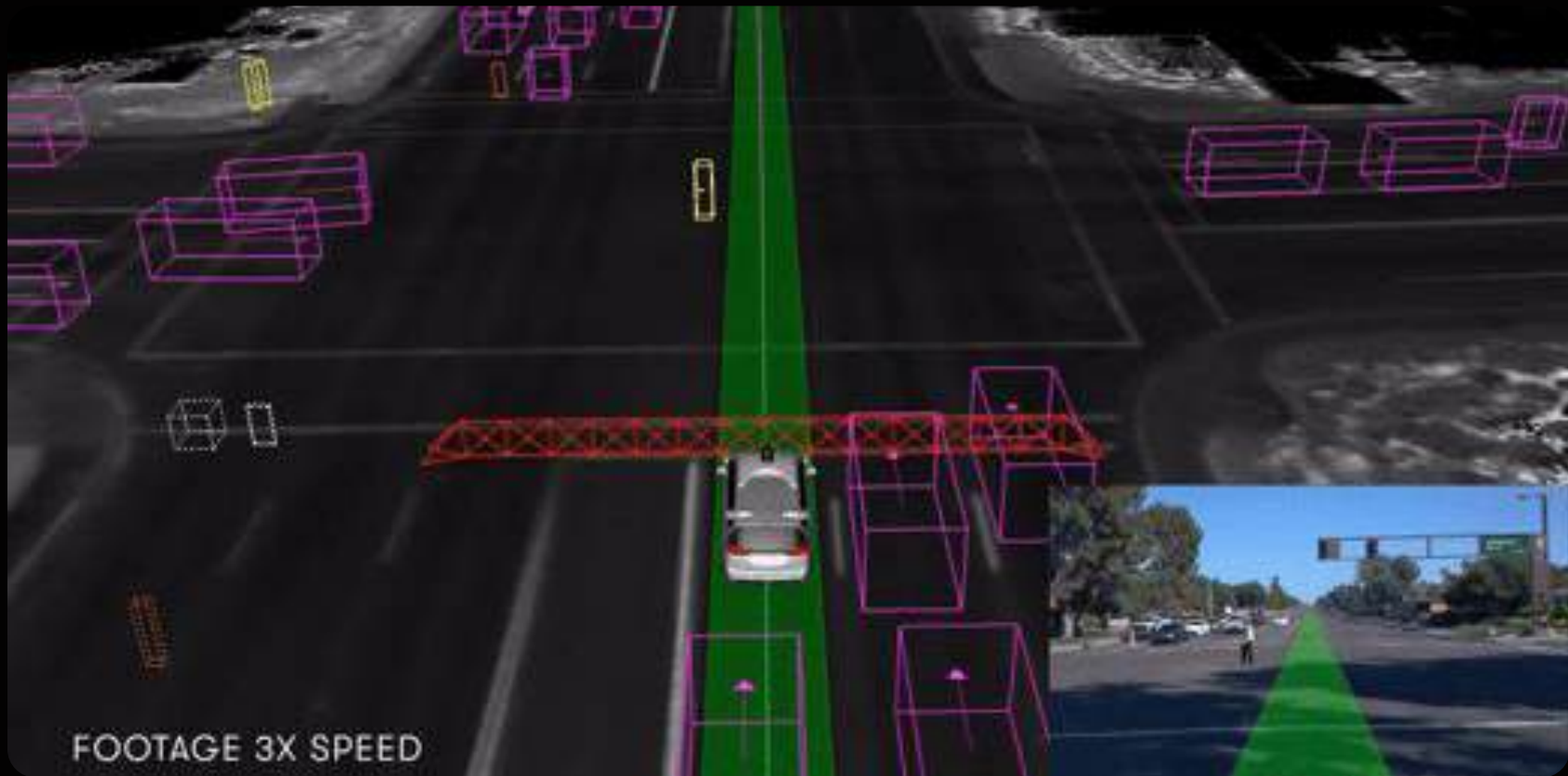
**Chemistry and  
Life Science**



**Security and  
Privacy**

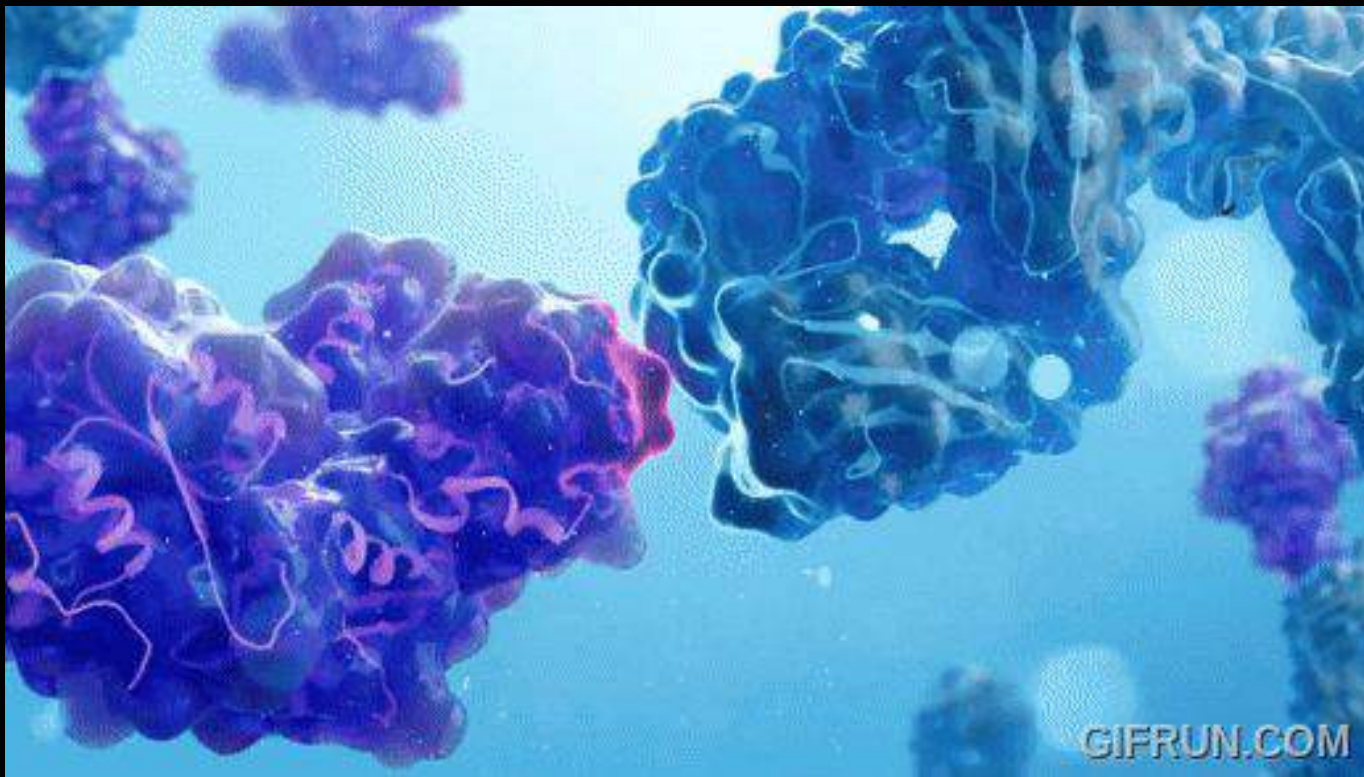


# Learning with AI Simulation



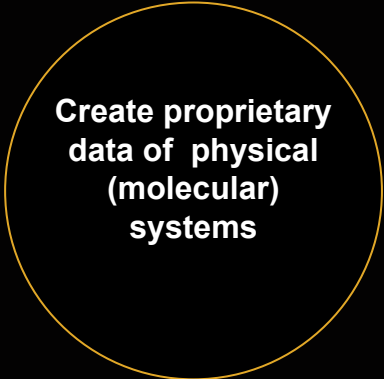
# AI Simulation

*Leveraging quantum equations data to train deep learning models*



# Snowball effect

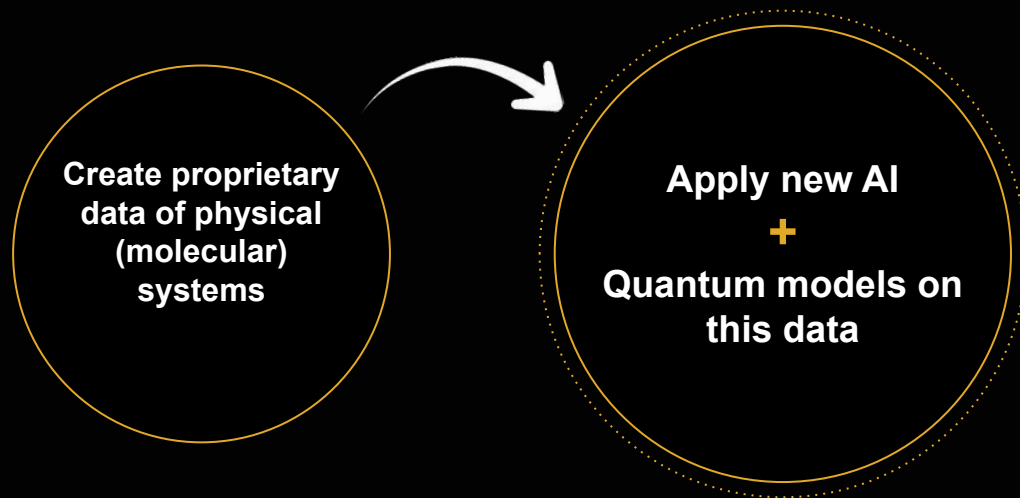
*Your models are as good as your data*



**Create proprietary  
data of physical  
(molecular)  
systems**

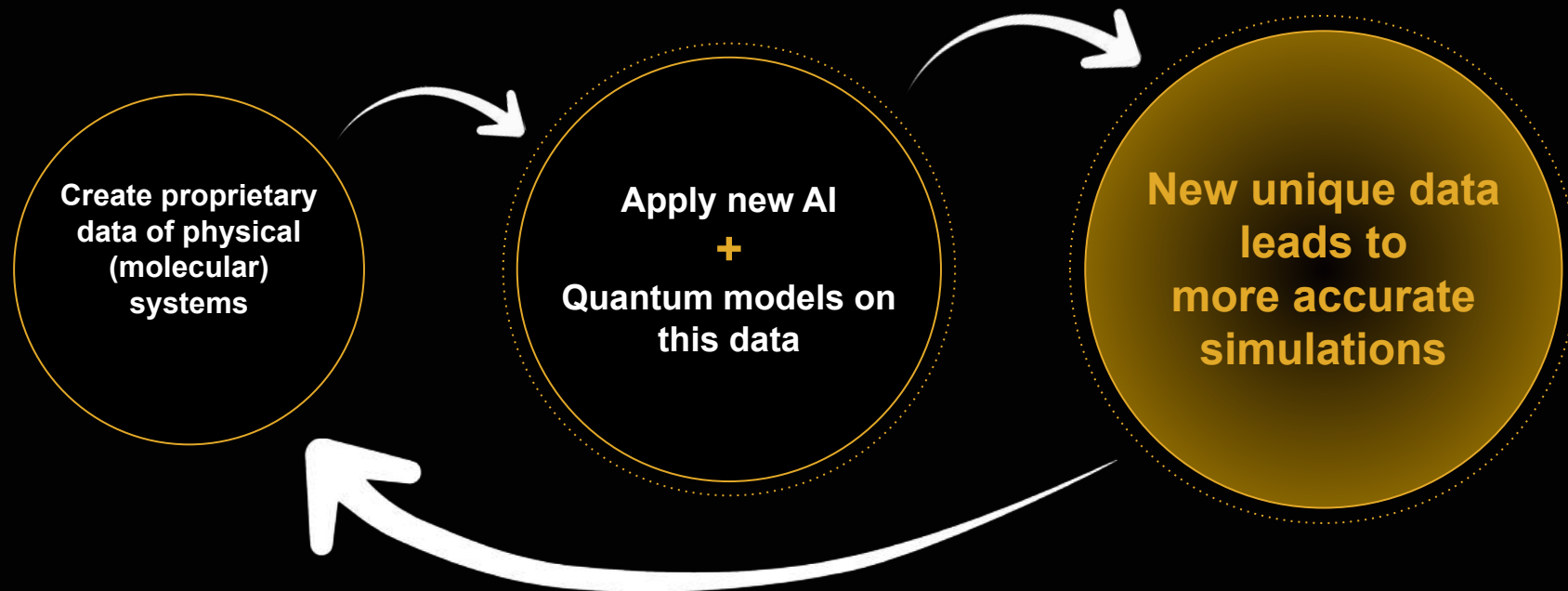
# Snowball effect

*Your models are as good as your data*



# Snowball effect

*Your models are as good as your data*



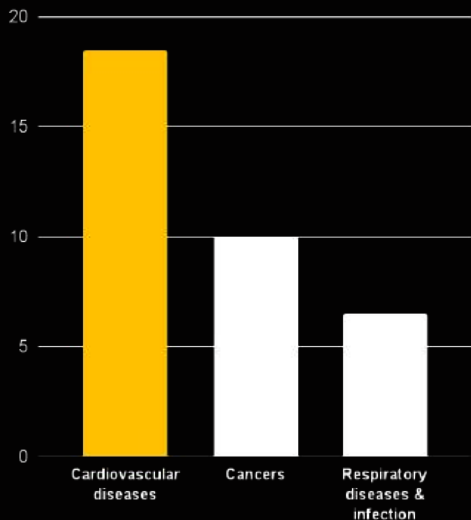






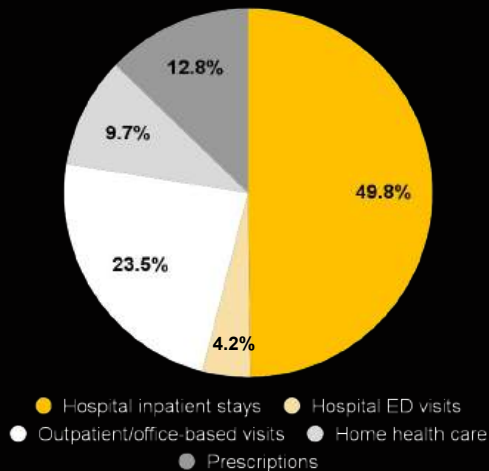
# Cardiovascular diseases have been the #1 cause of death for 30+ years

**19 Million people** worldwide died from cardiovascular diseases each year



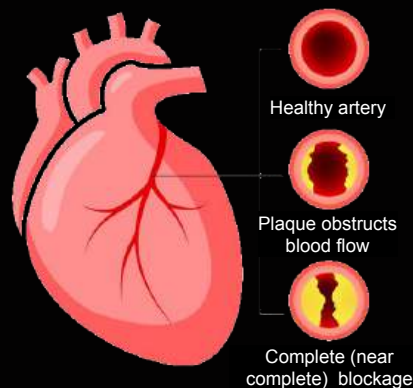
**Number of deaths by cause, worldwide**  
(2019, in millions)

The annual direct costs of heart disease in the United States is **US\$109B**



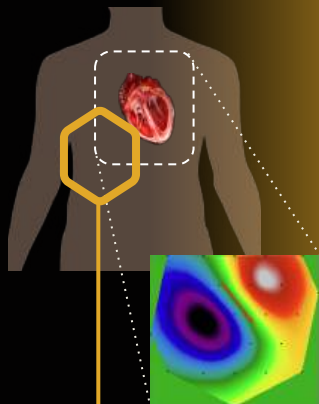
**Breakdown of the annual direct costs of heart disease**  
(Average 2017-2018, percentage)

**Coronary artery disease** is the most common type of heart disease



Reduced blood flow to the heart  
→ **chest pain**  
A complete blockage of blood flow  
→ **heart attack/ myocardial infarction**

# AI allows unshielded measurement for the first time



AI-enabled  
synthetic  
data

*MCG scan  
generated in  
an ER in <5  
mins*

Fully operated by clinical  
study coordinators after  
**1 hour of training.**



**High resolution Magnetic sensors**

detect the faint magnetic signal that represents heart function

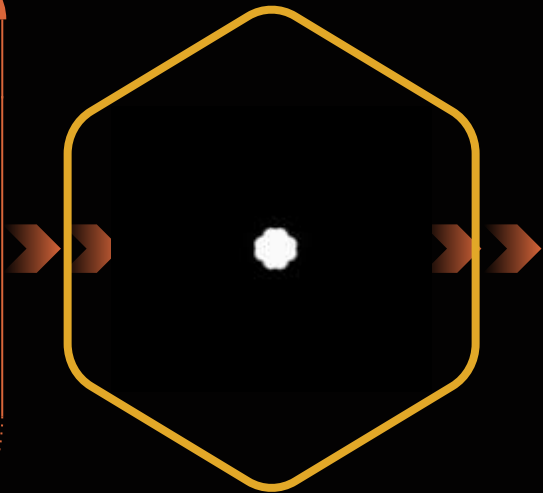
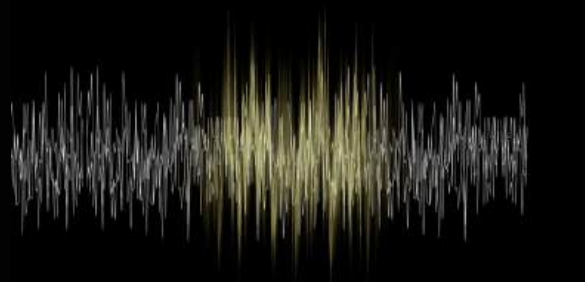


AI-enabled  
signal  
processing &  
data analysis

Unshielded, room  
temperature  
operation

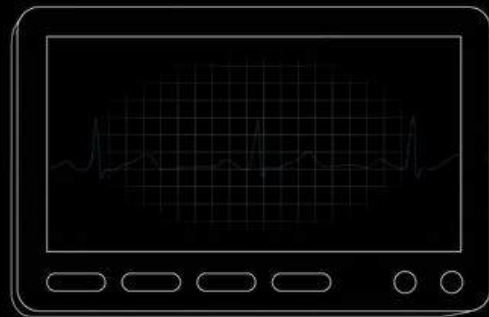
# Using AI to read Magnetic fields

What we get



AI models

What we deliver to the doctor

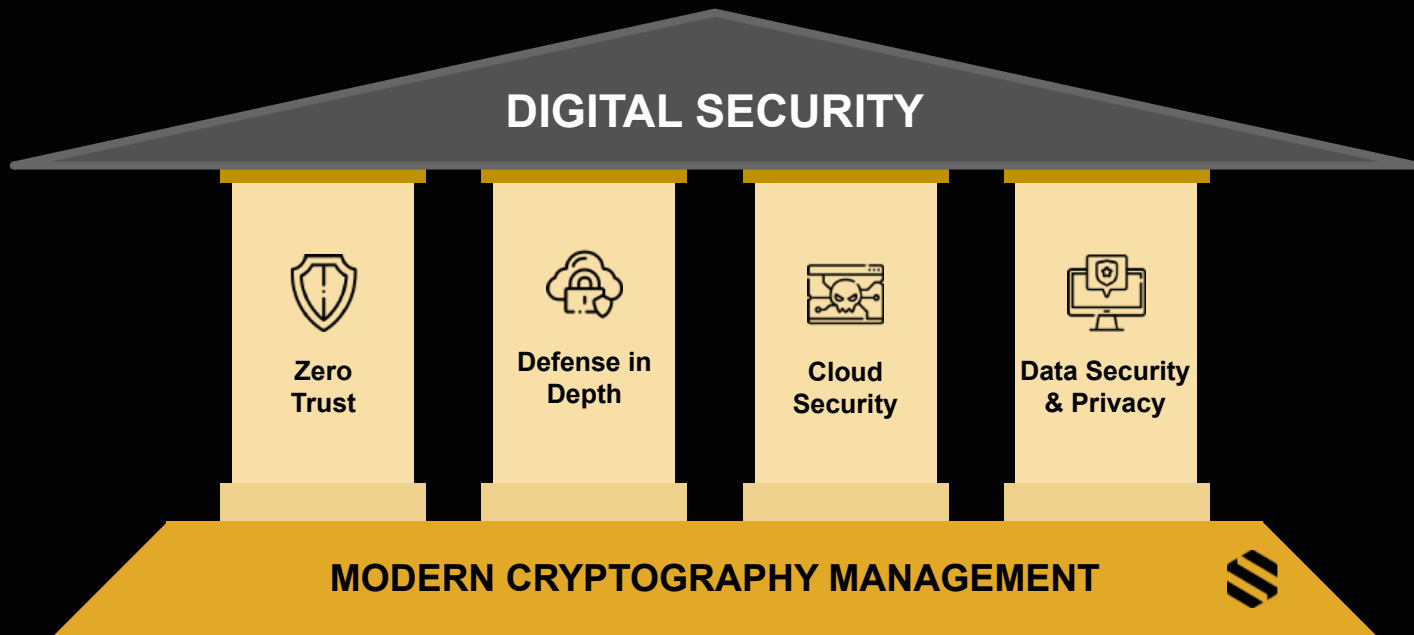


**That's Great...**




**But is it SECURE?**

# Cryptography management is foundational to all modern cyber transformations



Each of these programs have additional core pieces - but **without cryptography, none are possible**

# Today's cryptography management is bad: Broken protocols found in most enterprise environments



SECURITY

## MD5: The broken algorithm

28 July 2015 by Gorka Ramirez

7 years ago


DECIPHERS  
Security news that informs and inspires

Posted on November 13, 2022 at 7:49 AM

## CANADIAN FOOD RETAIL GIANT SOBEYS BECOMES LATEST VICTIM OF RANSOMWARE ATTACK


Canadian food retail giant Sobeys has become the latest victim of a cyber attack. The company has been experiencing issues with its IT systems since the attack.

As one of the two national grocery retailers in Canada, Sobeys services a network of 1,500 stores with 134,000 employees. Its operations cover all ten provinces under multiple retail banners, including Thrifty Foods, FreshCo, IGA, Safeway, Lawtons Drugs, and Foodland.



Jan 7, 2020

SHA-1 'FULLY AND PRACTICALLY BROKEN' BY NEW COLLISION



Full cryptographic migrations can take **decades to complete**, as demonstrated by recent attacks



**First step must be to identify and remove today's vulnerabilities (SHA-1, MD5 etc...)**

# Store Now Decrypt Later (SNDL) attacks are already happening around the world

Encrypted information is targeted by adversaries

Sensitive data that is still valuable years from now  
and will be exposed by QC if not secured by PQC



Retrieval of readily  
available data from the  
internet, VPNs, etc



Storage



Quantum processing



Decrypted  
message

# Significant Policy Drivers Since 2020...



**Executive Order 14028:** Improving Our Nation's Cybersecurity

2020



**NSM-8:** Improving the Cybersecurity of National Security, DoD, & Intelligence Community Systems

**NSM-10:** Promoting US in Quantum Information Sciences & Mitigating risk to Cryptographic Systems

**OMB M-23-02:** Memorandum Mitigating to Post Quantum Cryptography

**H.R. 7535** Quantum Computing Cybersecurity Preparedness Act

2022



**OMB M-24-14:** Cybersecurity Priorities for FY 26 Budget

**NIST PQC** Standards (FIPS 203-205)

OMB Report on PQC Migration, July 2024

2024



**\$7.1B**

**OMB recommended migration costs (2025-2035)**  
~5% of cyber defense budget

**\$17.9T**  89%

**costs of cyber attacks globally by 2030**

**“The threat of “record-now-decrypt-later attacks” means that the migration to PQC must start before a CRQC is operational; organizations MUST prioritize systems and data for migration”**



## Observability

You cannot manage what you don't know. Build a **3D inventory** of your cryptography

## Control

Making the right thing the easy thing. **Continuously assess** the quality and security of your cryptography

## Integrate

Make cryptography management part of the **existing IT management toolchain and workflows** (Jira, ServiceNow, Splunk...)

## Enforce

Compliance standard, corporate policies for data encryption and key management, PQ cryptography

# Modern Cryptography Management

## Document third-parties

Document artifacts and algorithms injected in your IT by external vendors, **check interoperability**

## Monitor performance, live

Transitioning to new standard while **optimizing IT performance**

## Agility

Smooth changes from one algorithm to another, with **no code changes and avoiding operational risk**

# The Power of Data Beyond LLMs



...Securely!



**Thank You!**

