Combining Blockchain (BC) and Artificial Intelligence (AI)

Professor Spyros Makridakis,
University of Nicosia
Institute For the Future (IFF)
Emeritus Professor, INSEAD

Blockchain: The Invisible Technology That's Changing the World

Blockchain-based networks, decentralized apps (DApps), and distributed ledgers are becoming the foundation of much of your digital life. There's a new immutable digital fabric remaking the internet beneath us, and you probably don't even realize it.

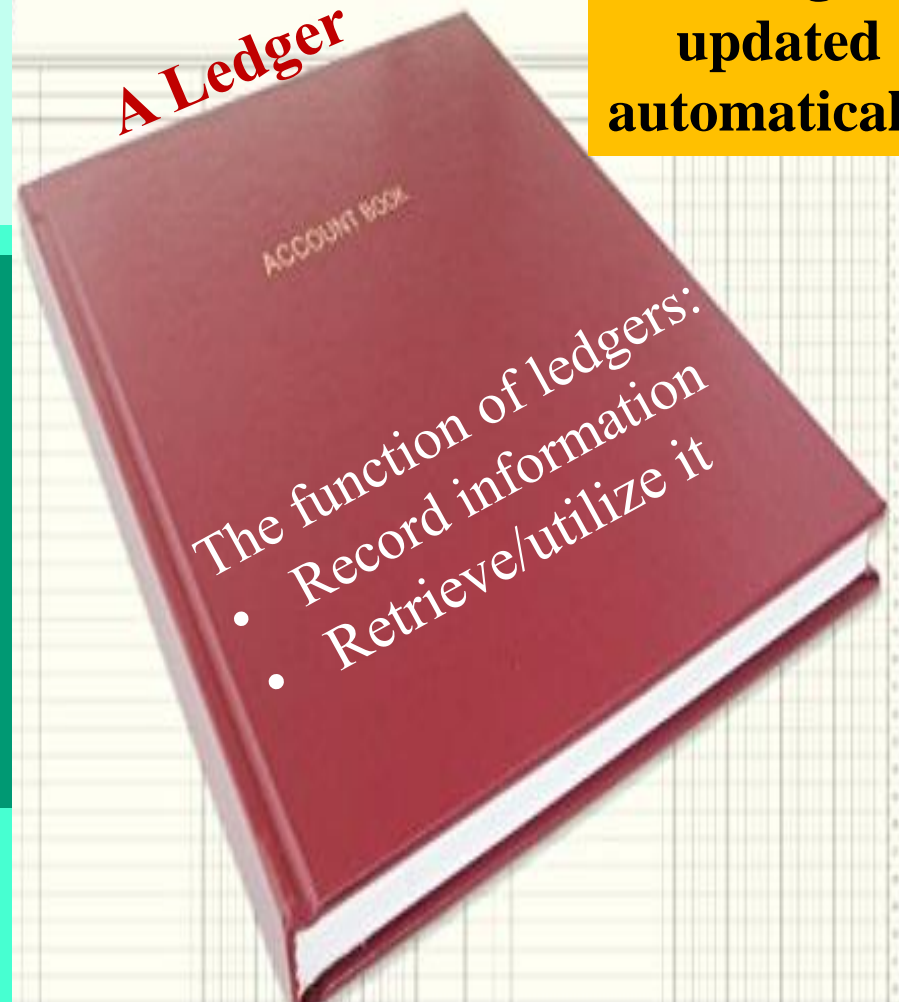By Rob Marvin   August 29, 2017 1:38PM EST

What is blockchain?

A Distributed, Decentralized, Ledger with some special, very valuable properties

- Ascertains **Trust** between unknown parties
- Its Records are **Immutable (Incorruptible)**

Safety **Reliability**

- Result: Disintermediation
- Result: Costs/Speed

A Ledger

ACCOUNT BOOK

50 Ledgers, updated automatically

The function of ledgers:
- Record information
- Retrieve/utilize it

Information is Encrypted and new Blocks are Chained to previous ones

Disruptive Changes: Traditional Internet

‣ **Traditional Internet of Communications/Information (Sending/receiving emails, searching Google, Tweeting, using Facebook, listening to music, watching videos, buying things on line, ordering a taxi, getting money from ATM etc.)**

- • **Implications for**
  - > **The advertising revenues of Mass Media**
  - > **Travel agents issuing tickets**
  - > **Bookstores and other retailers**
  - > **Phone operators**
  - > **Postal workers**
  - > **Bank tellers**
  - > **Job recruiters**
  - > **Librarians**
  - > **etc., etc.**

The birth of the Giants: Google, Facebook, Amazon, Alibaba

The birth of Network firms: Uber, Didi Chuxing, Airbab, Linkedin, Expedia, Netflix
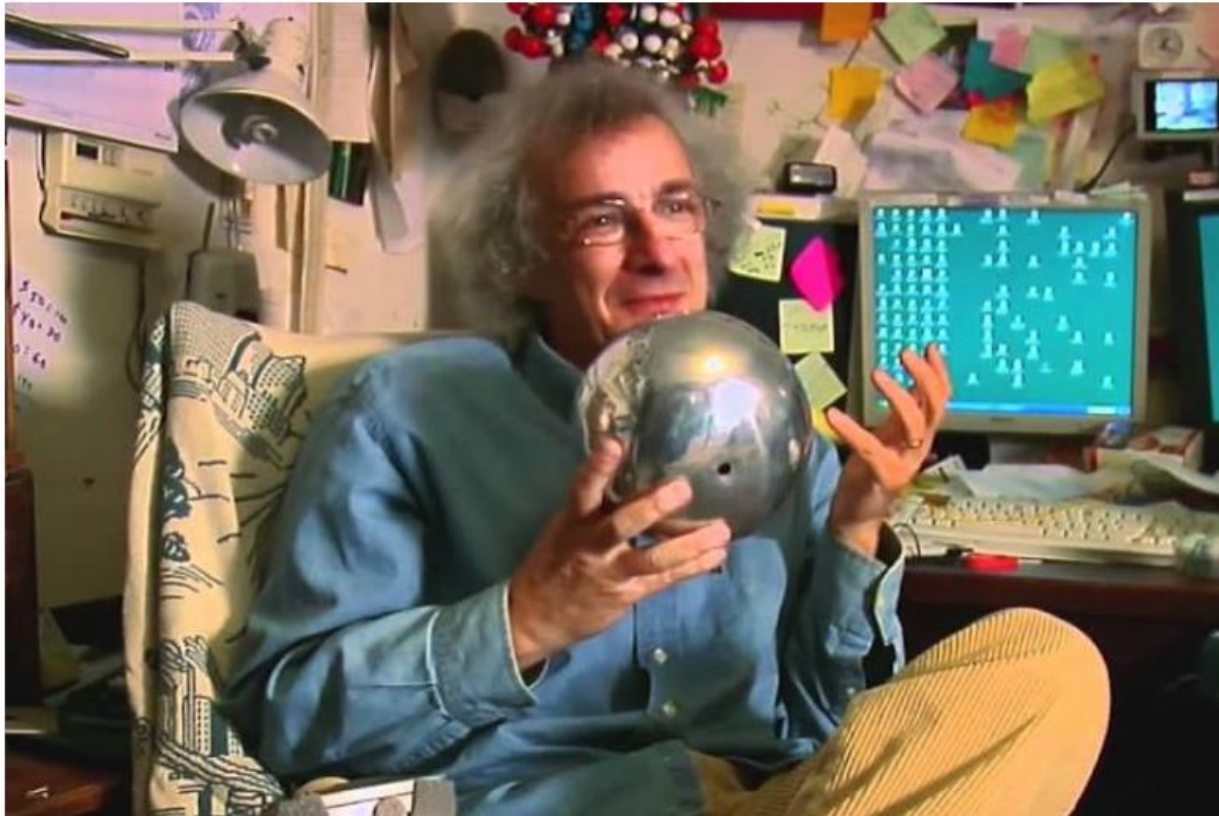
Blockchain is today where the Internet was in the middle of 1990s

WHY THE WEB WON'T BE NIRVANA

BY CLIFFORD STOLL ON 2/26/95 AT 7:00 PM

"Baloney. Do our computer pundits lack all common sense? The truth is no online database will replace your daily newspaper, no CD-ROM can take the place of a competent teacher and no computer network will change the way government works".

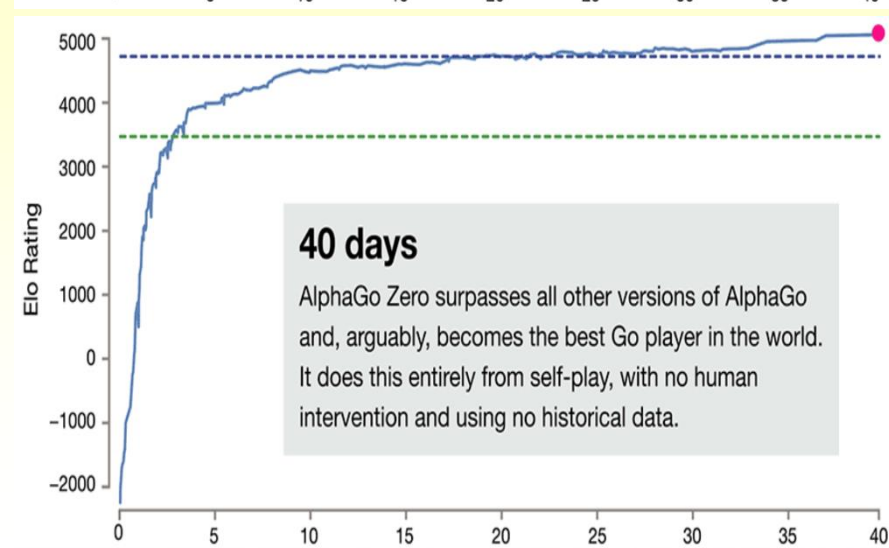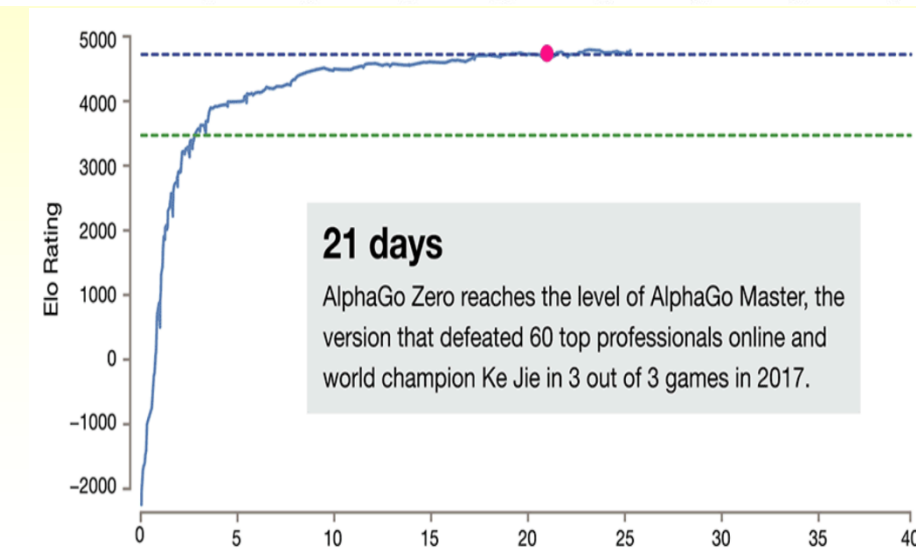# Disruptive Changes: Internet of Value (Being Created using Blockchain)

The Internet of Value using Blockchain (Securely trading virtual currencies, Transferring money for $2 instead of $20, Drawing/ Executing wills with smart contracts, eHealth records, Land registry certificates etc.)

▶ Implications for
- Travel agents booking vacations
- Taxi and Lorry drivers
- Language translators

The birth of the NEW Giants and Network firms ?

- Bankers, Investment analysts/Portfolio executives
- Lawyers
- X-ray, CT scan and eventually many other doctors
- Car Companies and Auto Dealers
- Supervisors and Managers
- Professors

AI: A revolutionary technology that teaches machines to think/learn on their own by analyzing and discovering patterns in massive data/info

Clean slate

Tabula rasa

0 days
AlphaGo Zero has no prior knowledge of the game and only the basic rules as an input.

3 days
AlphaGo Zero surpasses the abilities of AlphaGo Lee, the version that beat world champion Lee Sedol in 4 out of 5 games in 2016.

21 days
AlphaGo Zero reaches the level of AlphaGo Master, the version that defeated 60 top professionals online and world champion Ke Jie in 3 out of 3 games in 2017.

40 days
AlphaGo Zero surpasses all other versions of AlphaGo and, arguably, becomes the best Go player in the world. It does this entirely from self-play, with no human intervention and using no historical data.

Driverless Cars Could Reduce Traffic Fatalities by Up to 90%, Says Report

They're set to have one of the biggest impacts on public health ever.

China wants to be a $150 billion world leader in AI in less than 15 years

- China laid out plans to become a world leader in artificial intelligence (AI) by 2030.
- The government aims to make the AI industry worth $150 billion.
- China's three step program outlines its aim to use AI in a number of areas from the military to smart cities.

Putin: Leader in artificial intelligence will rule world

- Putin says that whoever reaches a breakthrough in developing artificial intelligence will come to dominate the world.
- Putin warned that "it would be strongly undesirable if someone wins a monopolist position".

Combining Blockchain and AI

First "Alliance for Development of Artificial Intelligence and Block Chain Technologies" Will Be Established in China for Development of Integration of the Two Technologies

SHARE

BEIJING, Sept. 5, 2017 /PRNewswire/ -- "Seminar of Artificial Intelligence and Block Chain Technologies" was held in Tsinghua University on September 3rd, during which it was proposed to establish the "Alliance for Development of Artificial Intelligence and Block Chain Technologies" (ABCD Alliance for short). The alliance, which will become the first alliance committed to development of integration of AI (Artificial Intelligence) and block chain technologies in China, aims at promoting integration and long-term development of "artificial intelligence and block chain", advancing innovation for the two technologies and other relevant

Blockchain

The **Secure** and **Reliable** Storing/ Transmission of Data/Information among users without the need of Intermediaries

Artificial Intelligence:
A revolutionary technology that can think/learn on its own by Analyzing and Discovering patterns in massive amounts of data/ info

Artificial Intelligence

Applications

- Government
- Health
- Banking/FinTech
- Driverless Vehicles
- IoT
- Supply Chain
- Smart Contracts
- DAO (Decentralized Autonomous Organizations)
- New applications: Irma Numerai

DATA

Blockchain

Value Added

- Security
- Reliability
- Lower Costs
- Greater Speed
- Standardization
- Cloud Services

Integrating AI and Blockchain (BC): Few Applications Great Prospects

▸ **Government**: Little BC (apart from exceptions), none AI

▸ **Health**: Some **BC**, Very little AI

▸ **Banking/FinTech**: Banking mostly BC, FinTech mostly AI

▸ **AV**: All AI, **Needs a lot of BC**   **Consider Terrorist Attacks**

▸ **IoT**: Mostly BC, Needs AI

▸ **Supply Chain**: Mostly BC, logistics mostly AI, Needs Both

▸ **Smart Contracts**: All BC, little AI, Must Integrate the TWO

▸ **DAO**: All BC, little AI, Must Integrate the TWO

Combining Blockchain and AI: Still in its Infancy

Estonia's eHealth System: The closest you can get in combining AI and Blockchain

Personalized Medicine

healthcare

Estonia's healthcare system has been revolutionized by innovative e-solutions. Patients and doctors, not to mention hospitals and the government benefit from the convenient access and savings that e-services have delivered.

Each person in Estonia that has visited a doctor has an online e-Health record that can be tracked. In order to keep health information completely secure and at the same time accessible to authorised individuals, the electronic ID-card system uses KSI Blockchain technology to ensure data integrity and mitigate internal threats to the data.

e-Health Records   e-Prescription

95% of health data digitized

97% of prescriptions are digital

500,000 queries by doctors every year

100% electronic billing in healthcare

IBM's Watson and DeepMind's Work on AI in Health

The University of Texas, "is using the IBM Watson cognitive computing system for its mission to eradicate cancer." **Well, now that future is past.** The partnership between IBM and one of the world's top cancer research institutions is falling apart. It is confirmed that the project (having cost $62 m) is on hold since late last year.

On AI research, we (DeepMind) are undertaking research partnerships with world-class hospital groups Moorfields and UCLH, **exploring** whether AI techniques can be used effectively and safely to support nurses and doctors. The results of this work **will be subject** to rigorous clinical scrutiny and will be published in peer-reviewed academic journals

Banking and Finance

How banks and financial institutions are implementing blockchain technology

Andrew Meola
Sep. 20, 2017, 4:44 PM   8,710

FACEBOOK | LINKEDIN | TWITTER | EMAIL | PRINT

How Blockchain Technology Spawned Virtual Currencies

Blockchain technology, less commonly known as distributed ledger technology (DLT), is the underlying foundation that can create shared digital databases of entries that are unchangeable.

Initially, the tech's developers conceived it as a way to centralize record-keeping (particularly of financial transactions) without the need for authorization by an third party. Instead, multiple users with access to

MAJOR BLOCKCHAIN CONSORTIA AND NETWORKS

R3 CEV

Bank of America, NATIXIS, COMMERZBANK, THOMSON REUTERS, MetLife, PING AN, 招商银行, NOMURA, ING, Westpac, citi, TD Bank, STATE STREET, TOYOTA, AIA, WELLS FARGO, CommonwealthBank, Danske Bank, CREDIT SUISSE, BNP PARIBAS, BNY MELLON, RBS, BBVA, MIZUHO, HSBC, MUFG, BARCLAYS, SMBC, UBS, usbank, BMO Financial Group, Northern Trust, Hana Financial Group, J.P.Morgan, SEB, SOCIETE GENERALE, CIBC, RBC, UniCredit, Deutsche Bank, INTESA SANPAOLO, Scotiabank, Nordea, SBI Holdings

Digital Asset Holdings (Investors)

ABN·AMRO, accenture, BNP PARIBAS, ASX, citi, Broadridge, CME Group, Goldman Sachs, ICAP, DTCC, IBM, Deutsche Börse Group, J.P.Morgan, PNC, Santander InnoVentures

Hyperledger Project (selected members)

accenture, ANZ, SWIFT, Digital Asset Holdings, STATE STREET, J.P.Morgan, CME Group, WELLS FARGO, DTCC, BNP PARIBAS, IBM, CISCO, SBERBANK, ABN·AMRO, Deutsche Börse Group, bloq, B, r3, Broadridge, BNY MELLON, London Stock Exchange Group, BLOCKCHAIN

Ripple

The Massive Hedge Fund Betting on AI

Initially wary of the technology, Man Group was soon persuaded by the returns from algorithm-centric funds.

By **Adam Satariano** and **Nishant Kumar**

The M4-Competition

As chief executive officer of one of the world's largest hedge funds, Luke Ellis prides himself on a healthy appetite for risk. "My job," he says, "is to not blink." About five years ago, he did, though—in a big way. What spooked him was an experiment at his firm, Man Group Plc. Engineers at the company's technology-centric AHL unit had been dabbling with artificial intelligence—a buzzy, albeit not widely used, technology at the time. The system they built evolved autonomously, finding moneymaking strategies humans had missed. The results were startlingly good, and now Ellis and fellow executives needed to figure out their next move.

Autonomous Vehicles

‣ **Blockchain technology and AI would allow Autonomous Vehicles (AV) to be truly autonomous. This means that they could refuel, recharge and park on their own and pay for those services as well as for tune-ups, oil changes or whatever other services needed**

‣ **The blockchain will assign each AV a digital identity that can follow it, using GPS, everywhere, time-stamping its location and providing instructions of what to do next**

‣ **AI will utilize the data collected to determine traffic patterns and speed up the time of journeys**

‣ **Blockchain and AI will allow full interconnectivity of all AV on the road, minimizing accidents, coordinating the flow of traffic and optimizing the routes to follow**

IoT

‣ **Blockchain could revolutionize the IoT if applied securely to the estimated 8.5 to 20 billion of connected IoT devices that exist in 2017. Exploiting the information they will generate using AI can transform our homes and cities and have a profound effect on our life's quality**

‣ **AI can provide important advantages optimizing the functioning of all IoT devices, allowing the trading of digital assets, the automatic ordering of goods and services and the enactment of smart contracts.**

‣ **Eciotify, a startup, specializes in applying blockchain to the IoT and enabling the use of Smart Contracts between IoT devices.**

Artificial Intelligence: The next big thing in Supply Chain Management

Imagine the endless possibilities of learning from 2.5 quintillion bytes of data generated every day. Artificial intelligence (AI), which began its journey 60 years ago is well on its course to make this implausible scenario a reality. Artificial Intelligence, is slowly taking over our lives.

By: Manish Chandra and Anand Darbhe | Published: July 26, 2016 12:32 PM

3
SHARES

f Facebook   🐦 Twitter   g+ Google Plus

Share on Twitter

Supply Chain (SC)

- Blockchain can save hundreds of billions by eliminating
  - Paper-based procedures
  - Letter of credits and factoring
  - Detailed inspections
- AI is being used at present for the logistics part (scheduling and planning) of SC but can be extended in the future for the majority of SC transactions including ordering of material and parts
- Smart Contracts, in conjunction to AI, can further automate SC by specifying how things should be implemented

Smart Contracts

▸ The purpose of smart contracts is the automation of business relations by reducing the need for paperwork and by eliminating intermediaries (e.g., lawyers) thus decreasing costs

▸ Wills and all sorts of Legal documents can be done using smart contracts (Ethereum allows the creation of smart contracts)

▸ AI can be incorporated into smart contracts assuring that they are legally binding and allowing their adaption in case of environmental changes

DAO (Decentralized Autonomous Organizations): Unlimited possibilities, Breakthrough implications

▸ **A DAO is an organization that exists as autonomous code on the blockchain, with no physical presence or employing people**

▸ **The code is embedded into a smart contract that is executed once the postulated conditions are met**

▸ **Anyone with an Internet connection can be a participant (owner), or a resource (work for a DAO)**

▸ **The code (smart contract) cannot be altered unless 51% of the participants agree**

▸ **People can participate in a DAO by buying tokens (bought and sold on exchanges)**

New Applications Combining Blockchain and AI

ANALYTICS   ENTERPRISE INFRASTRUCTURE   TECH

Drones, blockchain, and AI are future of insurance industry: Capgemini

Numerai

A new kind of hedge fund built by a network of data scientists.

JOIN NUMERAI   SIGN IN

Crowd Sourcing

The stock market is inefficient with respect to new developments in machine learning — only a fraction of the world's data scientists have access to its data. Numerai is changing this.

What Next?

**Short vs Long-Term Predictions: Amara's law**

Will Cars Replace Horses?

"Nevertheless no machine will ever be able to perform what even the worst horses can−the service of carrying people and goods through   the bustle and throng of a great city."
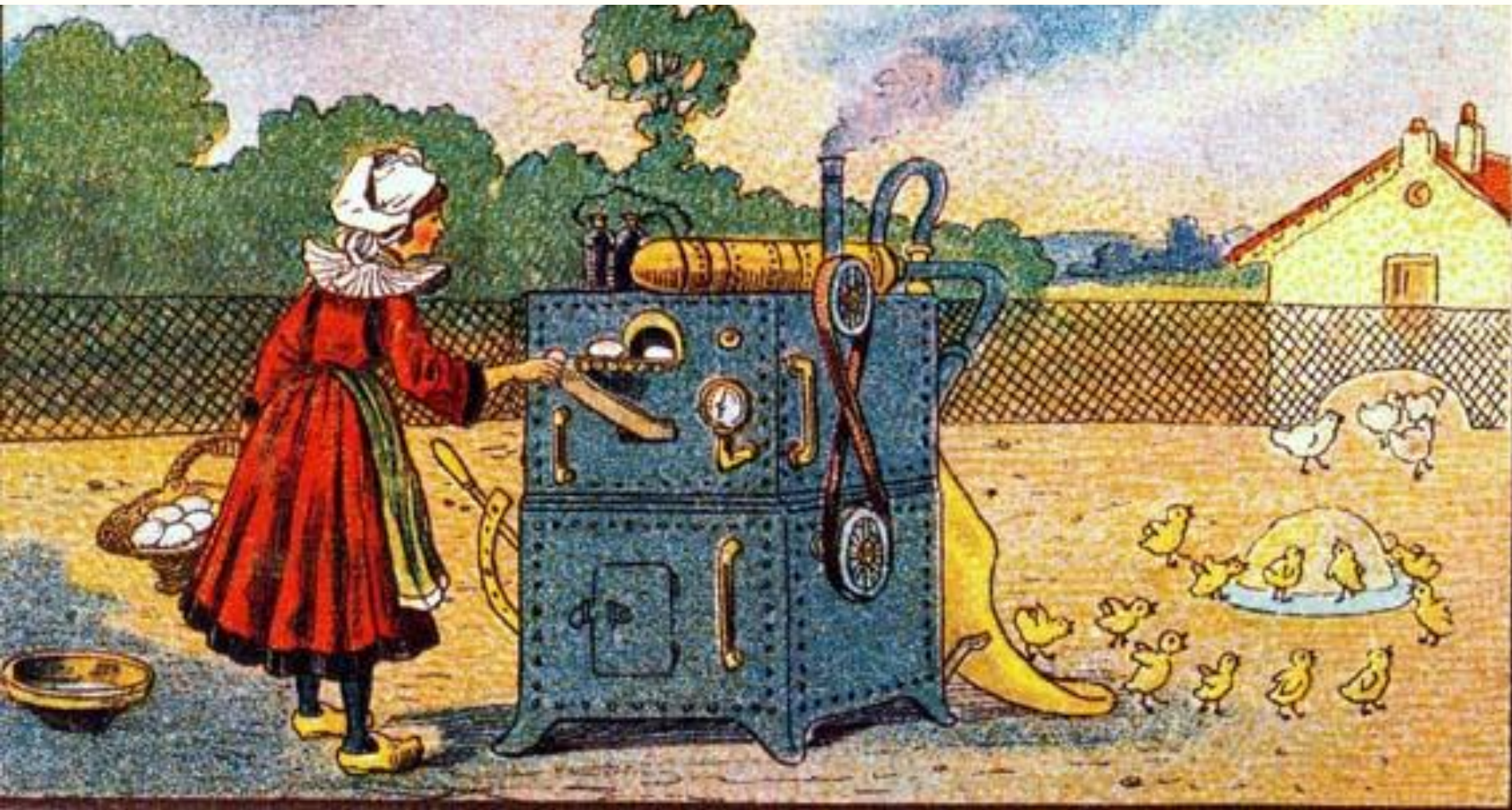   *(Jean-Baptiste Say, 1828)*

Could Jean-Baptiste had ever Dreamed of Driverless Cars back in 1828?
(The less than 190 years between 1828 and 2017 is insignificant in historical terms)

Kitchen Automation in the Year 2000. Notice: (a) No electrical appliances, (b) Child labor, (c) How well the helpers are dressed
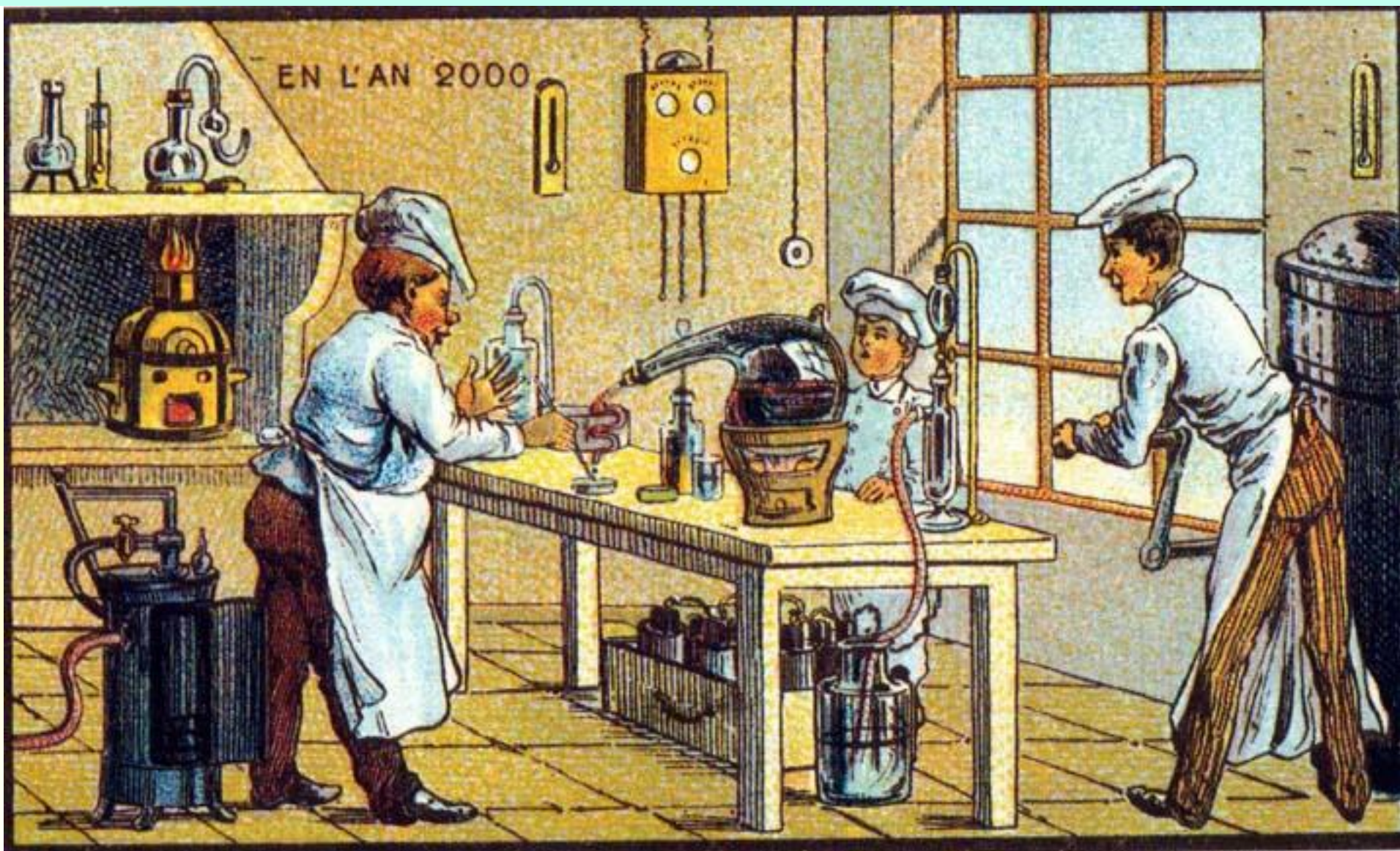
Automation in the Year 2000: Steam engine machine hatching chicken.
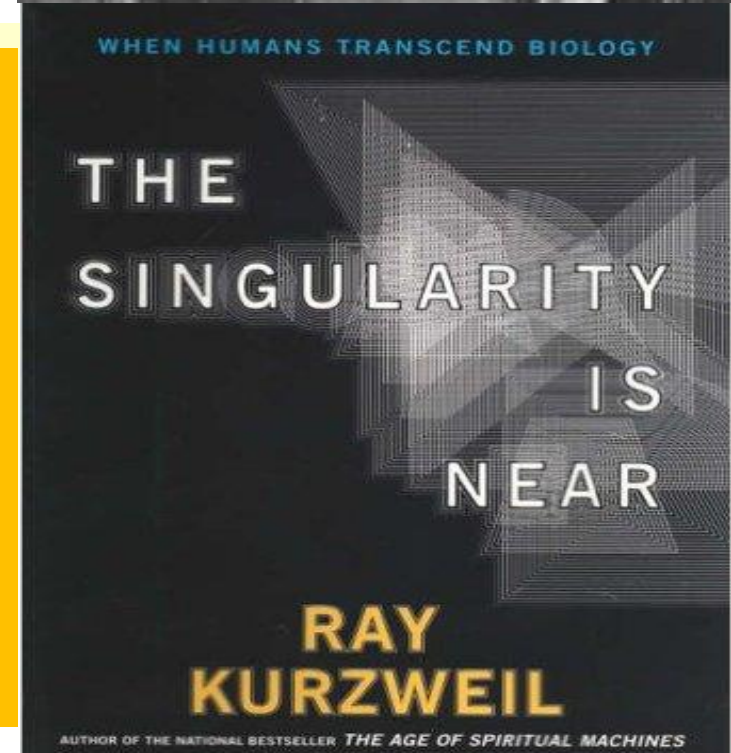**Notice: How well the farm girl is dressed**

"
OUR
QUANTUM COMPUTER
IS
100 MILLION TIMES FASTER
THAN PC.
- GOOGLE

WHEN HUMANS TRANSCEND BIOLOGY

THE
SINGULARITY
IS
NEAR

**RAY
KURZWEIL**

AUTHOR OF THE NATIONAL BESTSELLER *THE AGE OF SPIRITUAL MACHINES*

Science fiction is slowly becoming science fact (powered by BC and AI) with far reaching consequences, affecting all aspects of our lives, work and societies

Thank You