The Blockchain Transformation of Healthcare

September 13, 2017
Atlanta

Jack Shaw
@jackshaw

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HIMSS GEORGIA Chapter

Health Care Information Challenges

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- Healthcare Providers, Payers, and Patients must increasingly collaborate.
- This requires increased sharing of Patient information.
- To date increasing use of digital technologies has resulted in health information silos.
- Huge amounts of time and money spent managing data exchanges based on traditional technologies.
- Most hospital / clinical systems can't easily and safely share data. The result: delays and errors – some potentially fatal.
- Doctors are spending more time typing than with patients resulting in increased physician burnout.
- Balancing collaboration vs. privacy vs. fraud prevention is beyond the capabilities of traditional technologies

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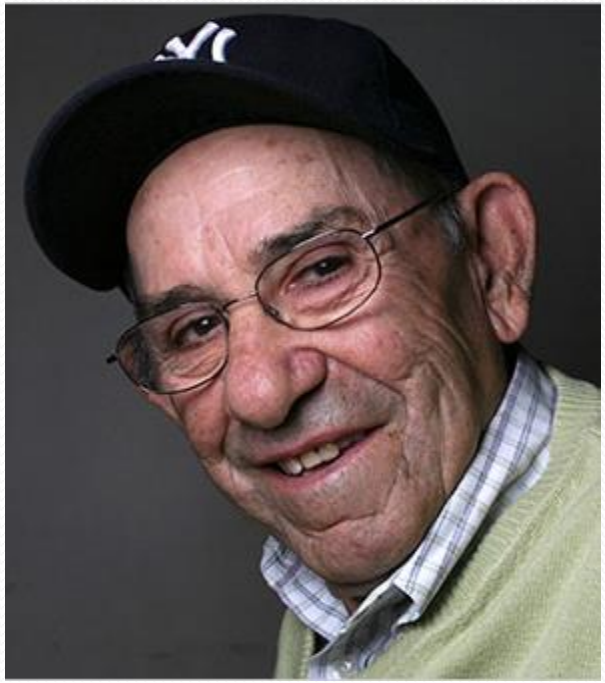

Yogi Berra

Making predictions is very hard,

especially about the future.

Predictions?

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- “We don’t sell books!”
- “This notion you’re peddling…”
- Nevertheless…

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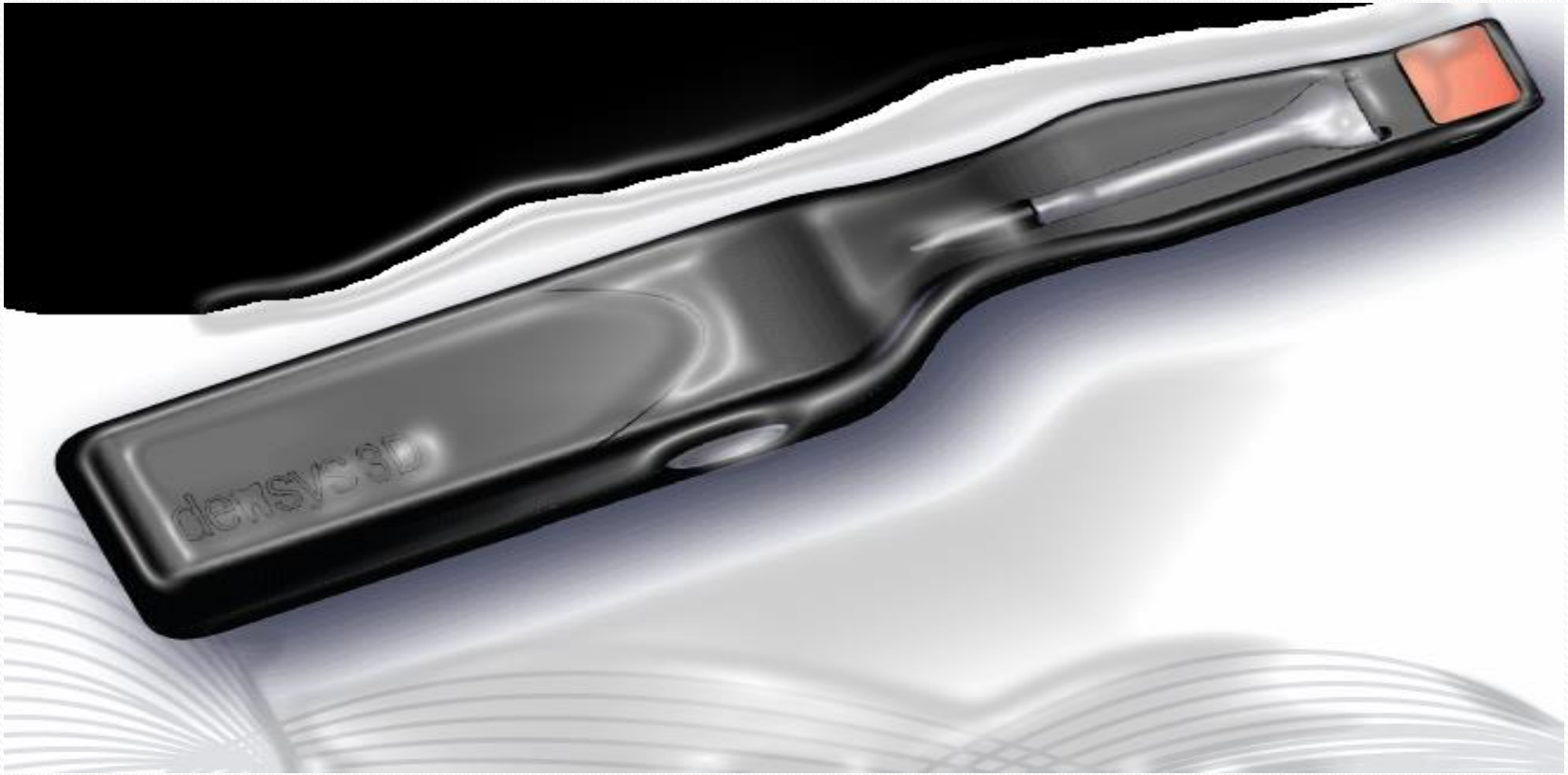

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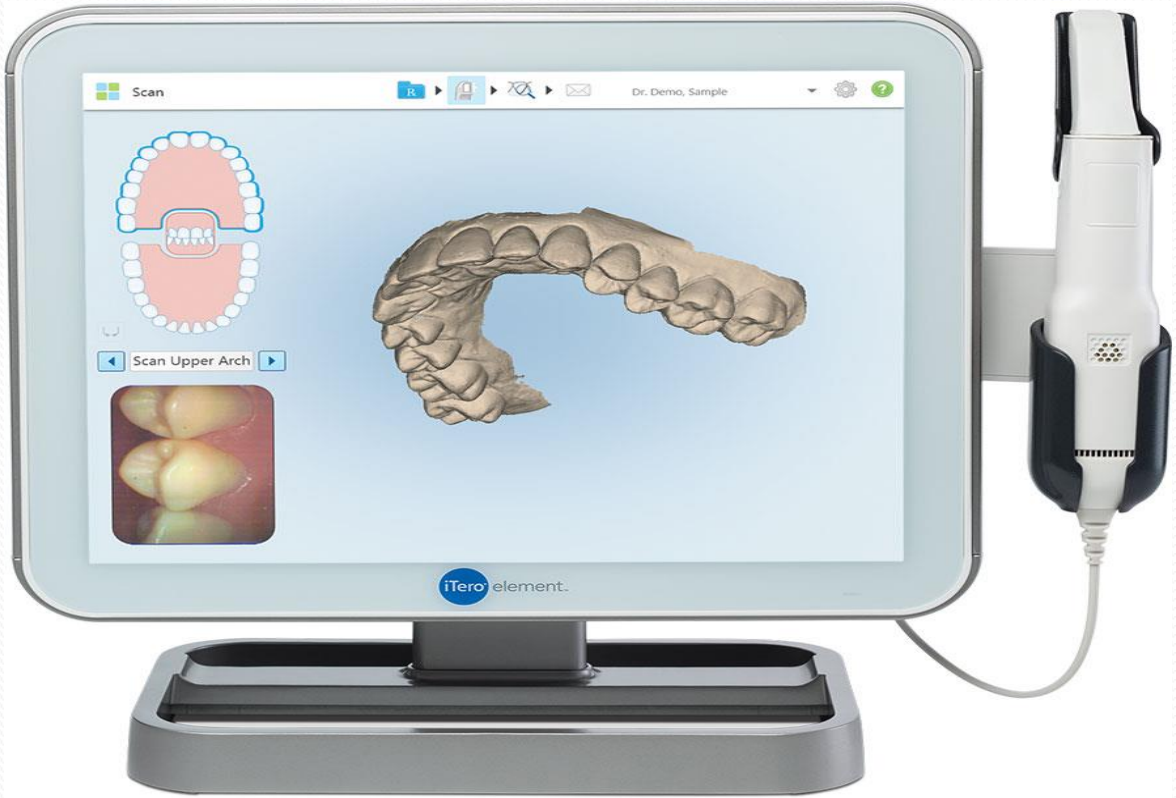

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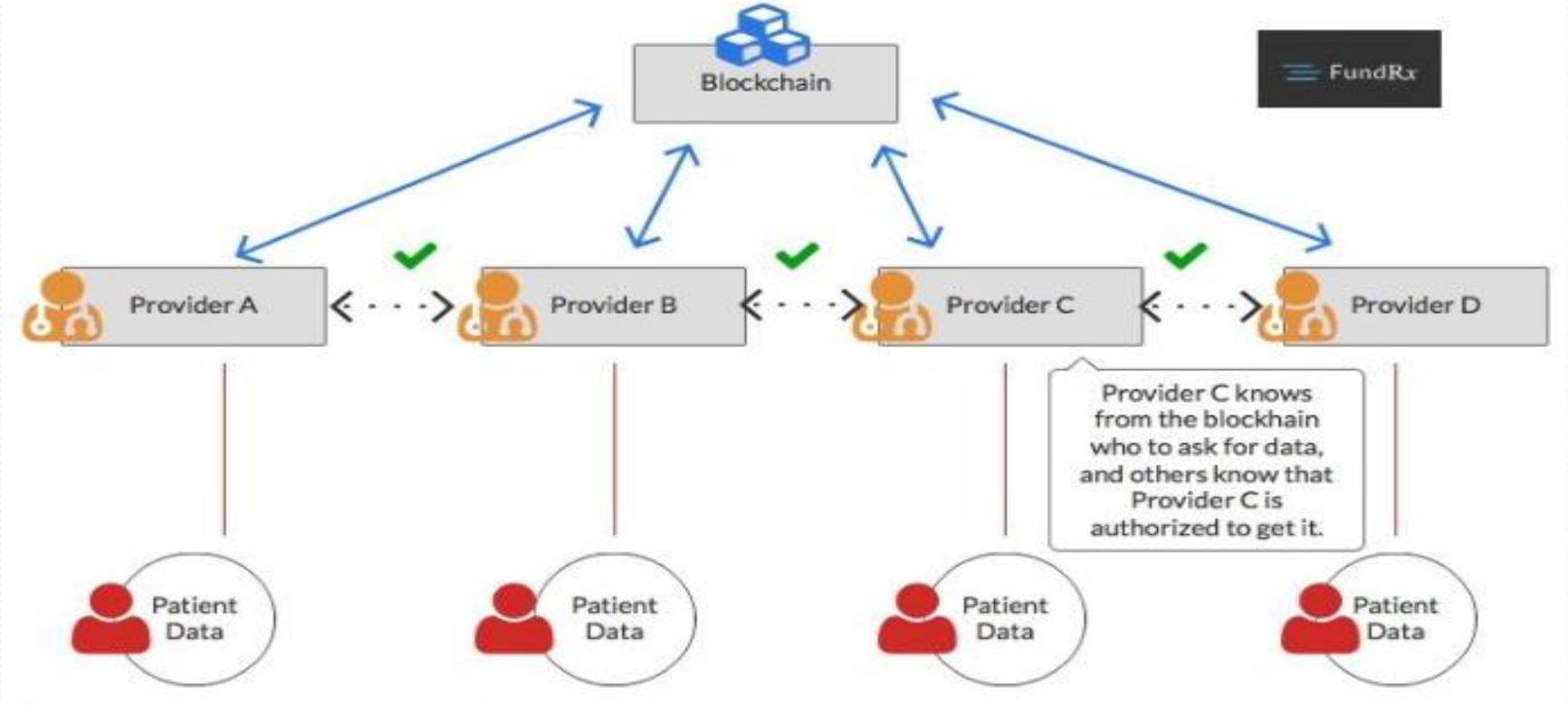

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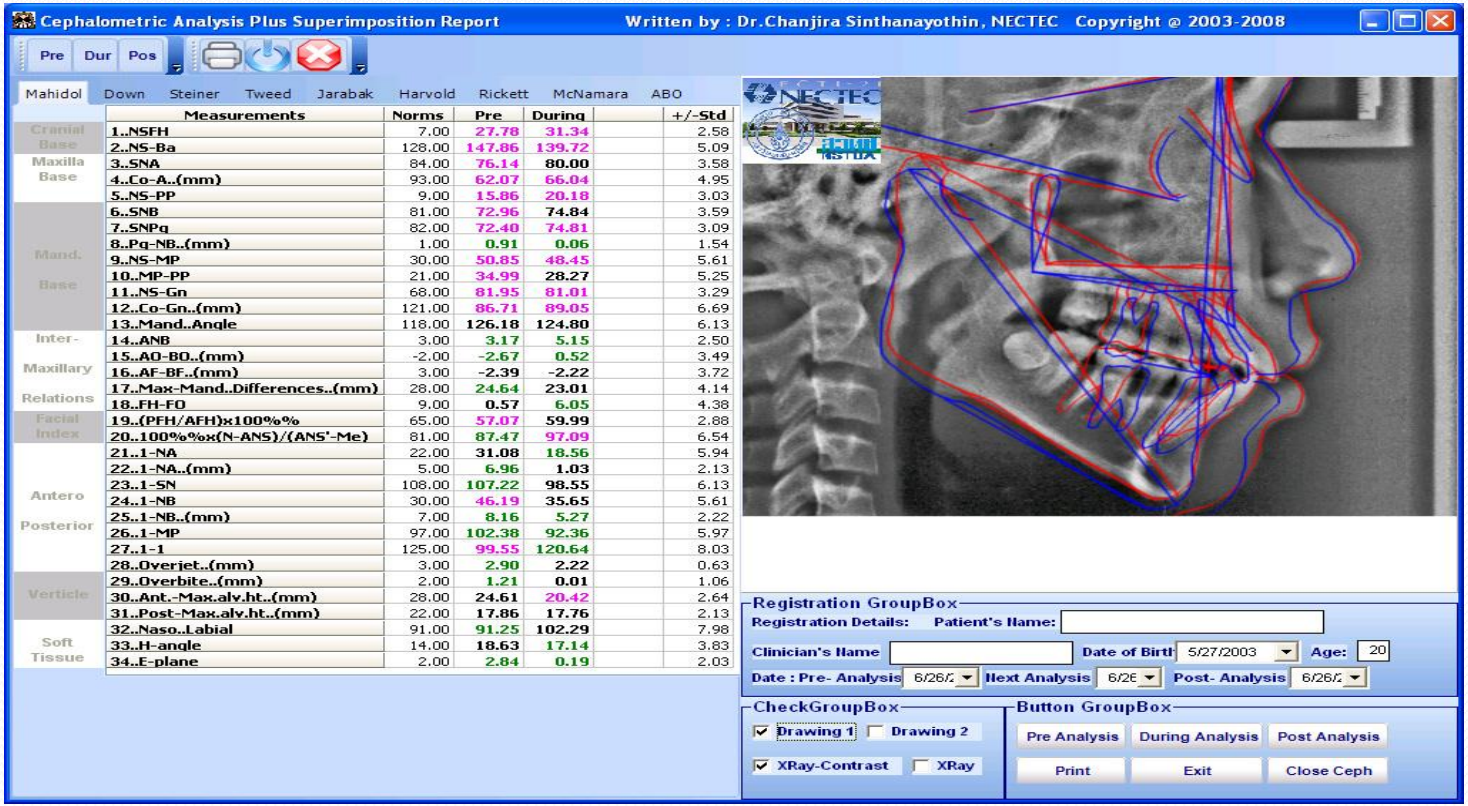

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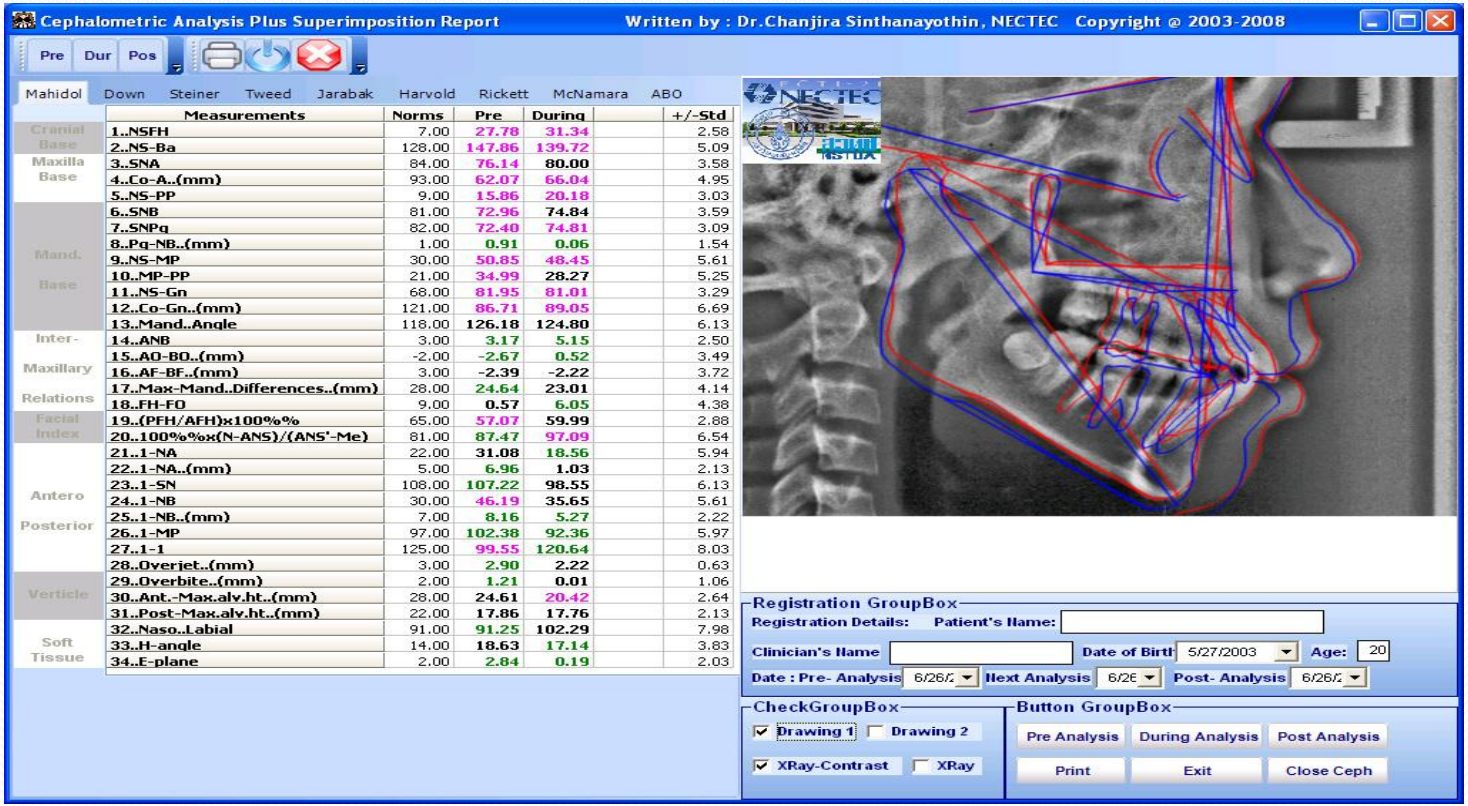

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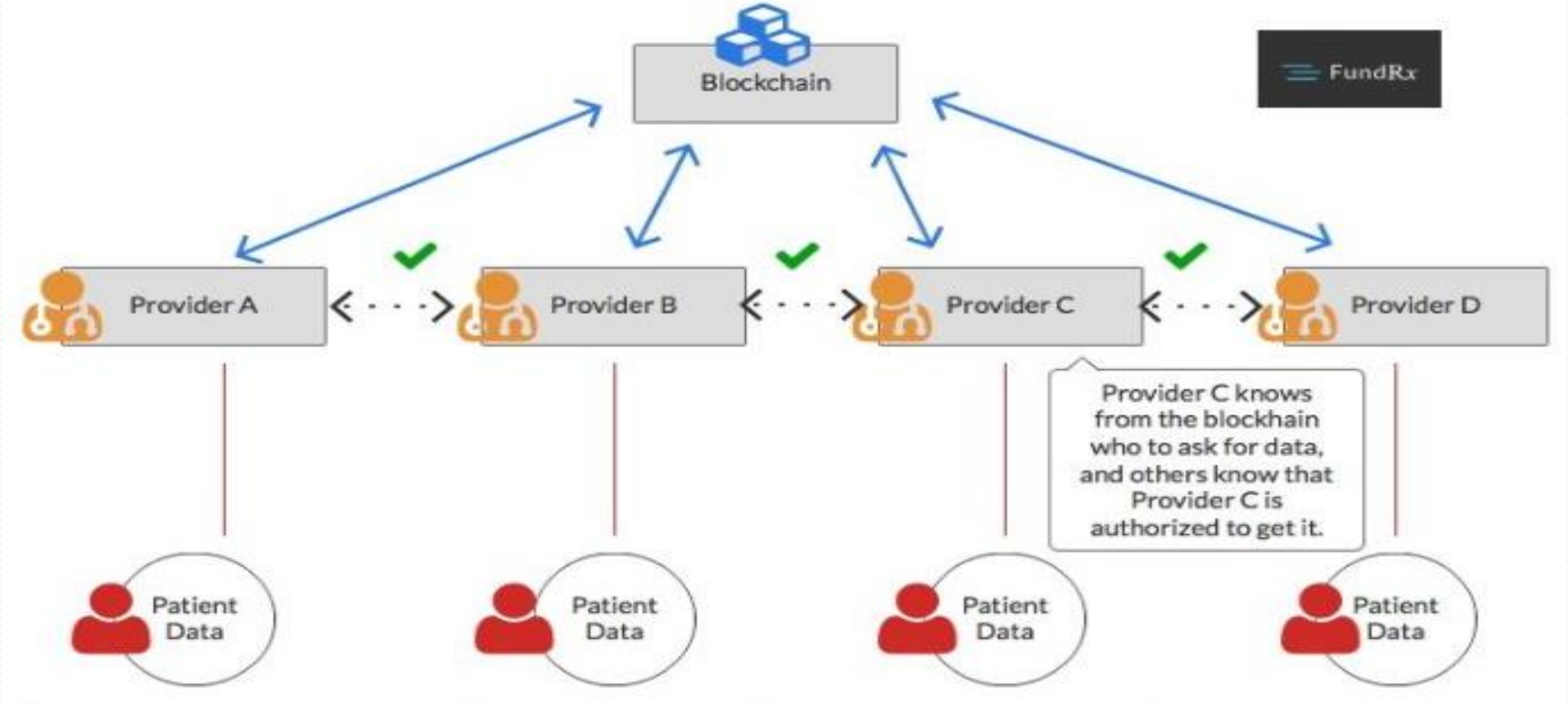

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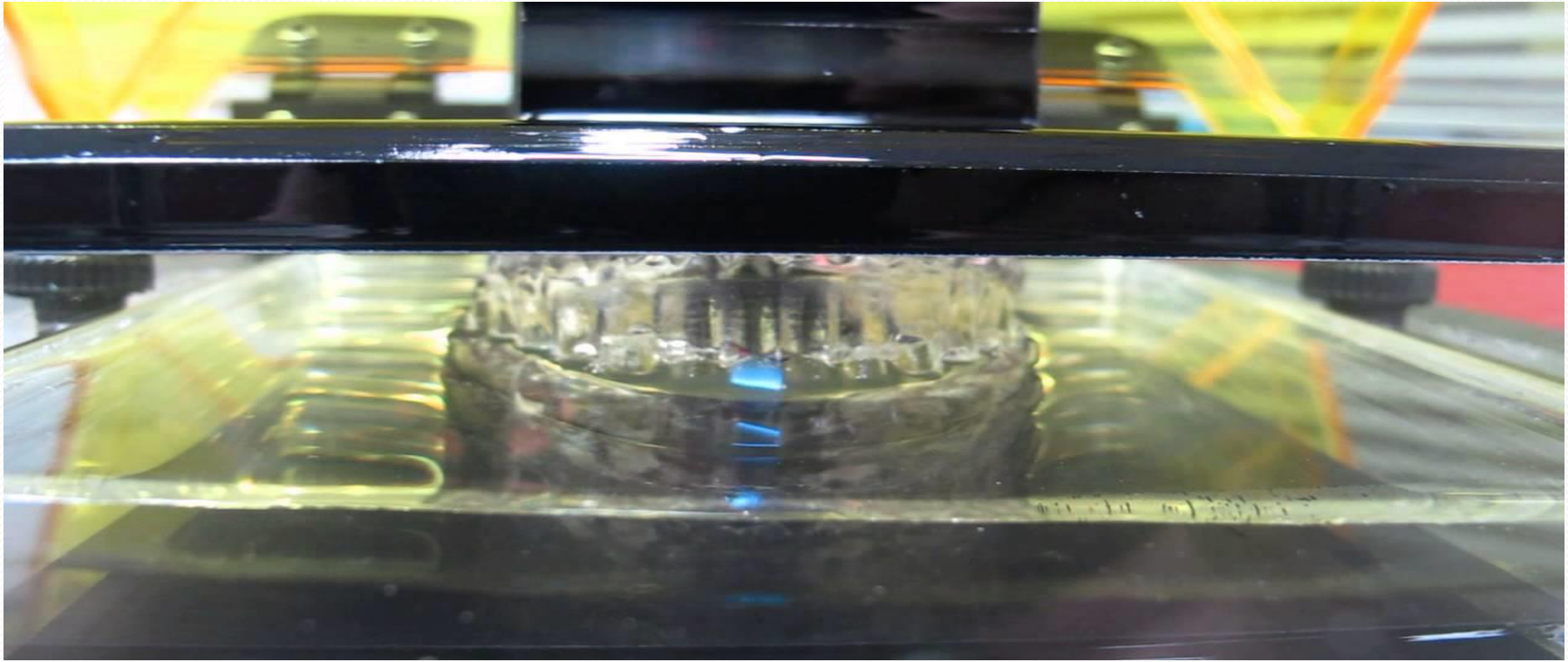

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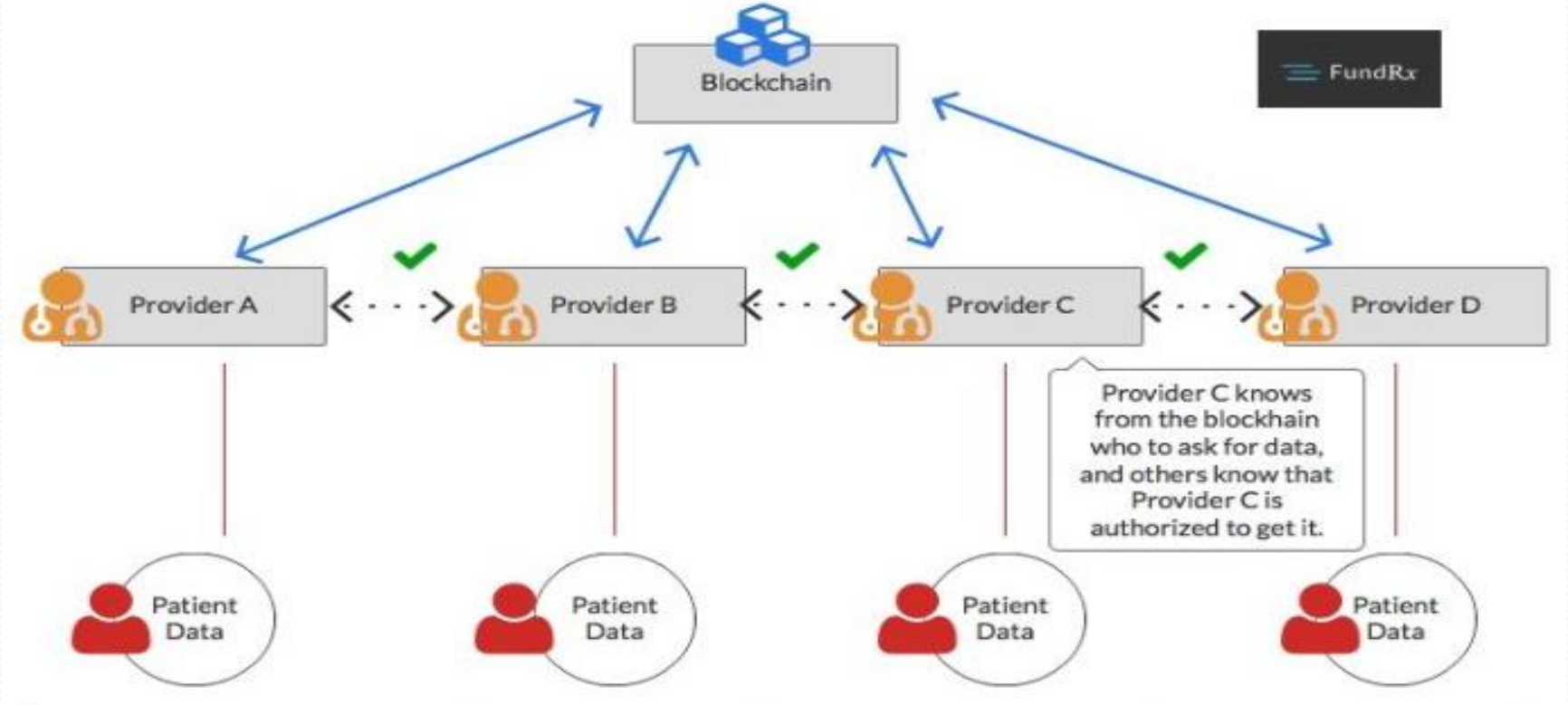

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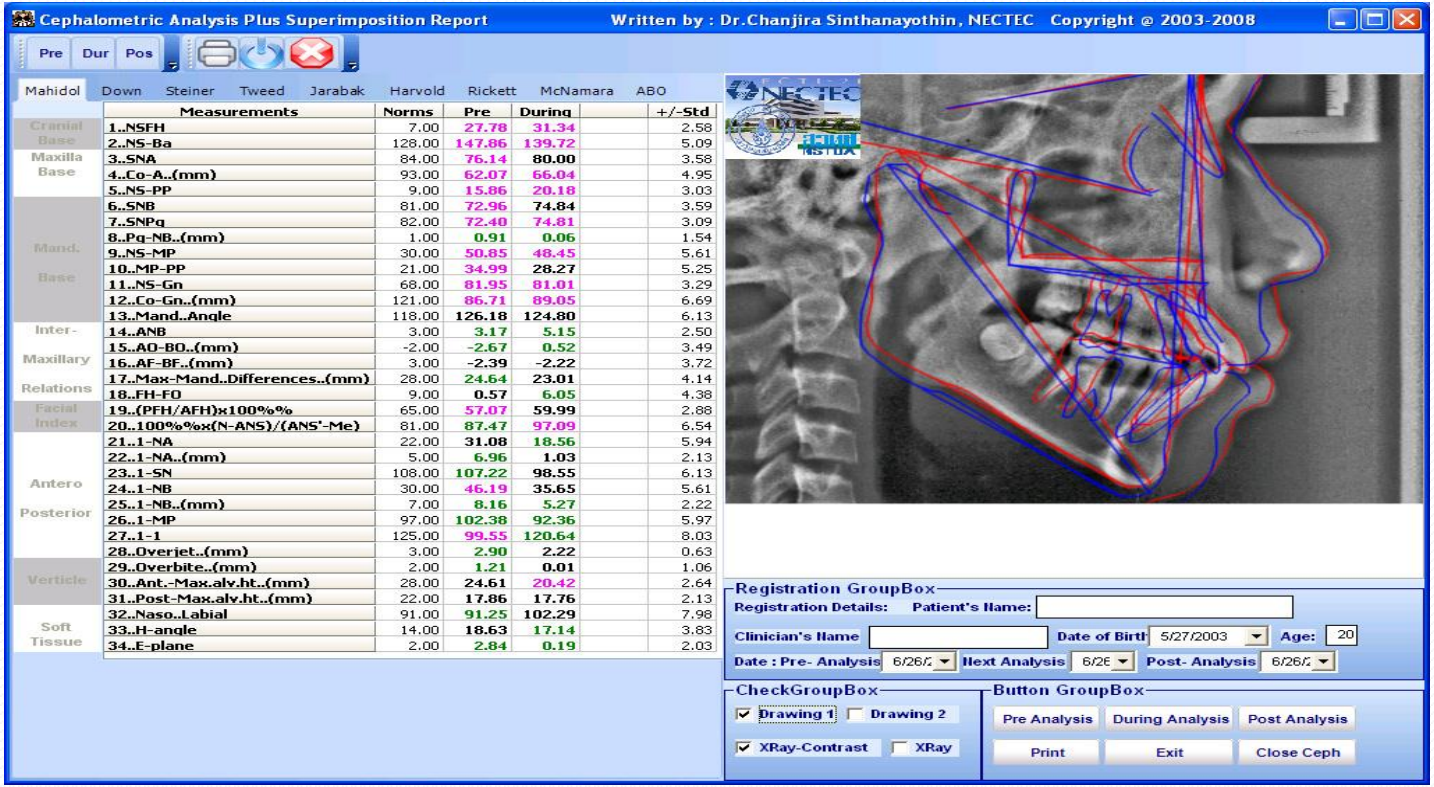

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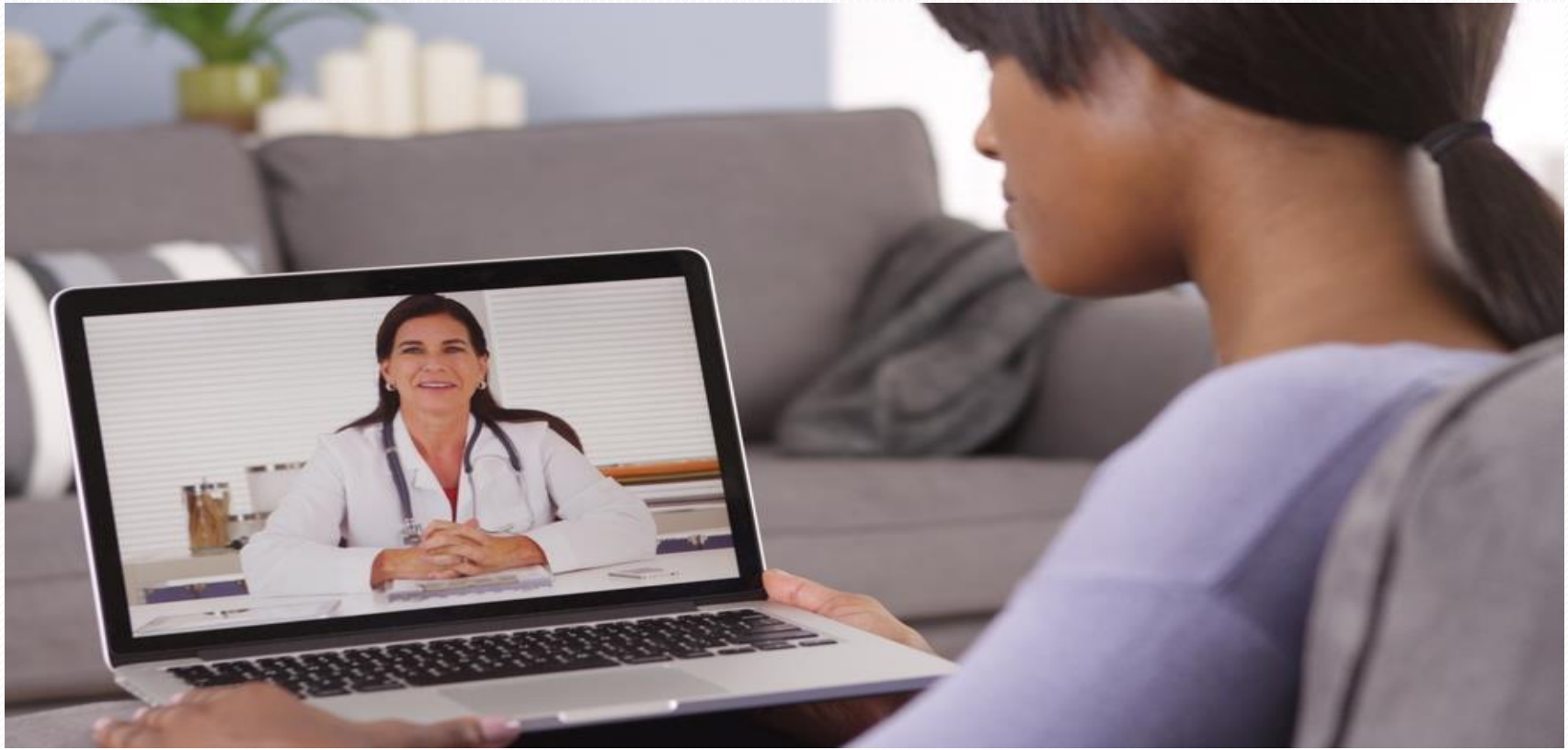

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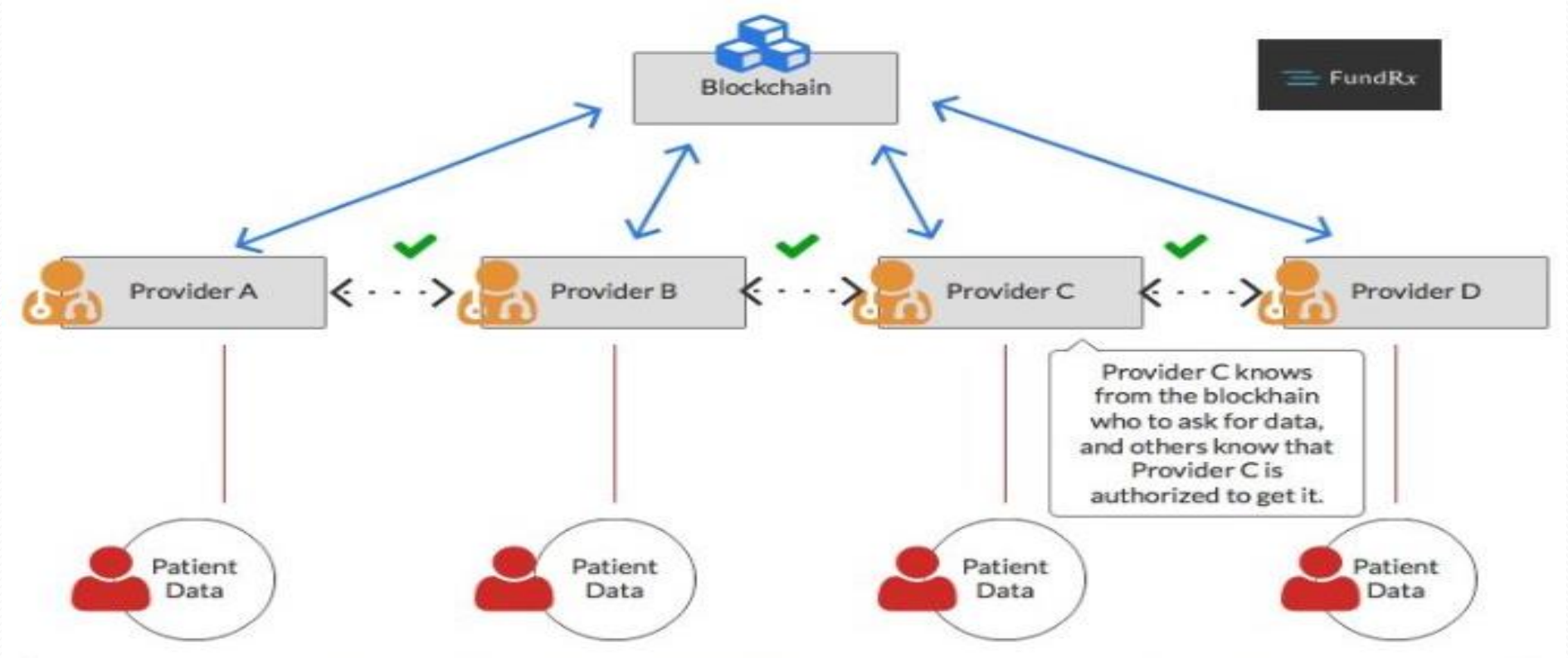

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INNOVATION
BUSINESS
PLAN
IDEA

Transformational Technologies

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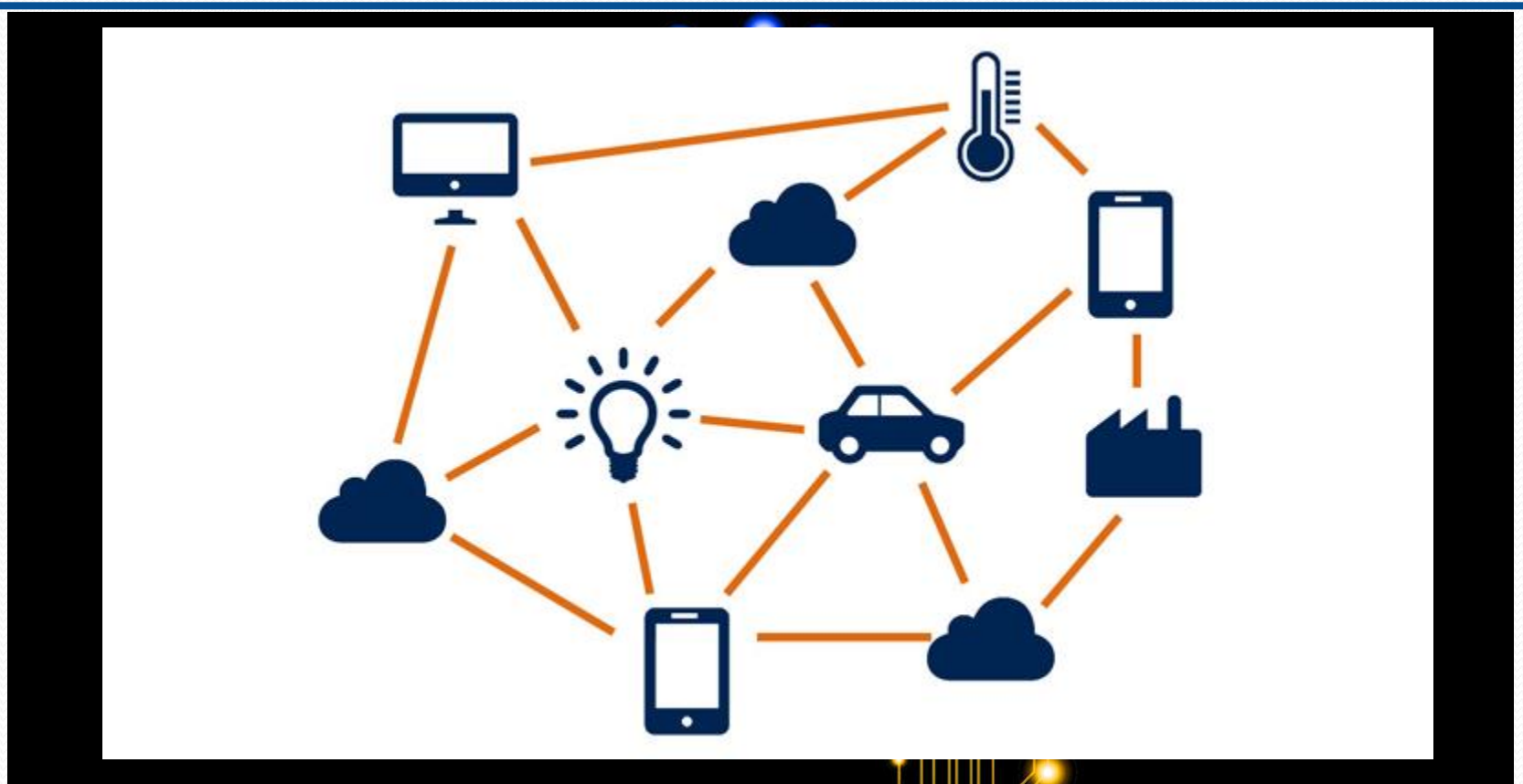

Blockchains: The Promise

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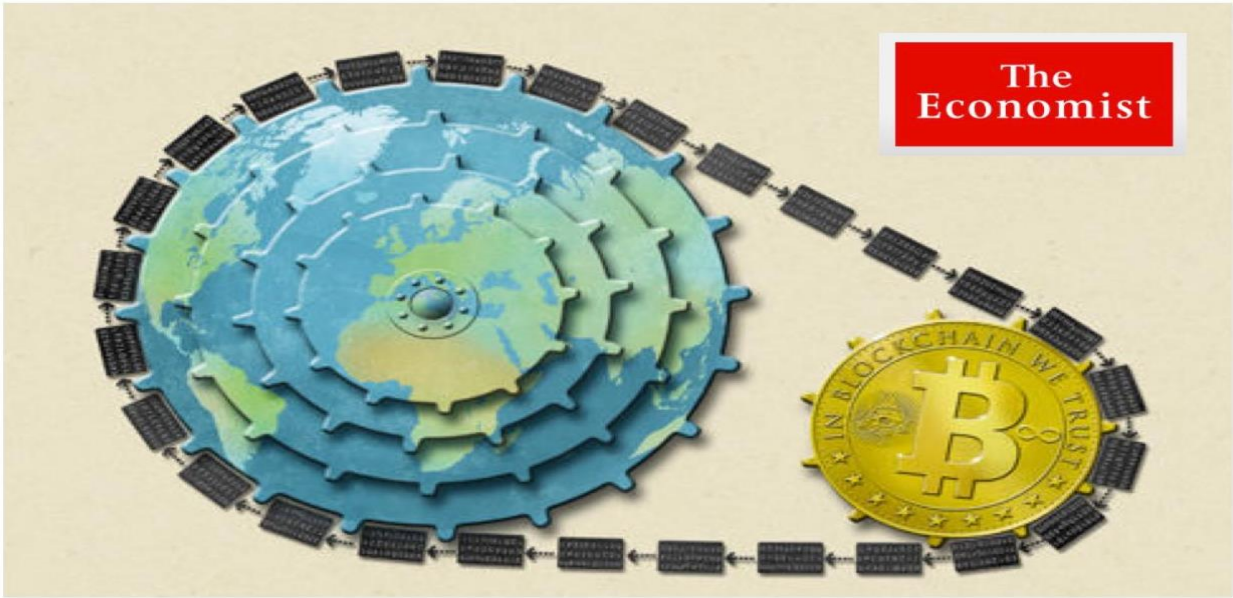
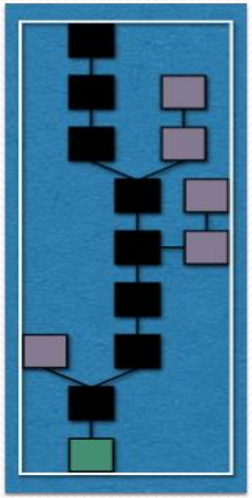
The promise of the blockchain

The trust machine

Oct 31st 2015 |

The technology behind bitcoin could transform how the economy works





The Meaning of Blockchain

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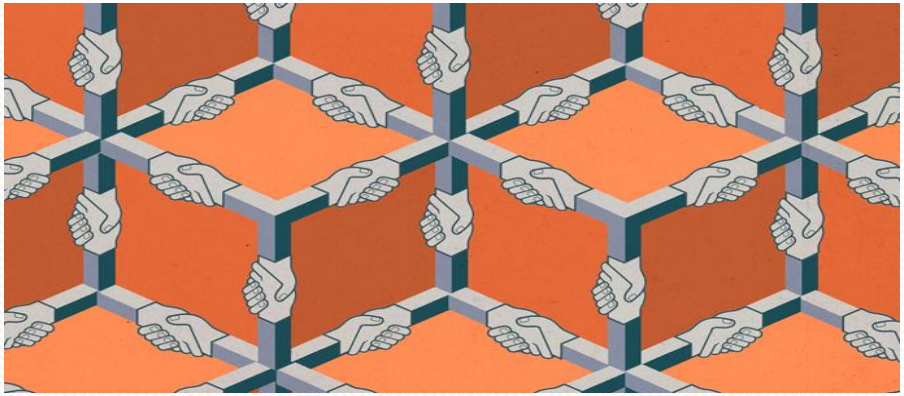

"Wherever people, processes, businesses, governments, or the social good requires proof of identity, ownership, transactions, or commitments; Blockchain technologies promise to meet those needs with a degree of trust and integrity never before possible."

– Jack Shaw,
Executive Director, American Blockchain Council

Blockchains Provide

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A Permanent, Immutable,
Signed, and Time-stamped Record
of Identity, Ownership, Transactions, or Commitments

Blockchains Provide

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Records can be shared among two or more Entities – without an intermediary

Blockchains Provide

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Globally available with Complete Transparency – for Those Authorized

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Unhackable Security against Those Unauthorized

The First Use Case for Blockchain

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Blockchain

Bitcoin is an implementation of the technology

Blockchain is the core technology

Identical Copies – Distributed Nodes

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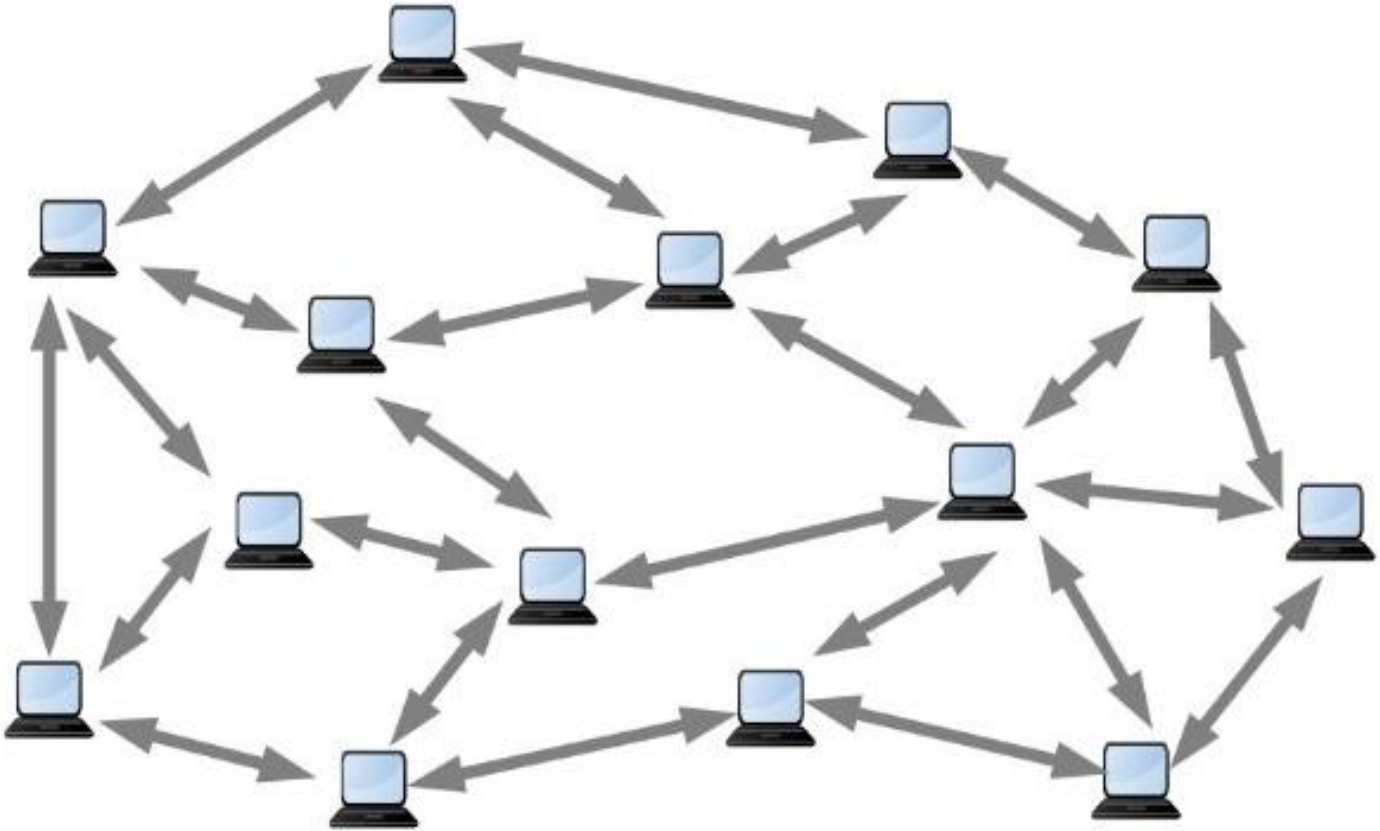

How a Blockchain Works

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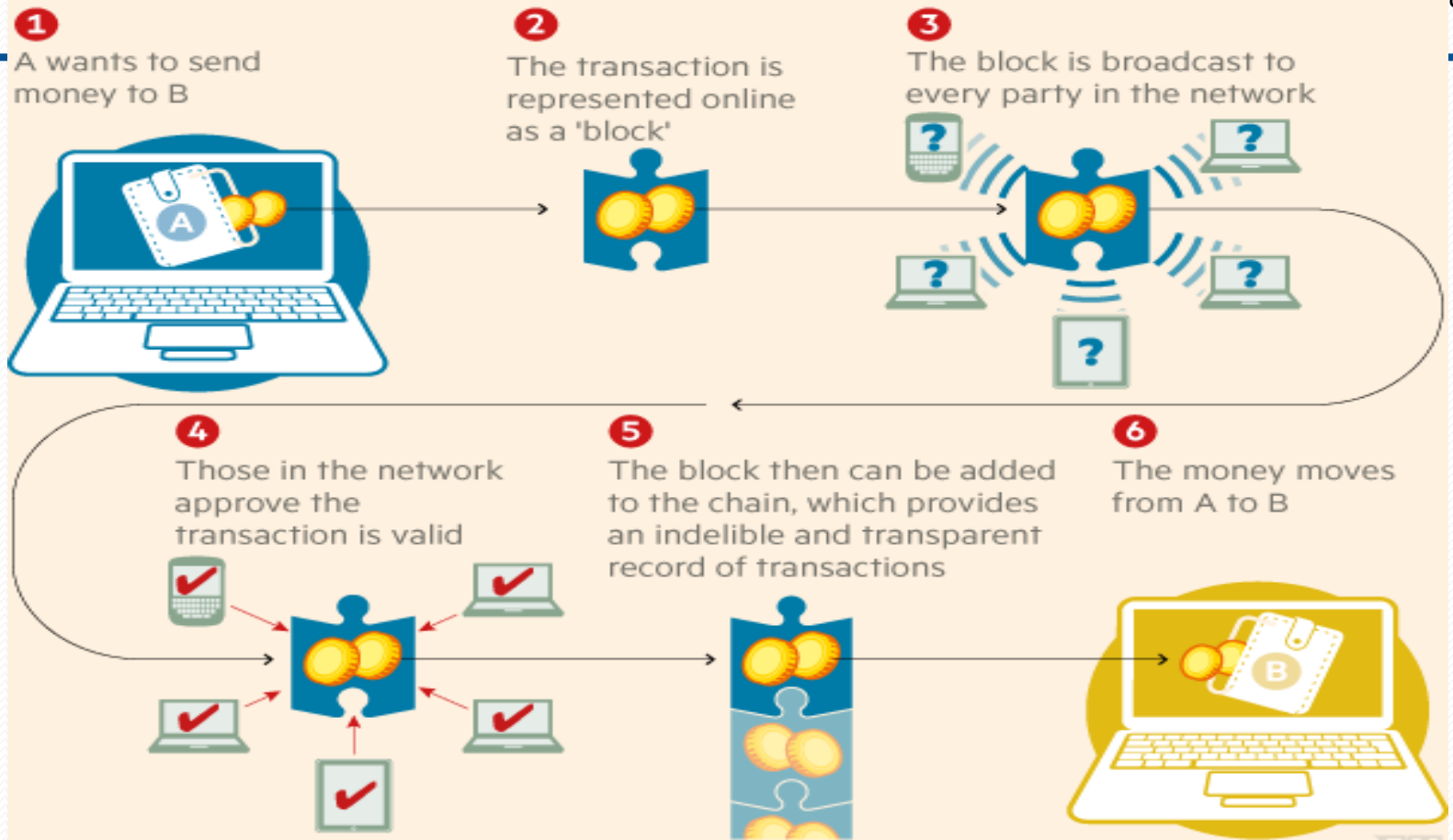

Hashing

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Hash Function

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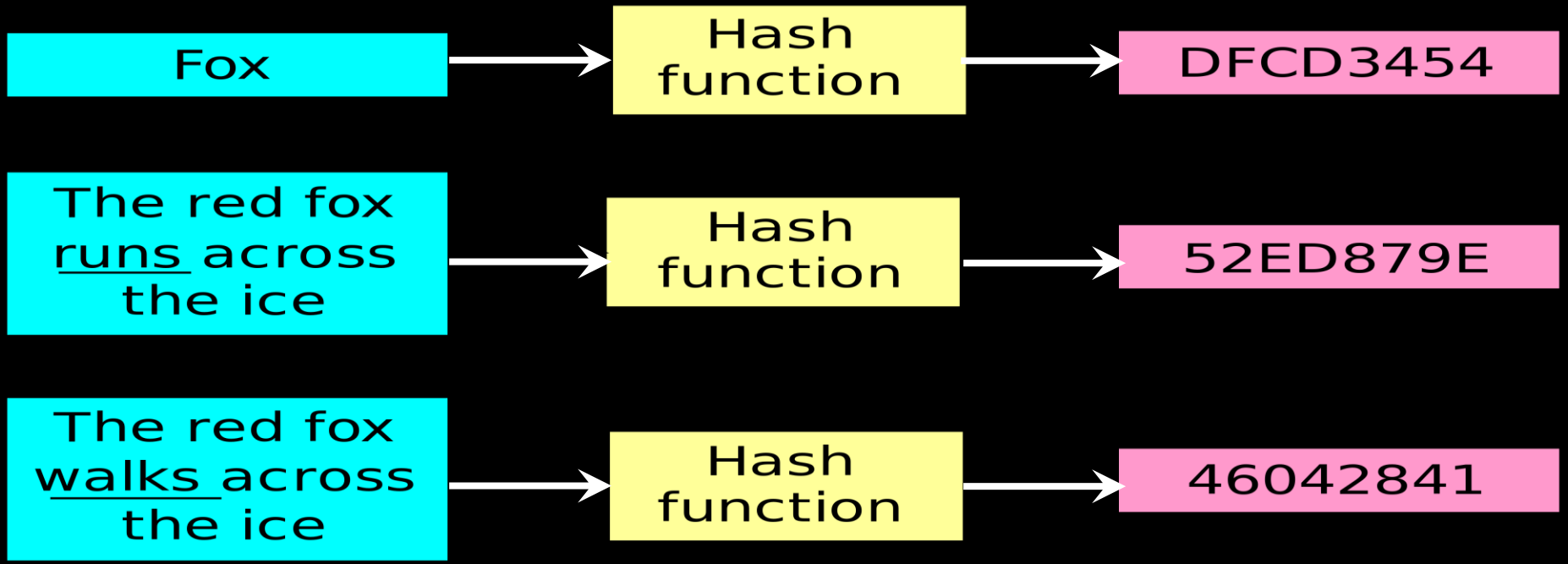

“Chaining” Blocks

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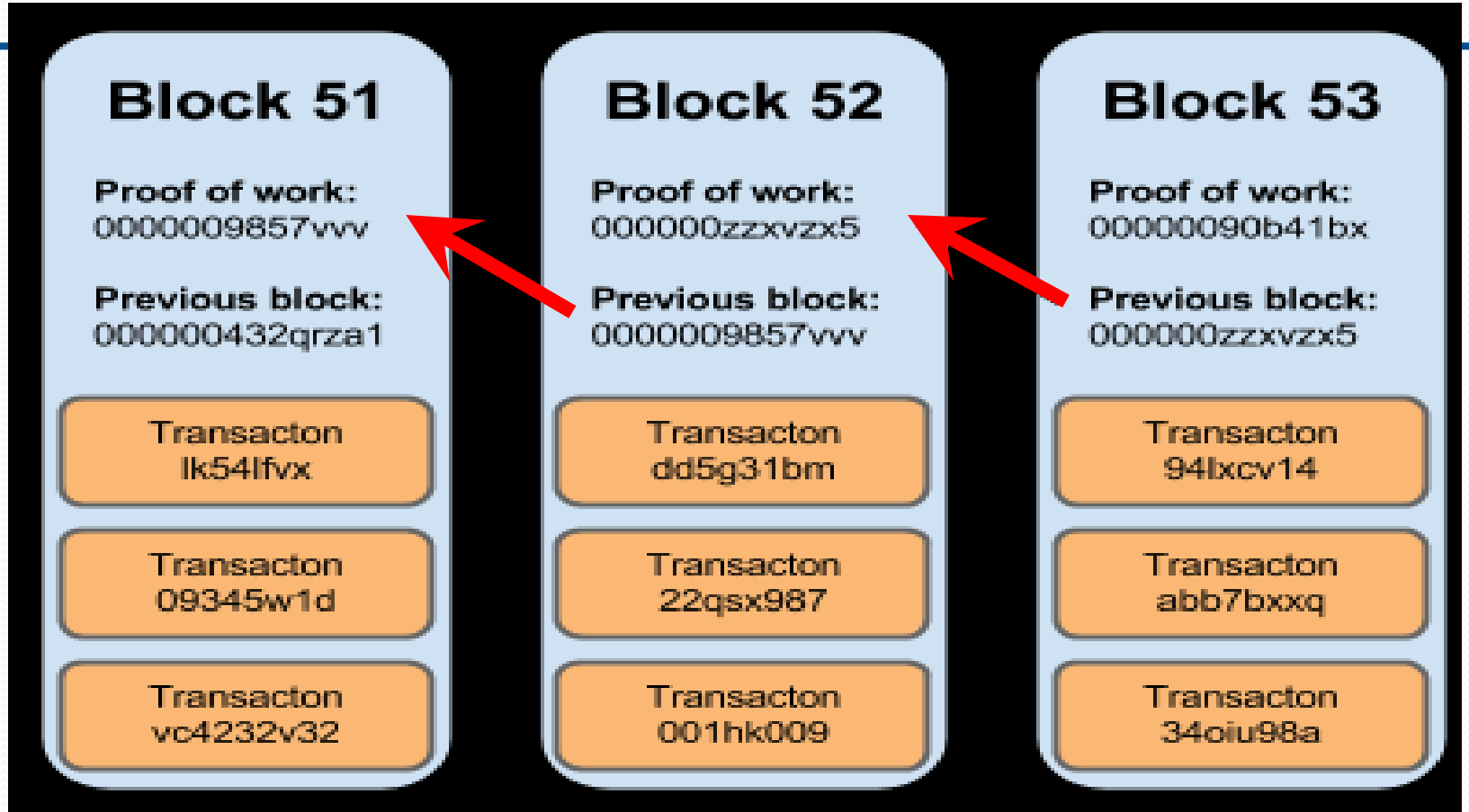

How to Hack a Blockchain

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- Penetrate multiple layers of world class security to hack into a single node on the blockchain.
- Find the record (block) containing the information you want to change – assuming it's not encrypted.
- Change the information on that block.
- Recalculate the hash in the header of the next block and rewrite that block.
- Now recalculate the hash in the header of the subsequent block and rewrite that block.
- Repeat thousands of times…and
- What have you got??

How to Hack a Blockchain, Part 2

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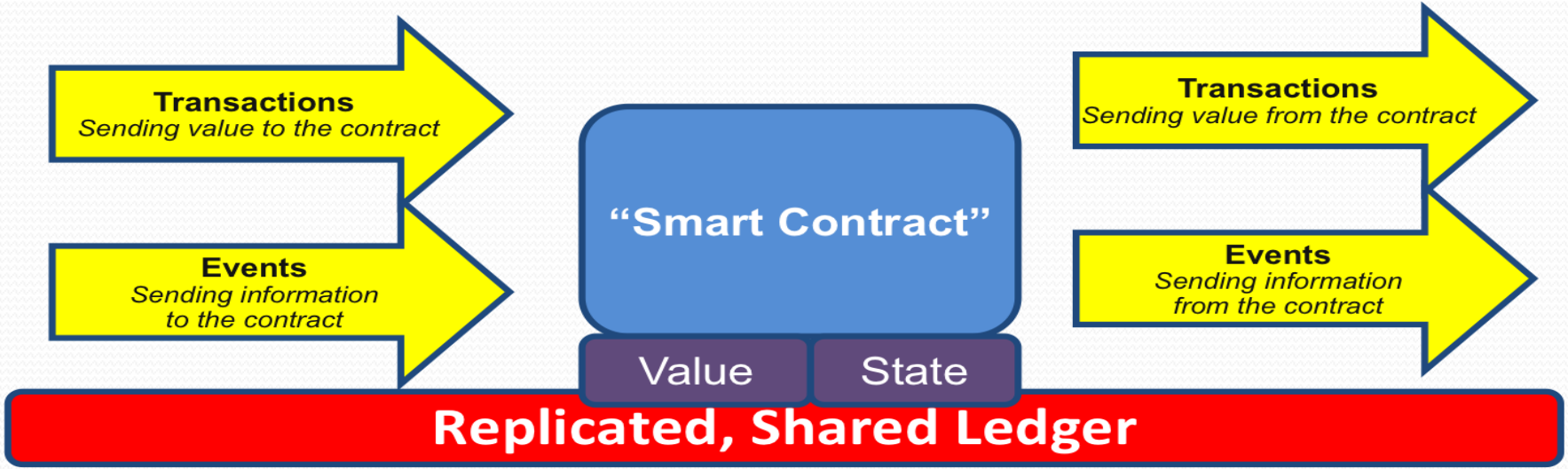
- Hack into a single node on the blockchain.
  - Find the record (block) containing the information you want to change – assuming it's not encrypted.
  - Change the information on that block.
  - Recalculate the hash in the header of the next block and rewrite that block.
  - Now recalculate the hash in the header of the subsequent block and rewrite that block.
  - Repeat thousands of times…and
- Repeat for a majority of the hundreds or thousands of nodes in that Blockchain.
- Do it all simultaneously.
- Complete within less than 10 minutes!

Why Not 3D Printing Design Files?

Why Not Electronic Medical Records?

Smart Contracts on the Blockchain



- "A smart-contract is a computer program,
- which runs on a replicated, shared ledger (Blockchain),
- which can take custody over assets on that ledger, and
- which can track what has happened to date and
- respond to incoming information or events."

Self-Sovereign Digital Identity

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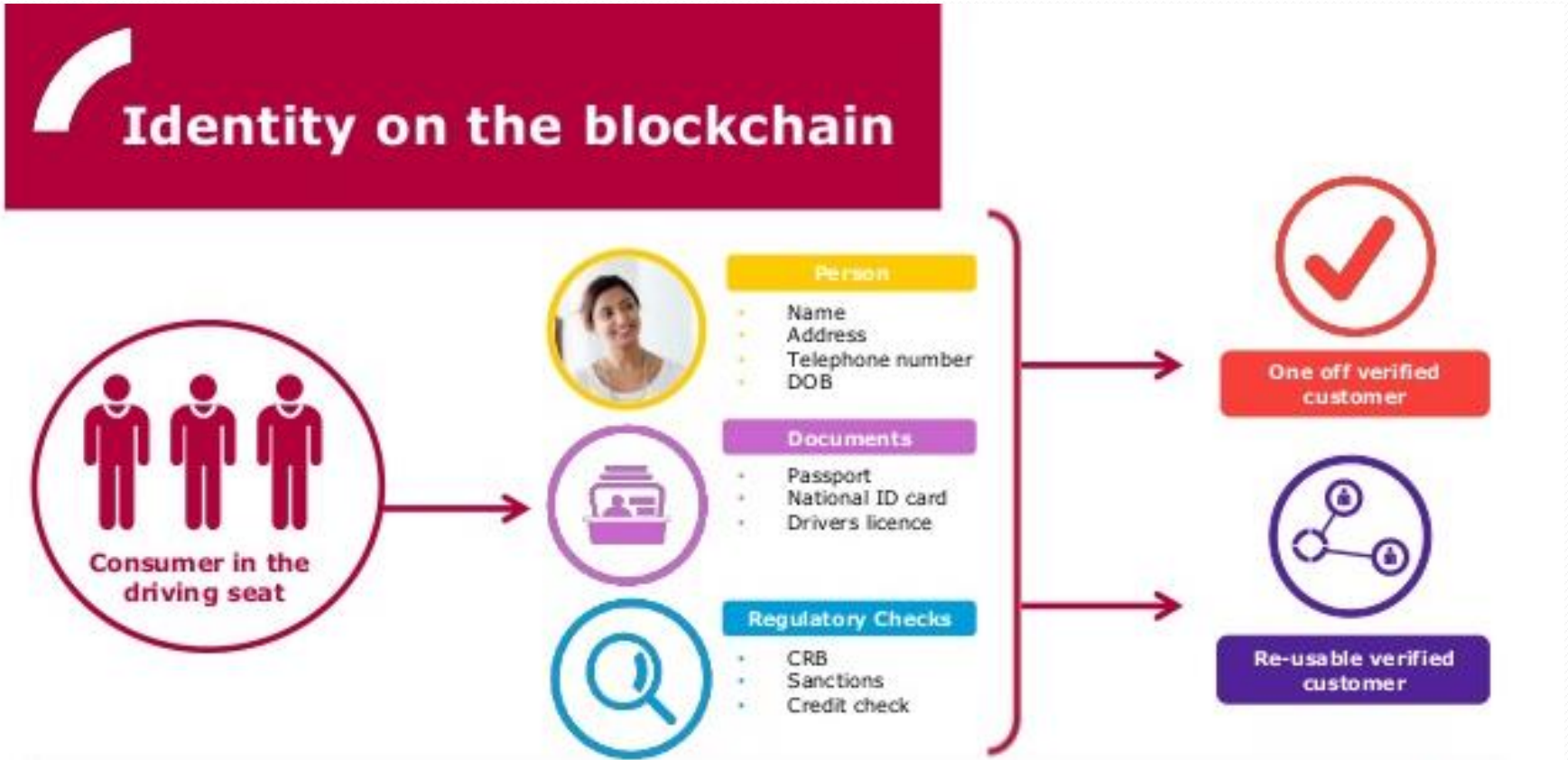

Self-Sovereign Digital Identity

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Blockchain and IoT

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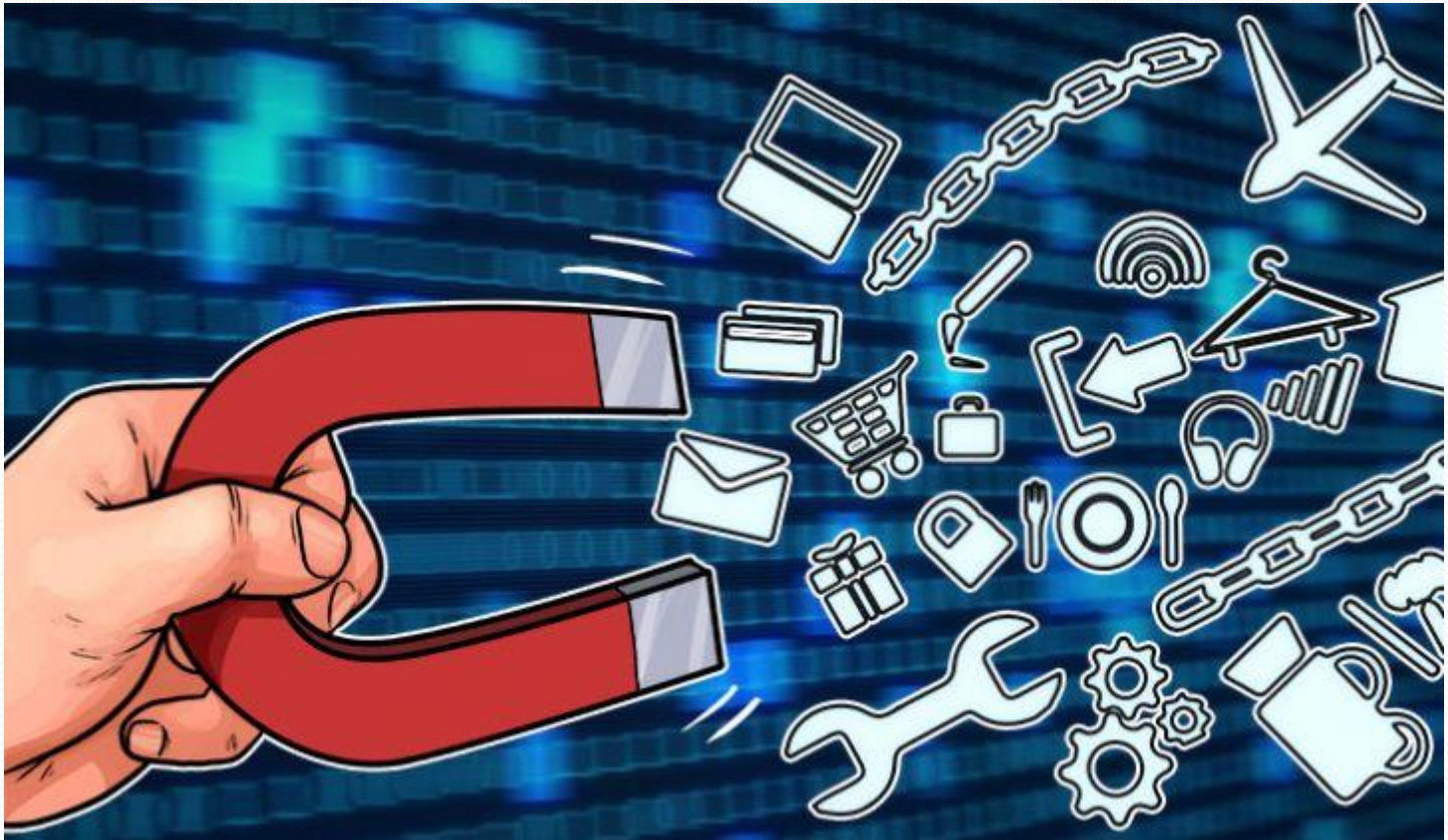

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Patient Mediated Health Data Exchange

Patient Consent Management
Direct visibility of consent authorized parties; immutable consent data in BC

Health Data Exchange
Secure Data Access to Authorized Health Data based on Patient Consent

Provenance
All consent, data access and updates can be traced back to origin

Accountability
Patients control the parties who have access to their health data, and keep them accountable

Control
Health Data can not be accessed without patient's consent

Transparency
Regulators can monitor activities and detect abusive practices

Security
Unlike traditional systems, Blockchain security is at the core in focus and design

Privacy
Only authorized parties can see health data and only what they are supposed to see

Blockchain in Healthcare

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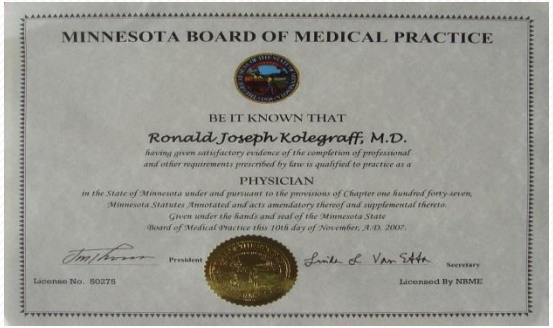
- **Blockchain powered health information exchange (HIE):** Shared Nationwide Interoperability
- **Doctor-Vendor RFP Services:** Similar to Uber car services, doctors and health practices bid to supply medical services, possibly using automated bidding over trade nets
- **Internet of Things and Blockchain:** Consumer-generated health data meets IoT wearables through data accessibility and health records interconnection
- **Notarization / Identity Verification:** Registration of EMR, insurance, and linking of Physician Credentials and Patient Identity


MINNESOTA BOARD OF MEDICAL PRACTICE

BE IT KNOWN THAT

Ronald Joseph Kolegraff, M.D.

having given satisfactory evidence of the completion of professional and other requirements prescribed by law is qualified to practice as a

PHYSICIAN

in the State of Minnesota under and pursuant to the provisions of Chapter one hundred forty-seven, Minnesota Statutes Annotated and acts amendatory thereof and supplemental thereto.

Given under the hand and seal of the Minnesota State Board of Medical Practice this 10th day of November, A.D. 2007.

President

Secretary

License No. 50275

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Blockchain in Healthcare

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- **Collaborative Crowdsourcing:** Open bazaar for services, transparency in pricing, and health property exchange
- **Medical Banking:** Disintermediating counterparties
- **Supply Chain Provenance:** of Parts and Materials. Smart Property
- **Counterfeit Drug Prevention and Detection:** Introduce Blockchain-enabled solutions to protect and enhance the pharmaceutical supply chain

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- **Health Document Notary Services:** Proof-of-insurance, test results, prescriptions, status, condition, treatment, physician referrals
- **Validation and Payment of Claims:** Reduce process time and friction, including compliance with smart contracts for adjudication and payment of health plan claims
- **Real-Time / Contextual Forms of Insurance:** Using smart controls, introduce new tools and services for growth, improving fraud detection and pricing, and reducing administrative costs
- **Outcome-Based Payments:** Assigns each consumer a unique digital identity with data from Blockchain (with IoT – payers track metrics for positive outcomes)

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- **Clinical Trial Results:** Improve accountability and transparency in the clinical trial reporting process
- **Population Health Management:** A Blockchain-based personal health record (PHR) system measuring consumer outcomes and influencing medical actions (for example, cases of influenza and preventative vaccines)
- **Genomics Research:** Accessibility to genetic data secured on Blockchain
- **Health Research Commons:** Aggregated personal medical records, quantified self data commons (DNA bits), genome and connectome files

Partial List of Industries Impacted by Blockchain

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- Accounting / Auditing
- Construction
- Energy
- Entertainment
- Financial Services
- Government / NFP
- Healthcare/Life Sciences
- Insurance
- Law / Legal Services
- Logistics / Transportation
- Manufacturing
- Media
- Real Estate
- Retail
- Supply Chain
- Technology

The Critical Role of Blockchain in Digital Transformation

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- Most Emerging Technologies are Point Solutions
  - 3D Printing
  - Augmented / Virtual Reality
  - IoT
  - Even AI
- They apply at a specific organizational or even geographic point.
- Blockchain is different.
- It provides the decentralized Infrastructural Glue that ties all of the points together.
- It enables the Digital Transformation of not just individual processes or organizations, but entire business and/or social ecosystems

Blockchain Transformation

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- Blockchain Transformation is NOT about force fitting new technologies into your existing business processes and infrastructure.
- It starts by rethinking your business or social ecosystem.
- Blockchain is a team sport!
- Then it's about rethinking your business model and your role within your ecosystem.
- Then using any and all technologies needed to implement the new vision.

Executive Seminars: Developing Your Strategy for Blockchain Enabled Digital Transformation

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Target Audiences include:

- C-Level Executives
- Other Senior Business Decision Makers
- Accountants, Auditors, and Attorneys
- Senior IT Management

Executive Seminars: Developing Your Strategy for Blockchain Enabled Digital Transformation

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Key Topics include:

- What is Blockchain technology? How does Blockchain work?
- What about identity and security?
- What is a smart contract?
- What are the legal and accounting issues?
- How do we integrate Blockchain with IoT, AI, 3D Printing, Augmented Reality, and other emerging technologies?
- How will this impact our industry?
- What opportunities are presented for our business?
- How do we develop our overall Strategy for Blockchain Enabled Digital Transformation?

Change & Progress

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Historian Henry Steele Commager

"Change does not necessarily assure progress,

but progress implacably requires change."

Follow Up

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