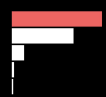
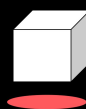
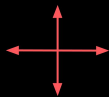


# Bitcoin:

## { Essential Concepts }

SLIDE  
COMPANION

BY ANIL



'An incredible job visually illustrating some of  
the most important concepts in bitcoin.'  
—SAIFEDEAN AMMOUS

# Bitcoin: { Essential Concepts }



Anil

## I. Economics

1. Scarcity  
*Monetary Premium*
2. Gresham's Law  
*Thier's Law*
3. Cantillon Effect
4. Schelling Point
5. Opportunity Cost
6. Impossible Trinity
7. Jevons Paradox
8. Power Laws  
*Winner-Take-All Effects*
9. Unit Bias
10. Veblen Good
11. Malinvestment
12. Asymmetric Payoff
13. Ansoff Matrix

## II. Technology & Systems

14. Gartner Hype Cycle  
*Amara's Law*
15. Orders of Magnitude  
*10x Improvement Rule*
16. Network Effects  
*Churn*
17. Accelerating Returns
18. Higher-Order Effects
19. Creative Destruction
20. Feedback Loops  
*Reflexivity*
21. Relativity
22. Thermodynamics 1st law
23. Thermodynamics 2nd law  
*Information Theory*
24. Moore's Law
25. Antifragility
26. Gall's Law  
*Attack Surface*
27. Catalysts
28. Friction

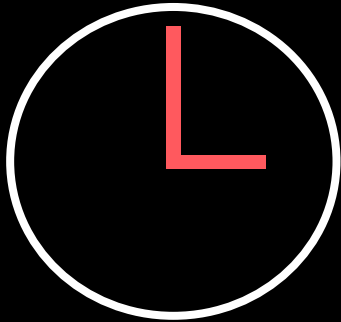
## III. Psychology

29. Prisoner's Dilemma  
*Jurisdictional Arbitrage*
30. Social Proof  
*Mimetic Theory*
31. First Conclusion Bias
32. Circle of Competence  
*Dunning-Kruger*
33. Category Error
34. Intransigent Minority
35. Inequivalence Theorem
36. Gell-Mann Amnesia
37. Lindy Effect
38. Emergence
39. Streisand Effect
40. Moral Hazard

# Economics

# SCARCITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*How limited resources are  
allocated and competed for*

**US M2  
MONEY SUPPLY**  
*1960-2022*

**\$21.3T**



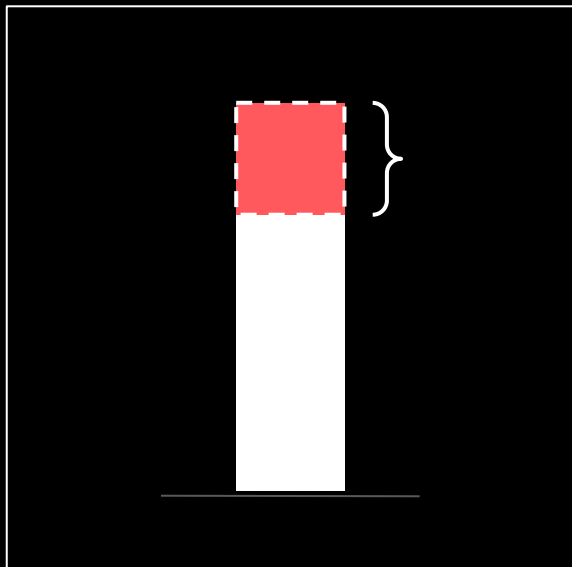
**฿21M**

**BITCOIN SUPPLY  
SCHEDULE**  
*2009-2140*

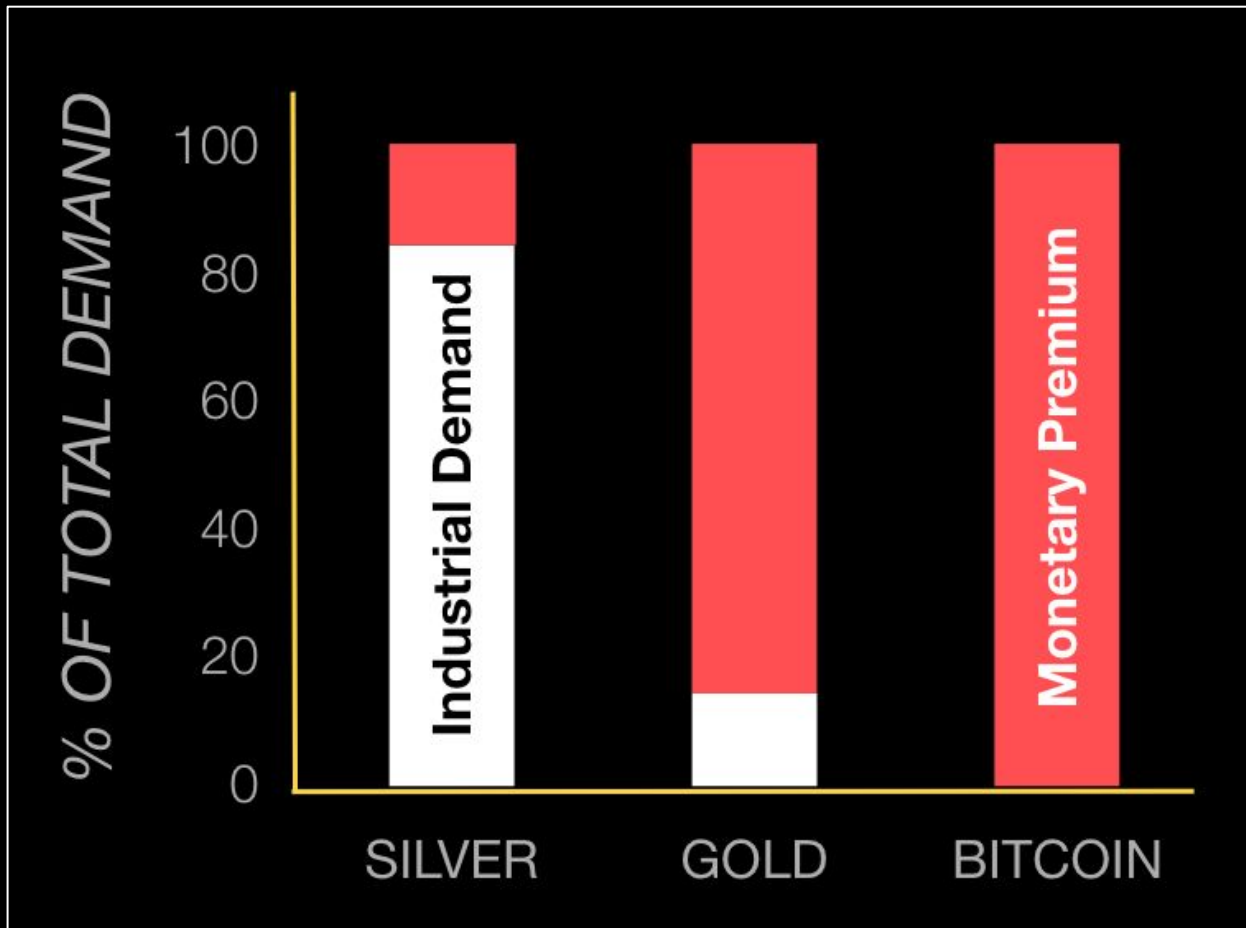


# MONETARY PREMIUM

**BITCOIN**  
ESSENTIAL  
CONCEPTS



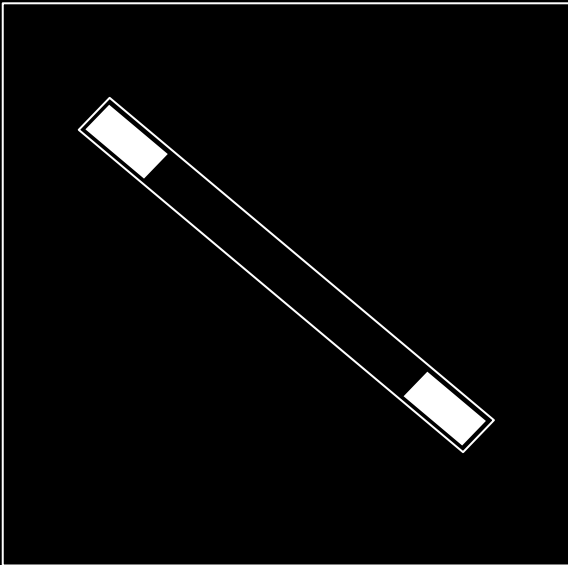
*Purchasing power of a  
monetary good in excess of  
its use-value alone*



source: 'The Bullish Case for Bitcoin' by Vijay Boyapati

# GRESHAM'S LAW

**BITCOIN**  
ESSENTIAL  
CONCEPTS



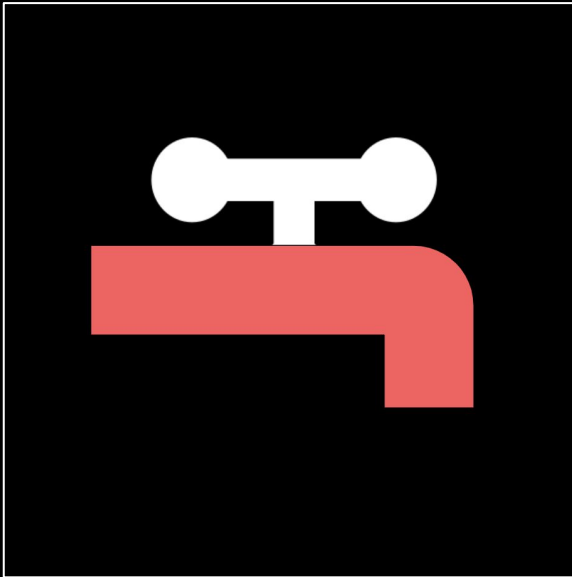
*When two forms of commodity money are decreed with equivalent face value, the more valuable commodity will disappear from circulation*





# CANTILLON EFFECT

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*New units of money create disproportionate price inflation when added into an economy based on the path they travel*

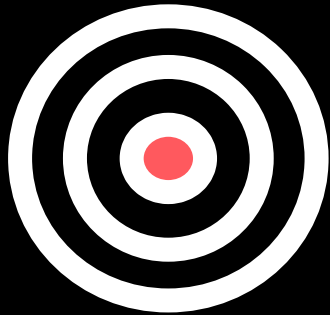


*“No matter who obtains the new money,..  
it will more or less be directed to certain  
kinds of commodities or merchandise,  
according to the judgment of those who  
acquire the money.”*

**—RICHARD CANTILLON**

# SCHELLING POINT

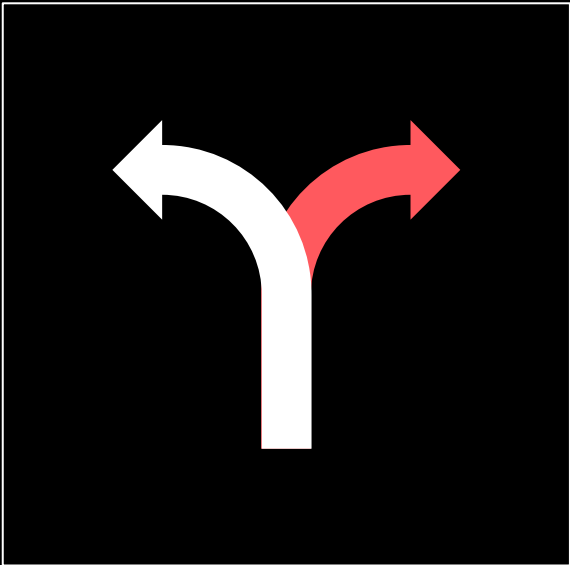
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*A solution that people tend to choose, by default, in the absence of communication*

# OPPORTUNITY COST

**BITCOIN**  
ESSENTIAL  
CONCEPTS



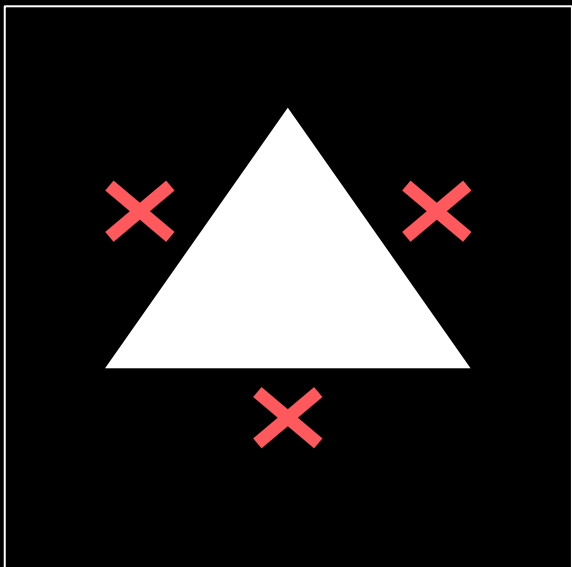
*When doing one thing comes  
at the cost of not being able  
to do something else*

*“When money is hard and can appreciate, individuals are likely to be very discerning about what they spend it on, as the opportunity cost appreciates over time.”*

**—SAIFEDEAN AMMOUS**

# IMPOSSIBLE TRINITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*A sovereign nation cannot simultaneously have free capital flows, independent monetary policy and a fixed exchange rate*

**PICK ANY TWO**

FREE CAPITAL  
FLOWS

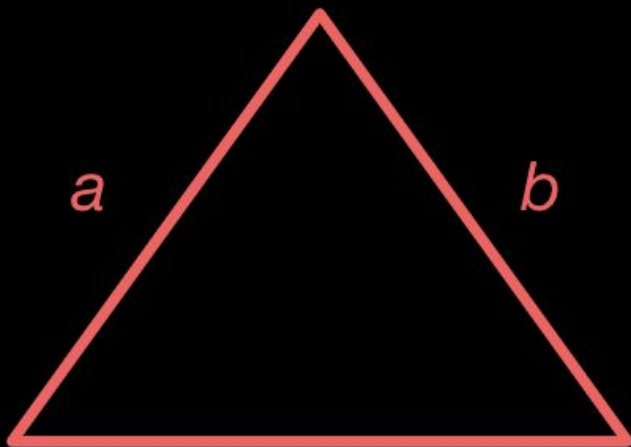
*a*

*b*

INDEPENDENT  
MONETARY  
POLICY

*c*

FIXED  
EXCHANGE  
RATE





# JEVONS PARADOX

**BITCOIN**  
ESSENTIAL  
CONCEPTS



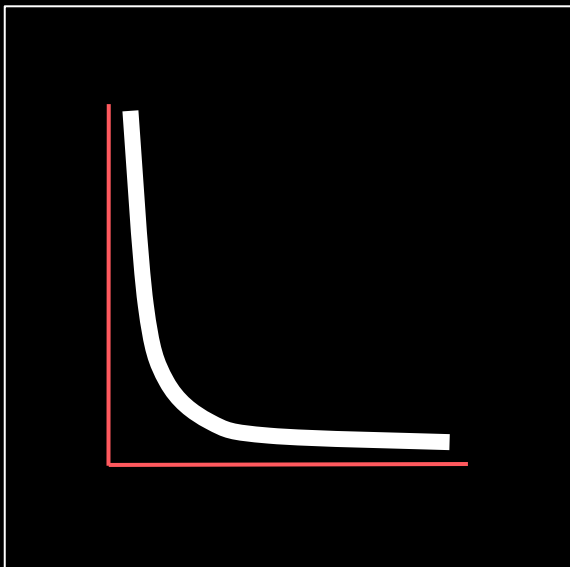
*The observation that consumption of a resource increases when efficiency gains are achieved through its use*

## DEMAND CURVE OF RESOURCE $X$

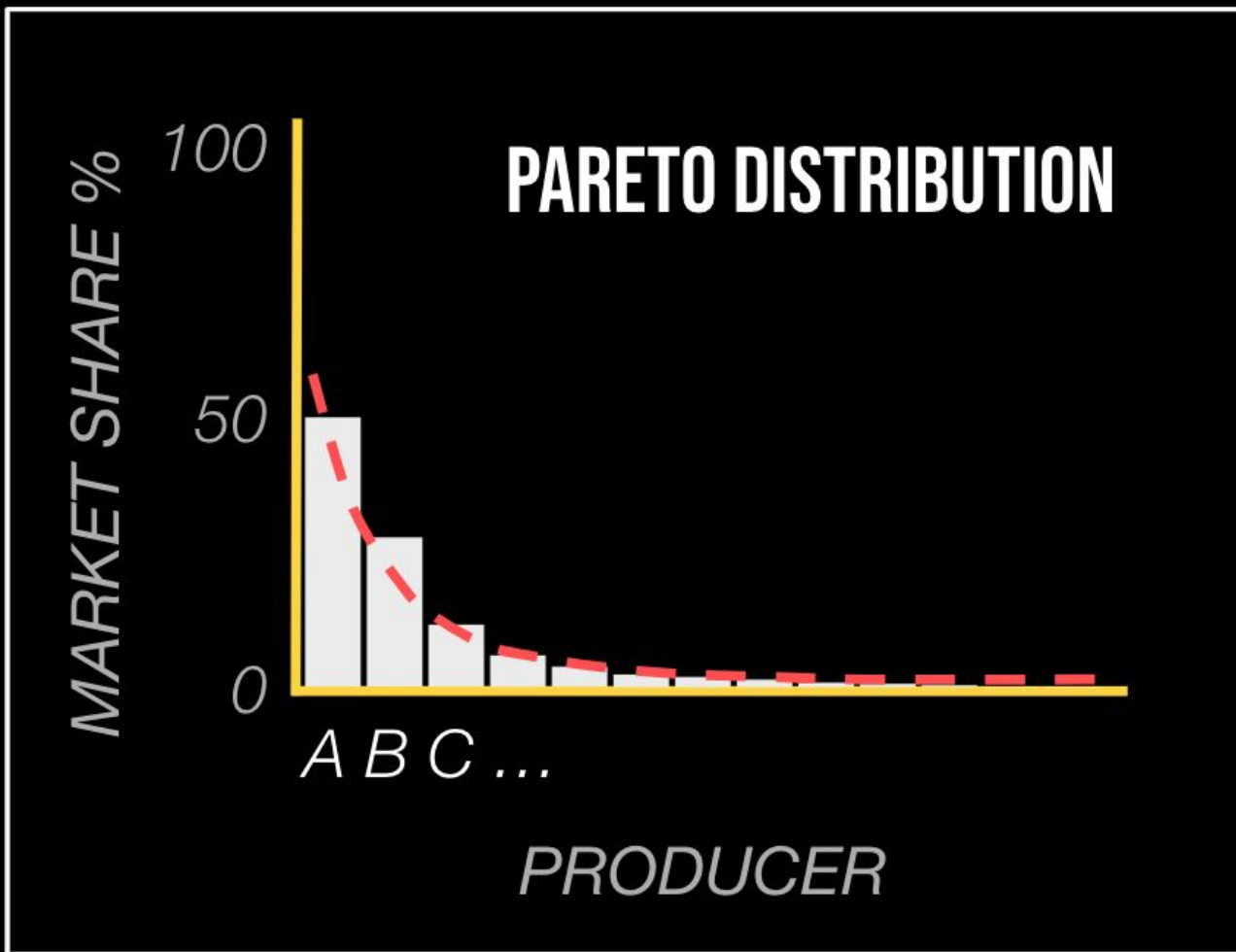


# POWER LAWS

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Relationships between two quantities, where changes to one leads to a proportional relative change to the other.*

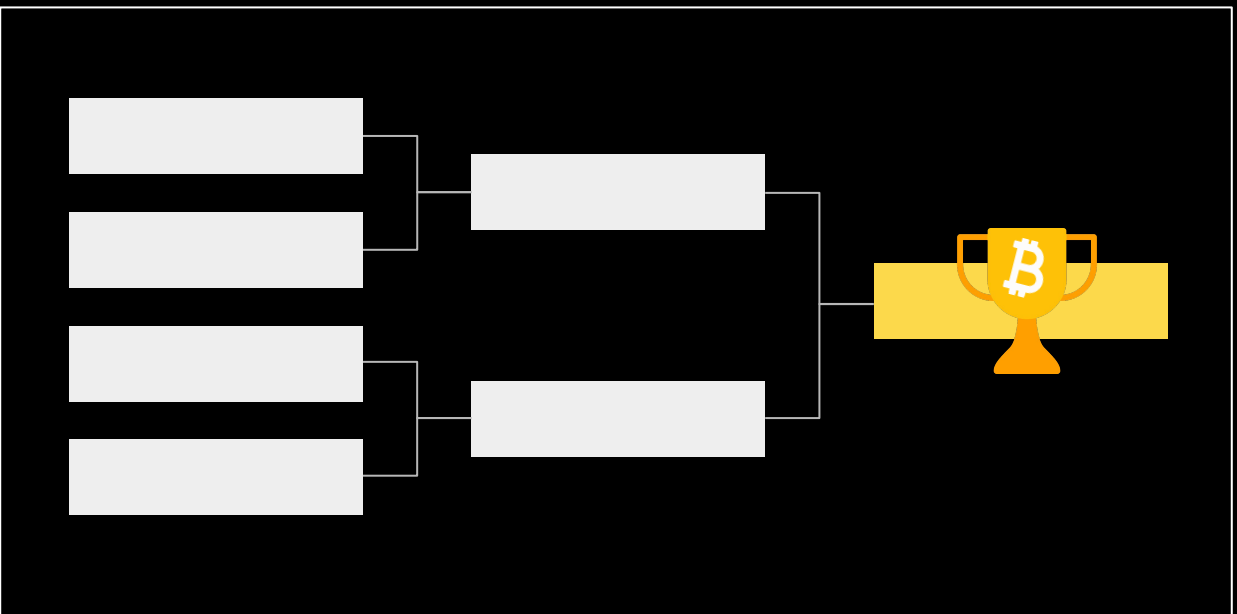


# WINNER-TAKE-ALL MARKETS

**BITCOIN**  
ESSENTIAL  
CONCEPTS

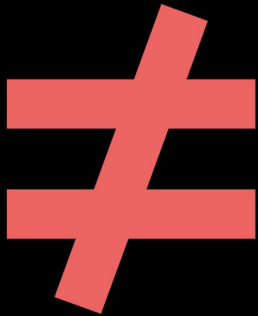


*Competitions where the single best performer captures the entire reward available*



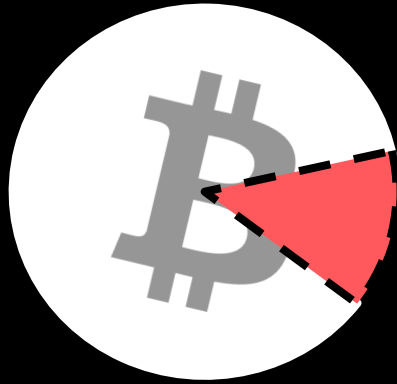
# UNIT BIAS

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The faulty reasoning that a single unit must be the appropriate amount from which to make assessments and comparisons*

**YOU CAN  
BUY A**



**FRACTION**

**OF A BITCOIN**

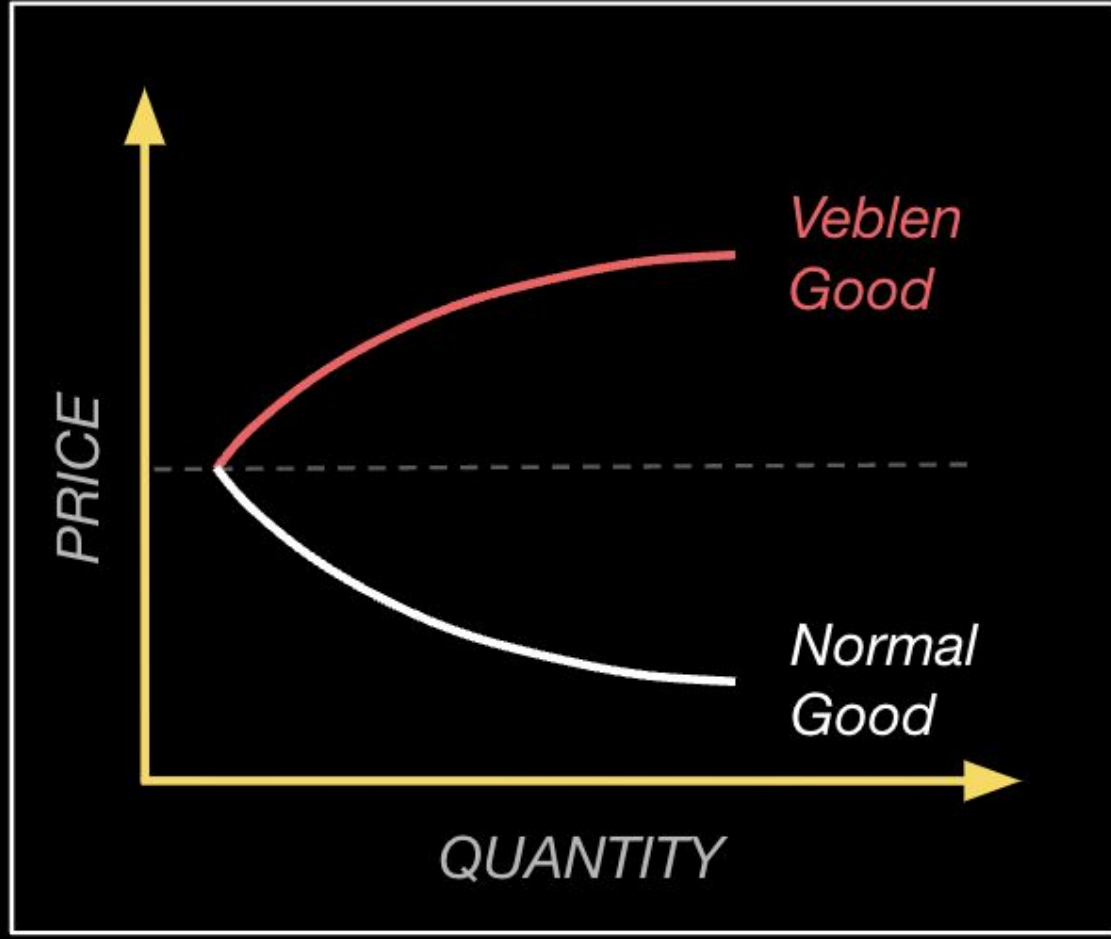


# VEBLEN GOOD

**BITCOIN**  
ESSENTIAL  
CONCEPTS

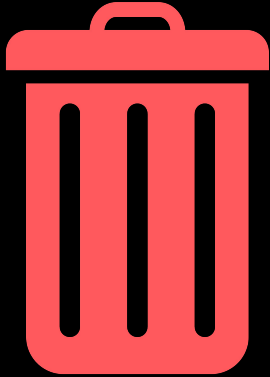


*Types of goods where the quantity demanded increases as the price increases*

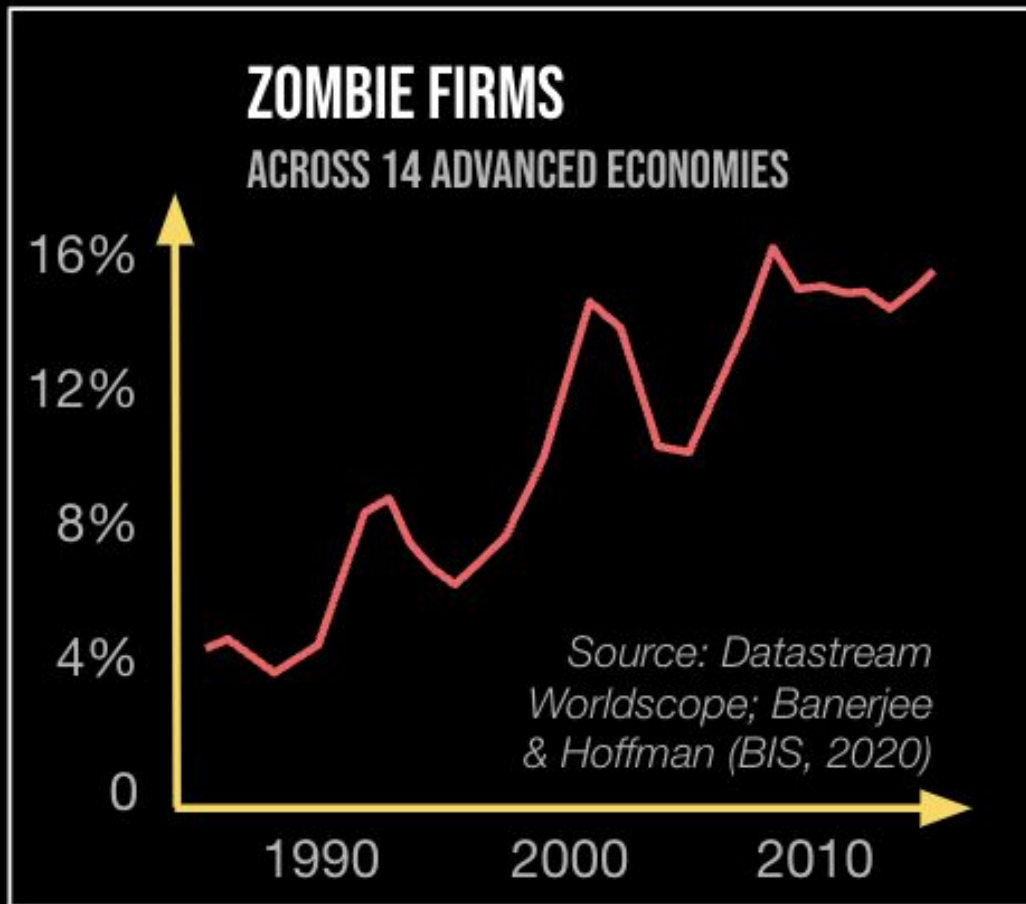


# MALINVESTMENT

**BITCOIN**  
ESSENTIAL  
CONCEPTS

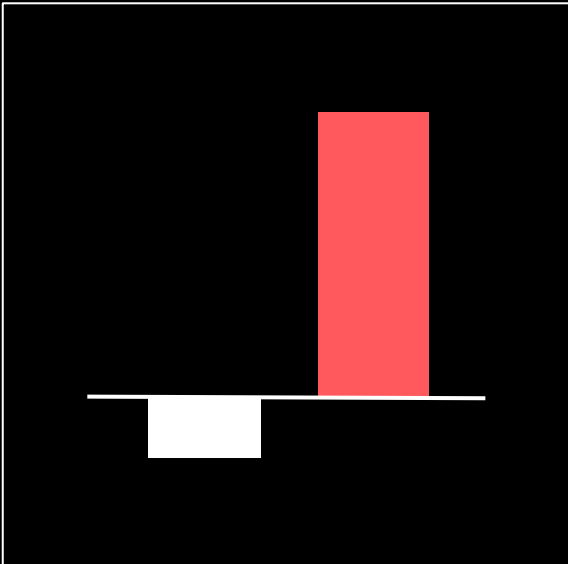


*Distorted price signals cause a misallocation of capital towards less productive uses than would otherwise be chosen under a free market*



# ASYMMETRIC PAYOFF

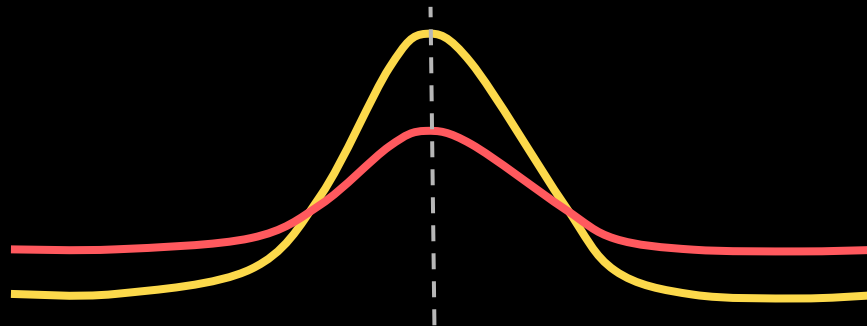
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Investment decisions where  
the potential upside is  
disproportionately greater  
than the downside risk*

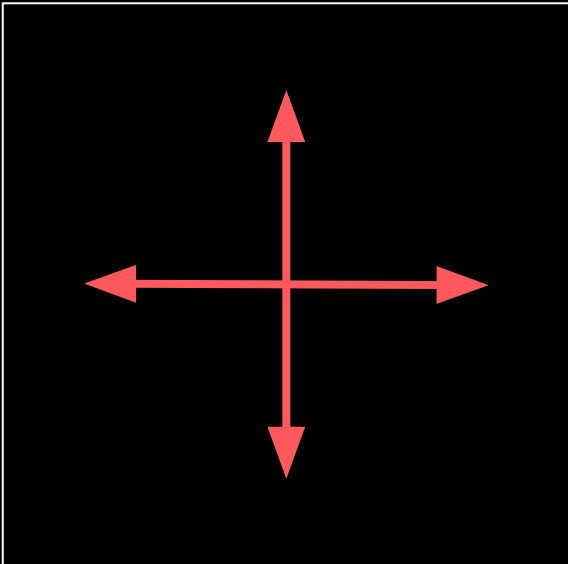
*“We can debate whether or not bitcoin is going to be a big deal in the future. But I don’t think we can debate that if it is it’s going to have an enormous right tail.”*

**—ROSS STEVENS**

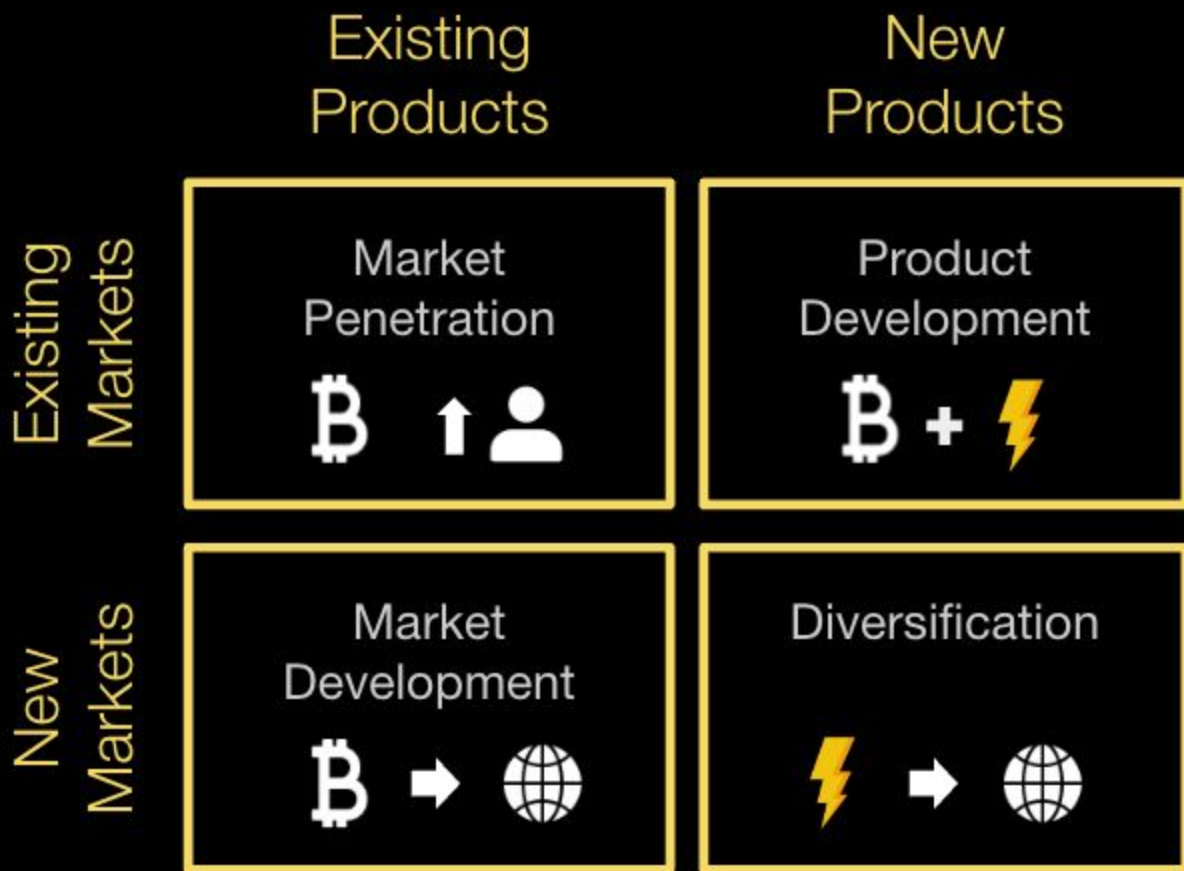


# ANSOFF MATRIX

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*A strategic framework for growth opportunities of a product across lines and markets*

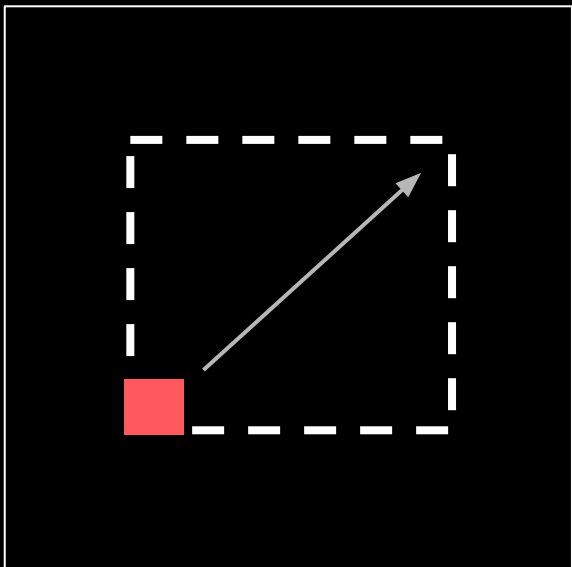




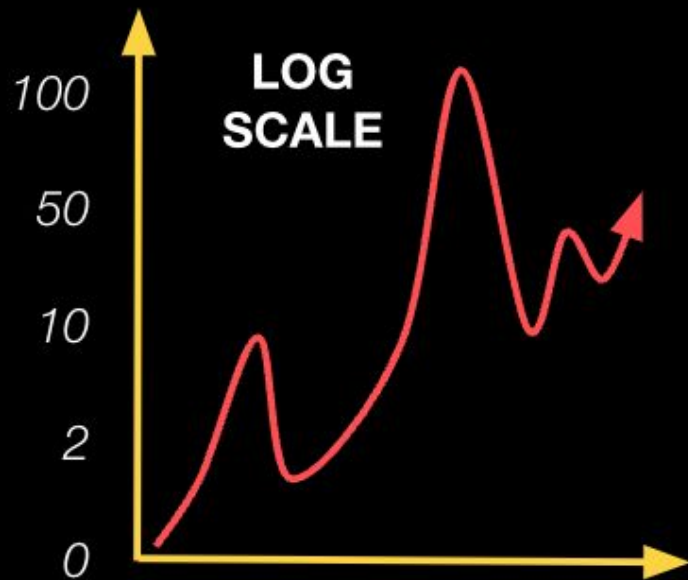
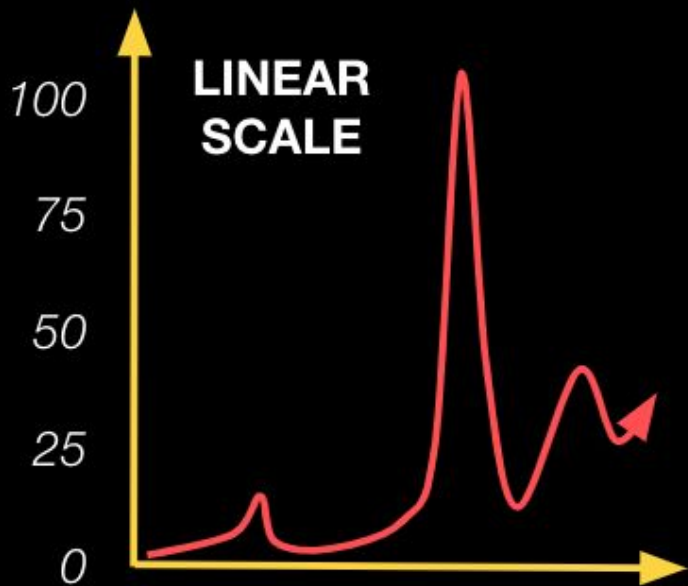
# Technology & Systems

# ORDERS OF MAGNITUDE

**BITCOIN**  
ESSENTIAL  
CONCEPTS

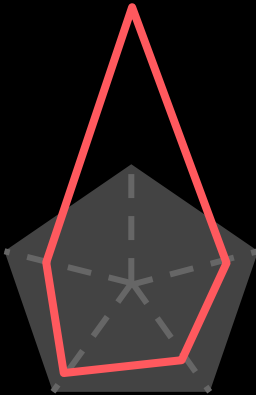


*When comparing two measurements in linear terms in infeasible, multiples of ten can provide a more intuitive scale*



# 10X IMPROVEMENT RULE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



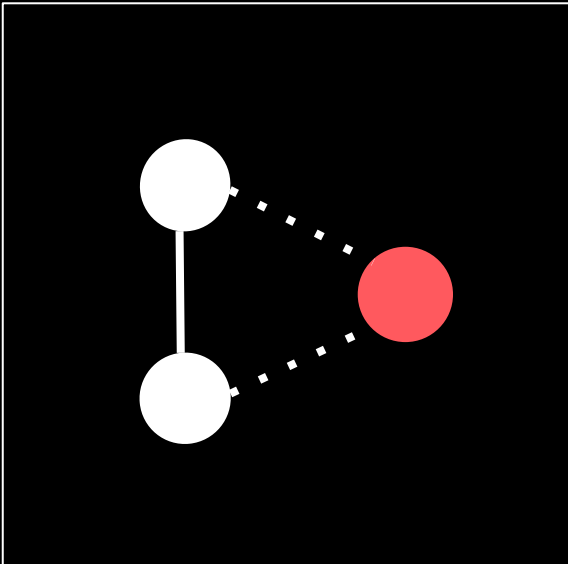
*New technologies must offer a benefit ten times greater than a predecessor or substitutes to gain widespread adoption*

*“As a good rule of thumb, proprietary technology must be **at least 10 times better** than its closest substitute in some important dimension to lead to a real monopolistic advantage.”*

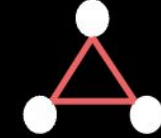
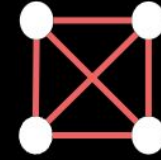
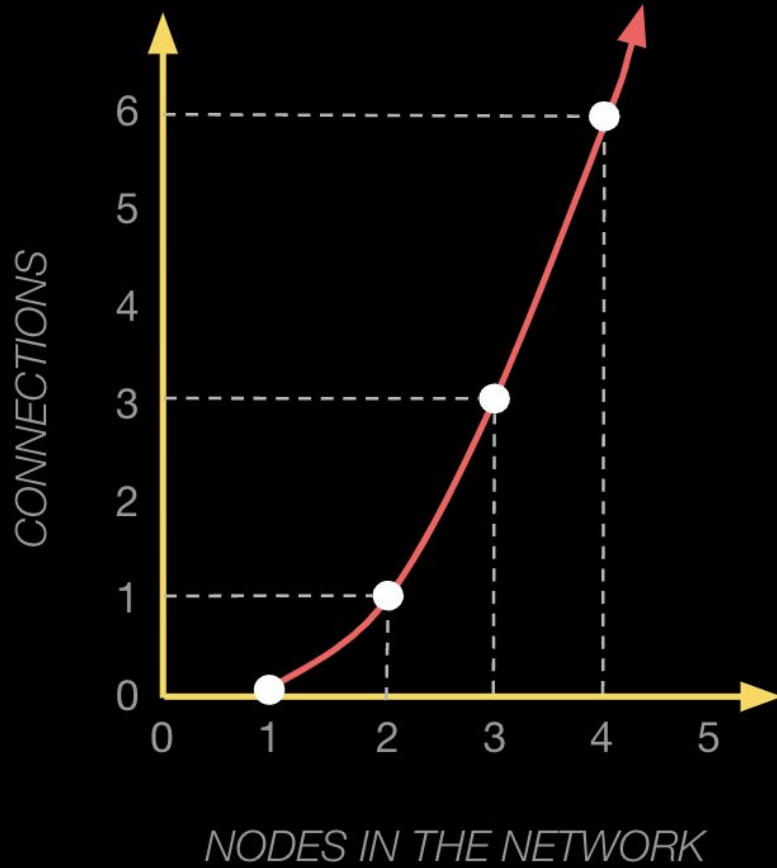
**—PETER THIEL**

# NETWORK EFFECTS

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The phenomena whereby each additional user to a network adds disproportionately more value and utility*



$$\frac{n(n-1)}{2}$$

# CHURN

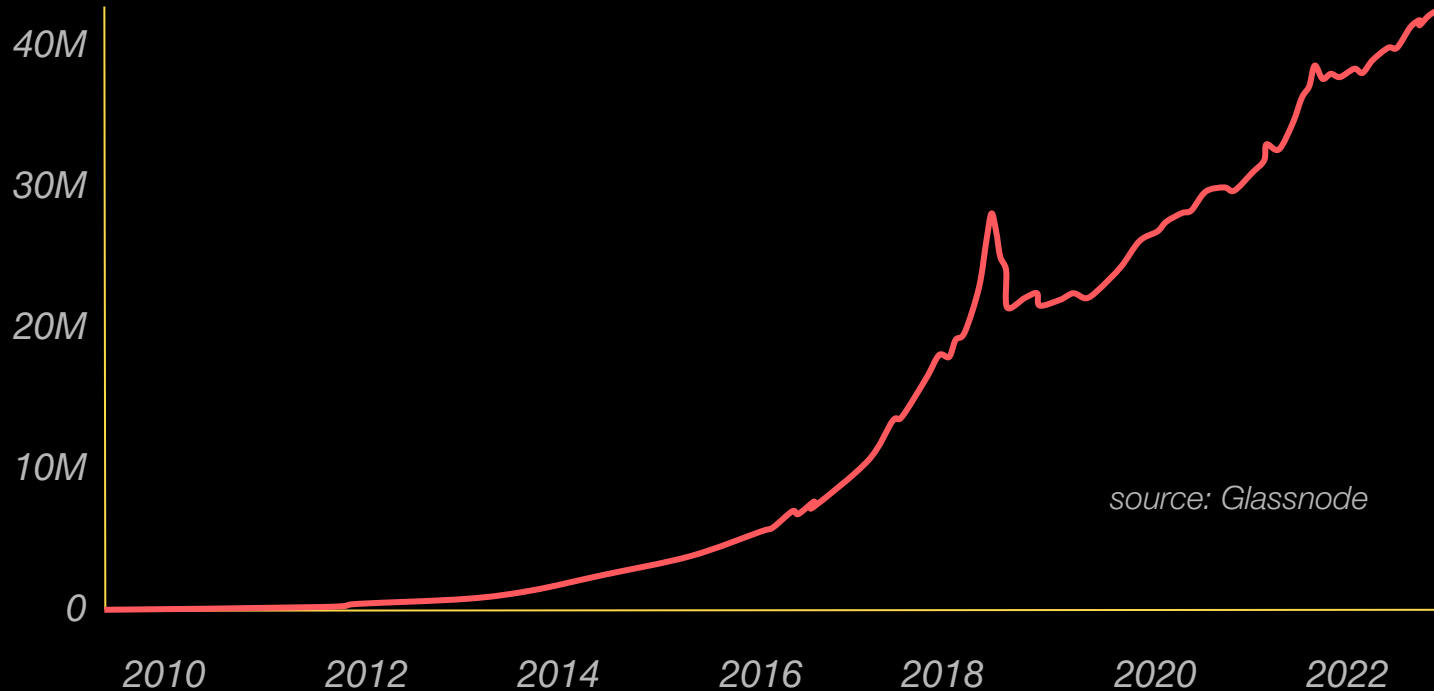
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The rate of user attrition,  
often expressed as a  
percentage*

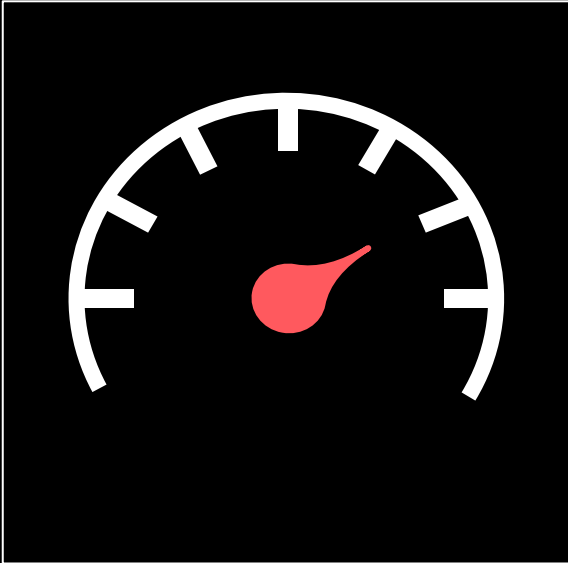


## # NON-ZERO BITCOIN ADDRESSES



# ACCELERATING RETURNS

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The rate of technological change is exponential, resulting in ever-increasing innovation and disruption*

TECHNOLOGICAL  
CHANGE

You are  
here



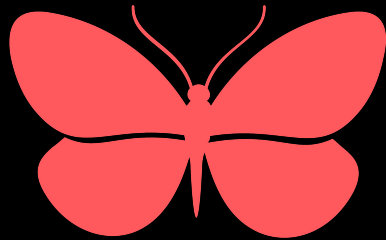
Actual

Expectation

TIME

# HIGHER-ORDER EFFECTS

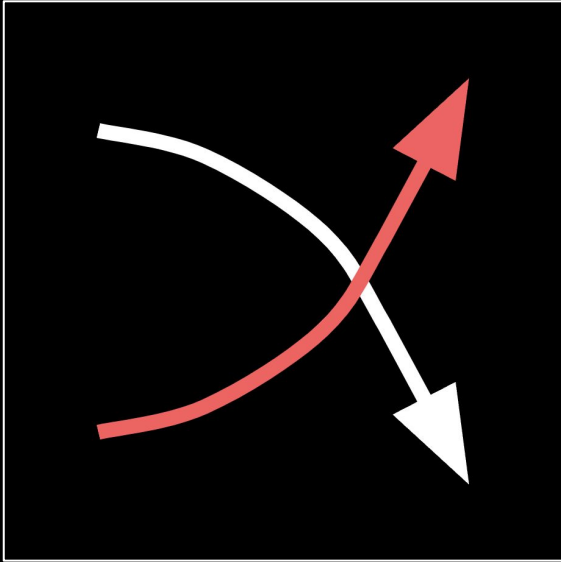
**BITCOIN**  
ESSENTIAL  
CONCEPTS



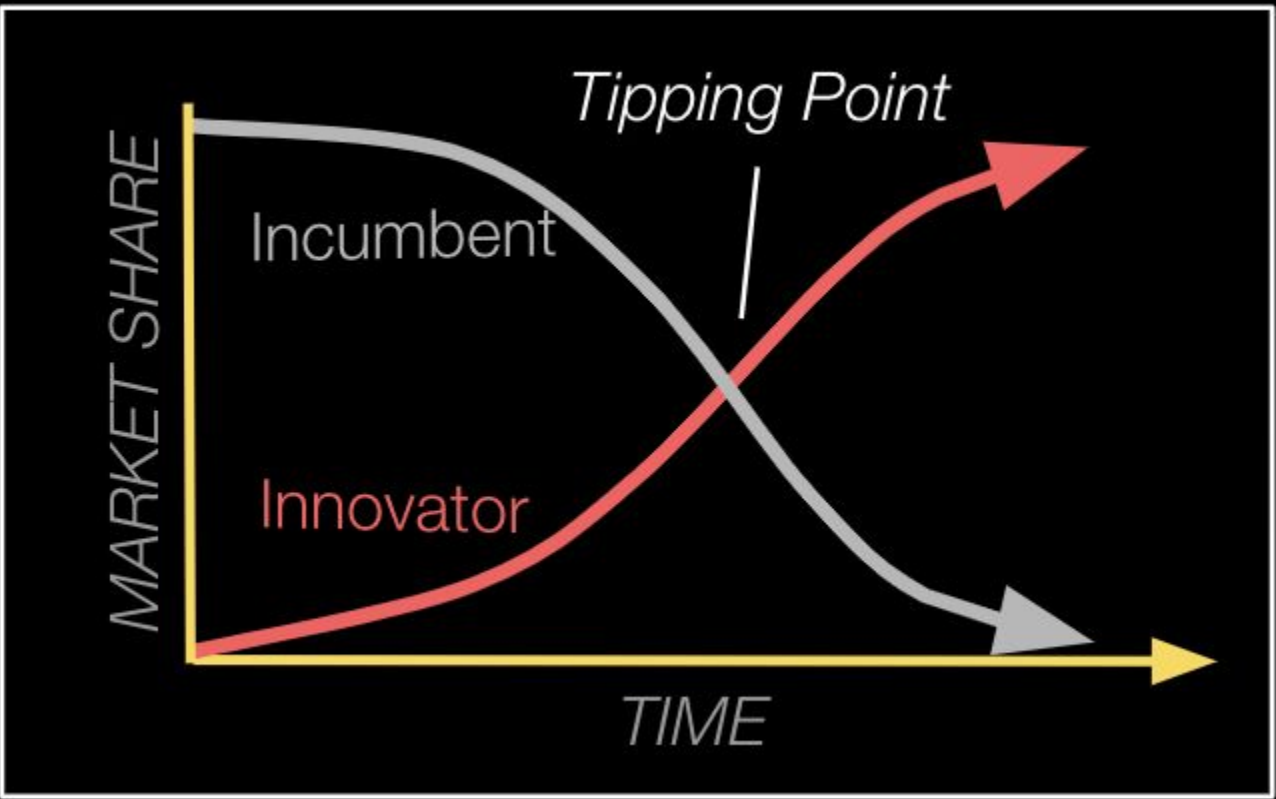
*Actions have consequences.  
And those consequences  
have consequences.*

# CREATIVE DESTRUCTION

**BITCOIN**  
ESSENTIAL  
CONCEPTS

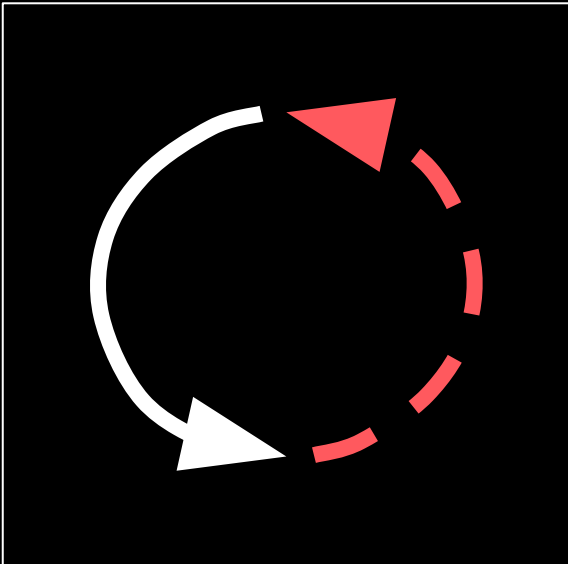


*The cycle of entrepreneurs  
out-innovating and obsoleting  
incumbents, under a free-market*



# FEEDBACK LOOPS

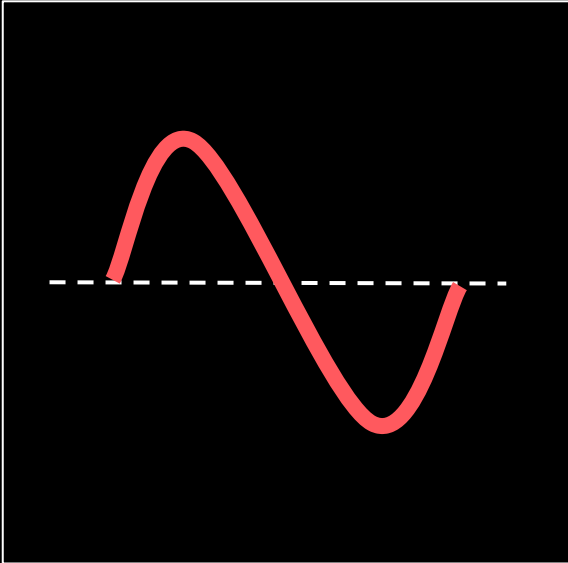
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*A system that reacts to its environment and the resultant output gets re-incorporated as an input*

# REFLEXIVITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The circular relationship between market participants and market sentiment, whereby attributing the respective impact of either is difficult*



# RELATIVITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



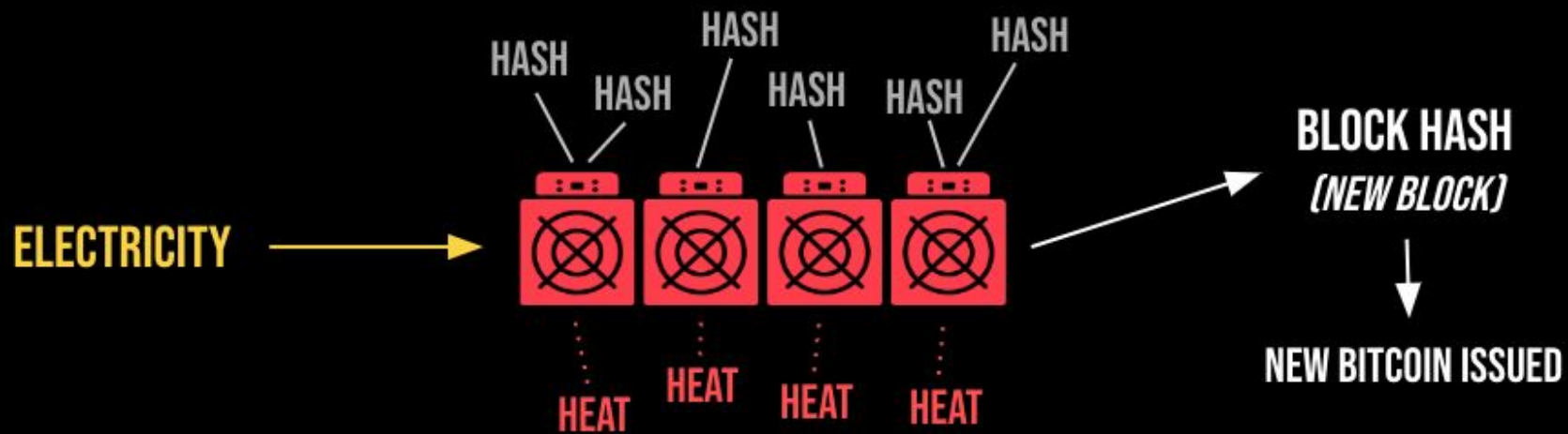
*When you're a part of a system, it can be difficult to zoom out to gain perspective*

# THERMODYNAMICS 1ST LAW

**BITCOIN**  
ESSENTIAL  
CONCEPTS

0000000000000000  
000000592A974  
B1B9F087CB776  
28BB4A097D5C2  
C11B3476A58E

*Energy cannot be created nor  
destroyed in isolated systems.  
It can only be transformed*



# ENTROPY

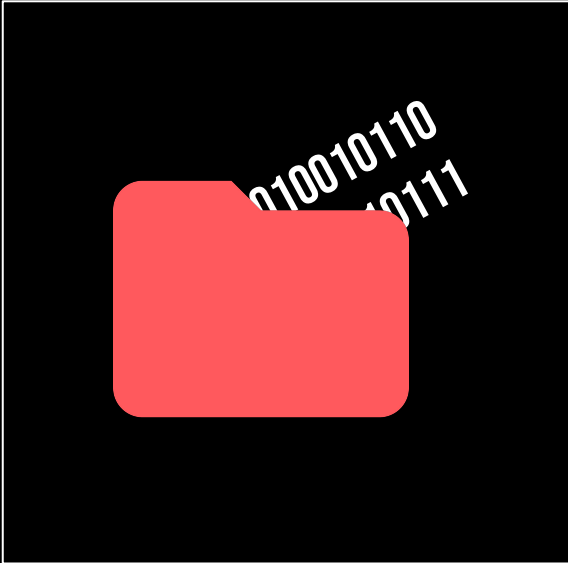
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The degree of disorder or  
randomness within a system*

# INFORMATION THEORY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*how digital information is  
communicated, stored,  
and quantified.*

## COMMUNICATIONS SYSTEM

*Produces a  
message*

**INFORMATION  
SOURCE**

*Converts  
into a signal*

**TRANSMITTER**

*Channel  
transports  
signal*

*Reconstructs  
msg from signal*

**RECEIVER**

*Intended  
recipient*

**DESTINATION**

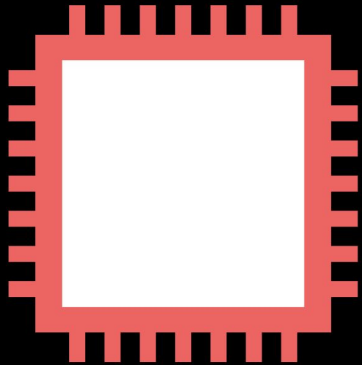
**NOISE**

*Interference*

*Adapted from A Mathematical Theory of Communication by Claude Shannon (1949).*

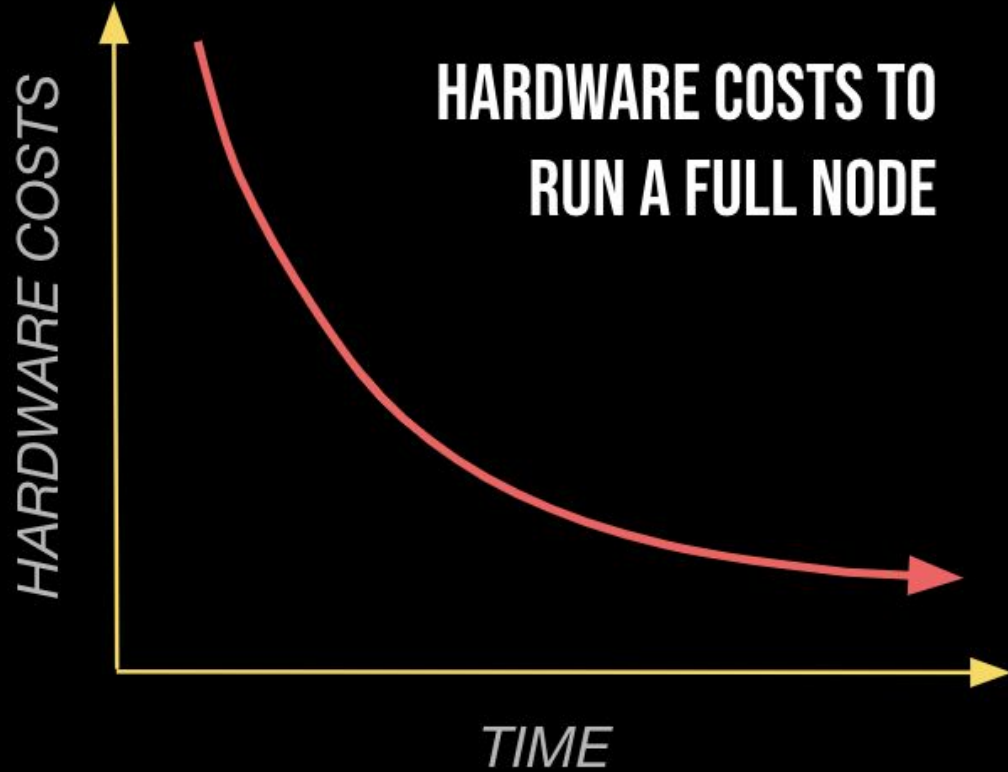
# MOORE'S LAW

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The observation that the number of transistors on a computer chip doubles approximately every two years*

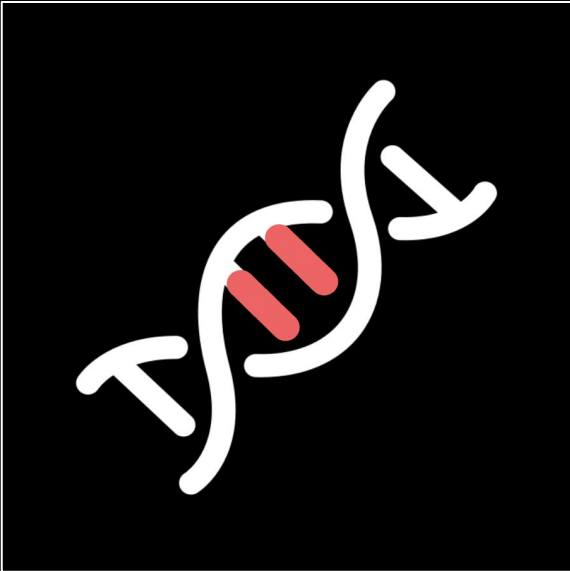
# **HARDWARE COSTS TO RUN A FULL NODE**





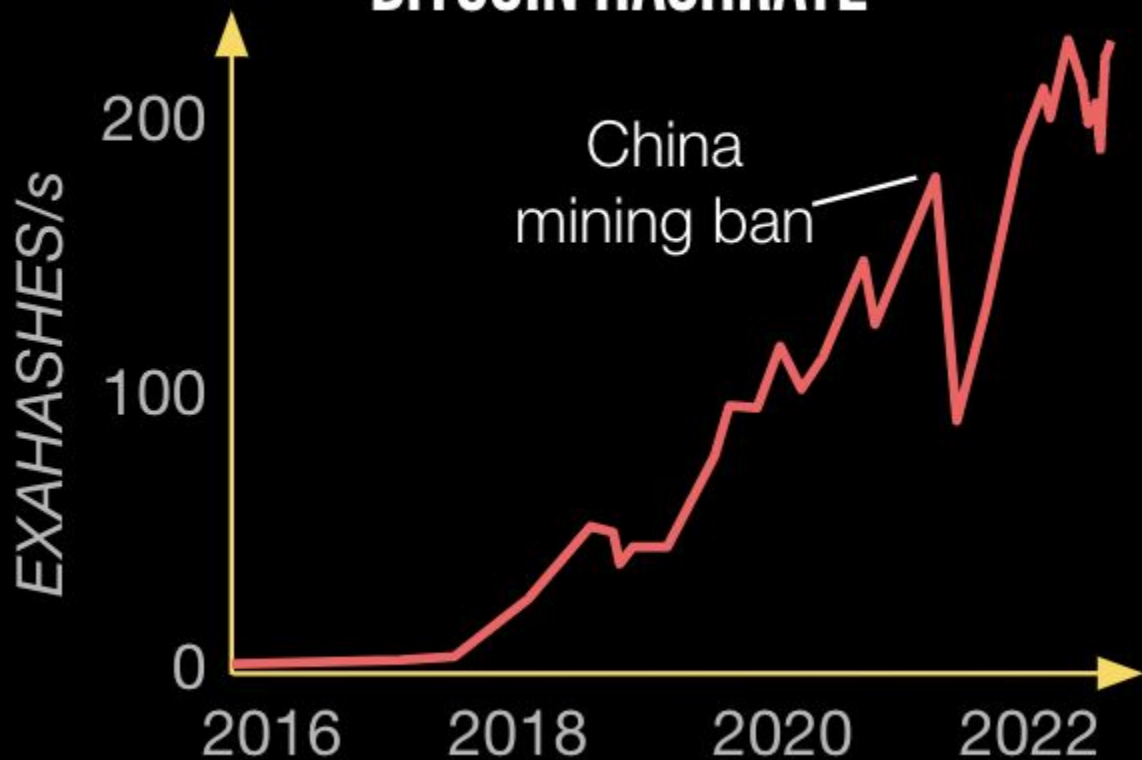
# ANTIFRAGILITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Things that actively gain from  
volatility and unpredictability  
by using rapid feedback  
loops to evolve*

# BITCOIN HASHRATE



# GALL'S LAW

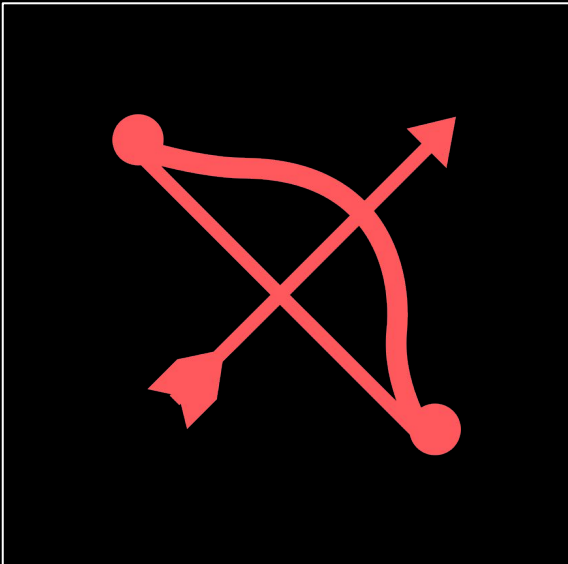
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Incremental improvements made to a functional system is a superior strategy to building a complex system from scratch*

# ATTACK SURFACE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



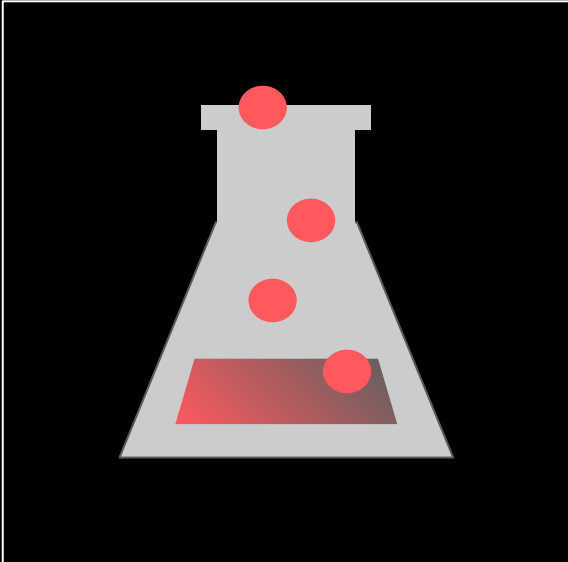
*The sum of all potential  
vulnerabilities from all  
potential access points*

*“Being open source means anyone can independently review the code. If it was closed source, nobody could verify the security.”*

**—SATOSHI NAKAMOTO**

# CATALYSTS

**BITCOIN**  
ESSENTIAL  
CONCEPTS



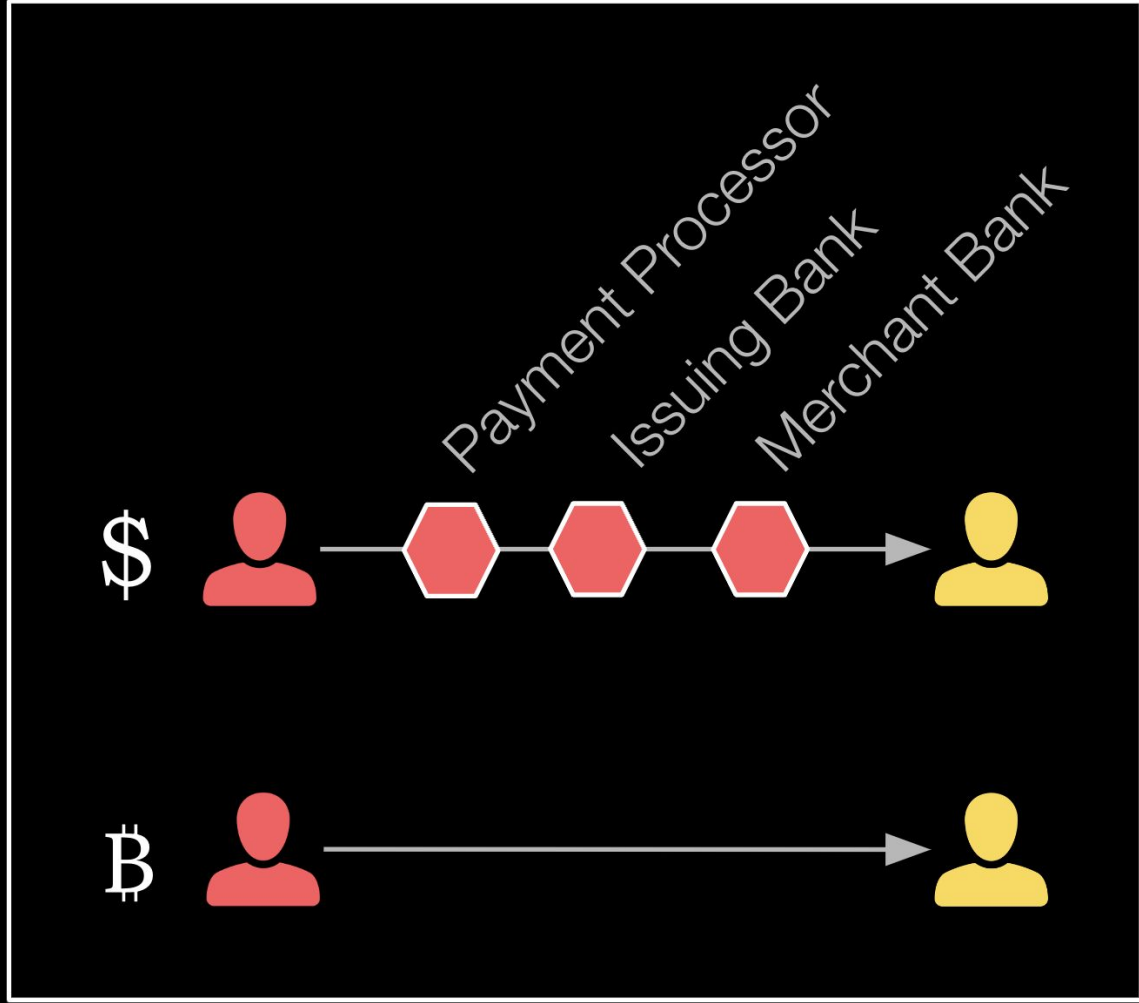
*Kick-starts a reaction  
but isn't itself a reactant*

# FRICTION

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*A force that opposes the relative movement of something*

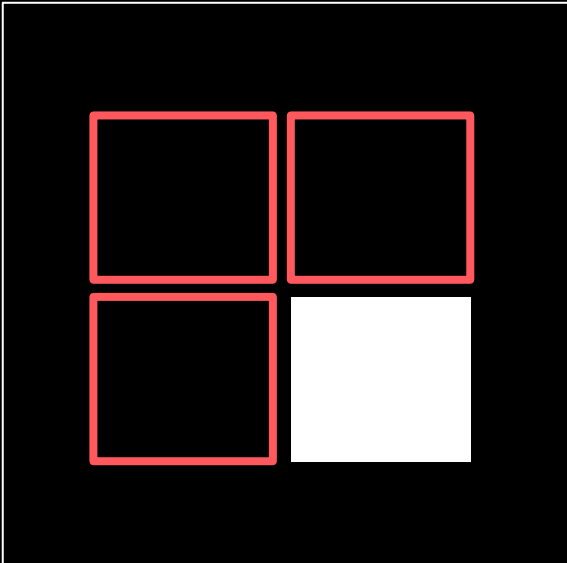




# Psychology

# PRISONER'S DILEMMA

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Using math to determine if  
it's better to cooperate or  
compete in multiplayer  
games*

*“If bitcoin adoption increases, the countries that secure some bitcoin today will be better off competitively than their peers. Therefore, even if other countries do not believe in the investment thesis..., they will be forced to acquire some as a form of insurance.”*

**—CHRIS KUIPER & JACK NEUREUTER**

# JURISDICTIONAL ARBITRAGE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*taking advantage of  
discrepancies between  
competing legal jurisdictions*

# SOCIAL PROOF

**BITCOIN**  
ESSENTIAL  
CONCEPTS



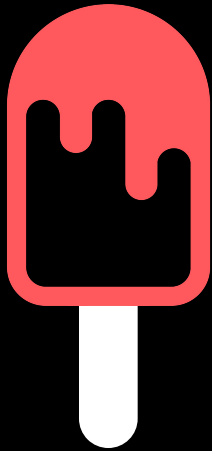
*In uncertain situations we  
look to those we deem  
knowledgeable or competent  
for guidance*

*“Paul Tudor Jones validates  
it for other hedge fund managers, hedge fund  
managers validate it for sovereign-wealth funds,  
sovereign-wealth funds will validate it for  
central banks.”*

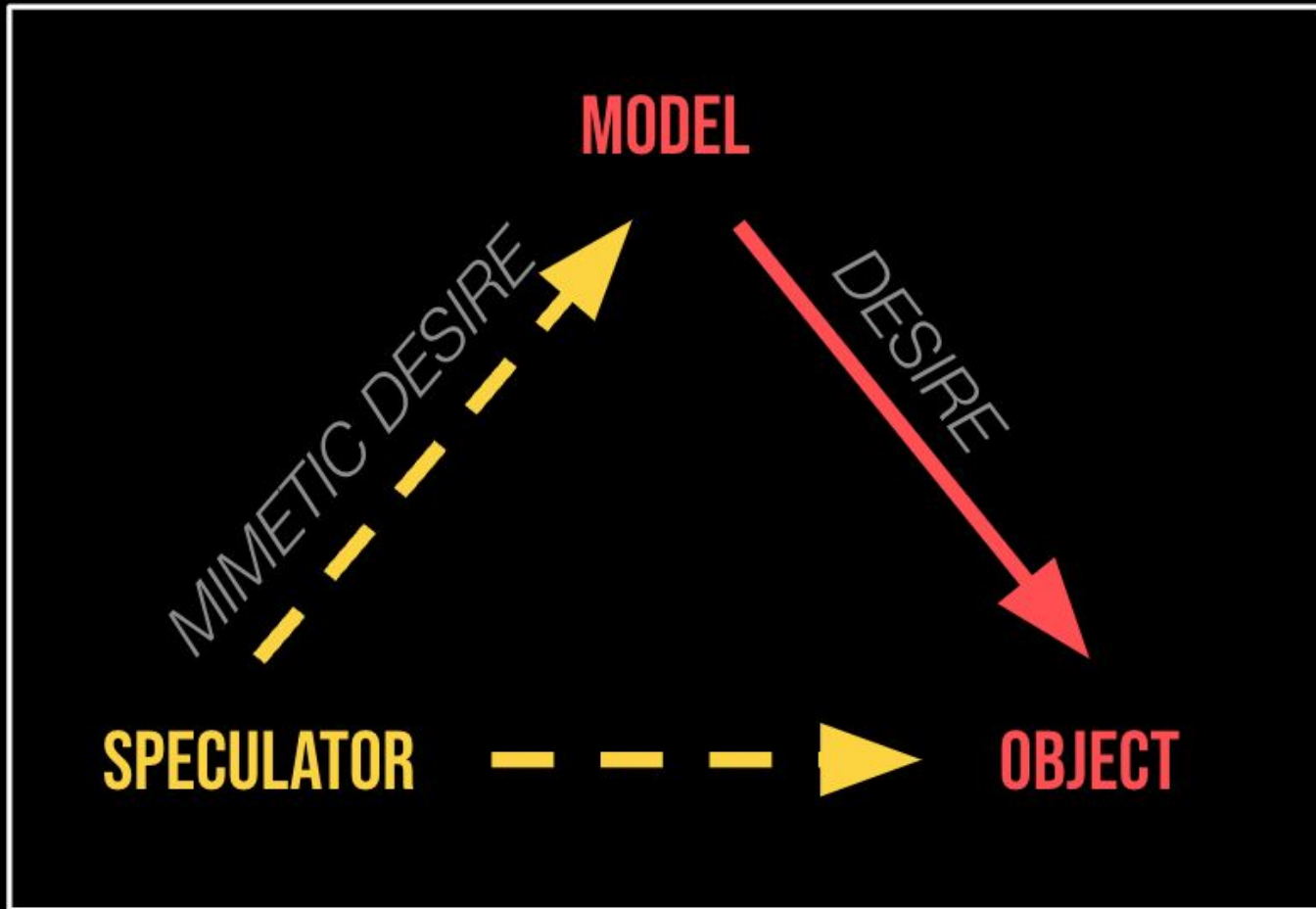
**—NAVAL RAVIKANT**

# MIMETIC THEORY

**BITCOIN**  
ESSENTIAL  
CONCEPTS



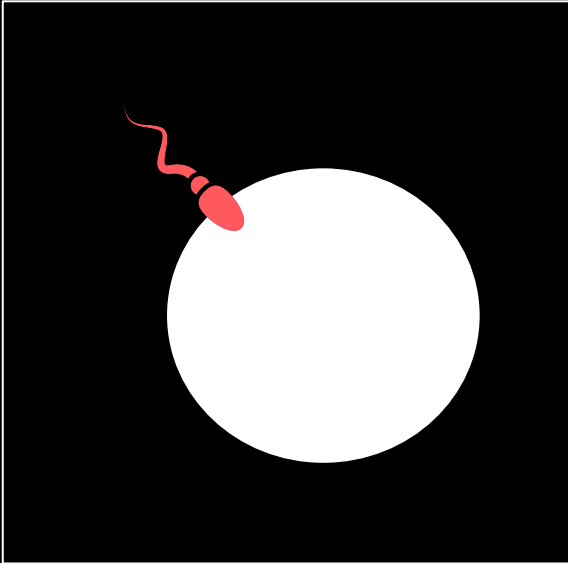
*Our desires are not intrinsic,  
but derived from the desires  
of others that we seek to  
imitate*





# FIRST CONCLUSION BIAS

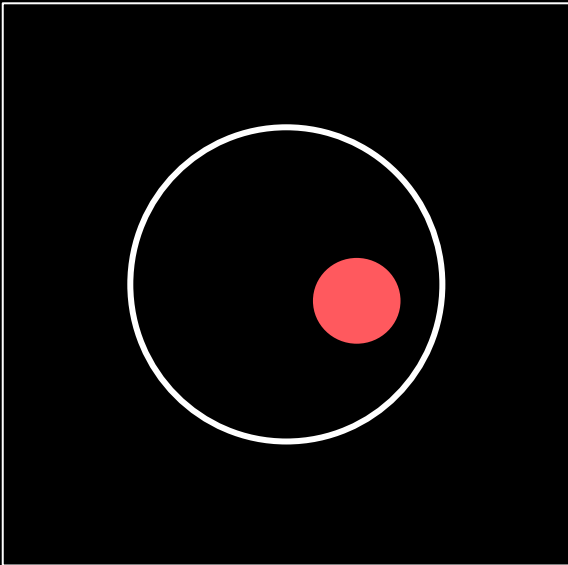
**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The tendency to accept the first answer offered, regardless of correctness, shutting out any further inquiry or debate*

# CIRCLE OF COMPETENCE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Understanding where your  
knowledge is lacking will  
illuminate where you're  
vulnerable*

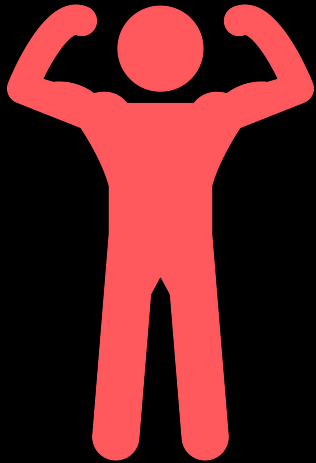
**WHAT YOU  
THINK YOU  
KNOW**



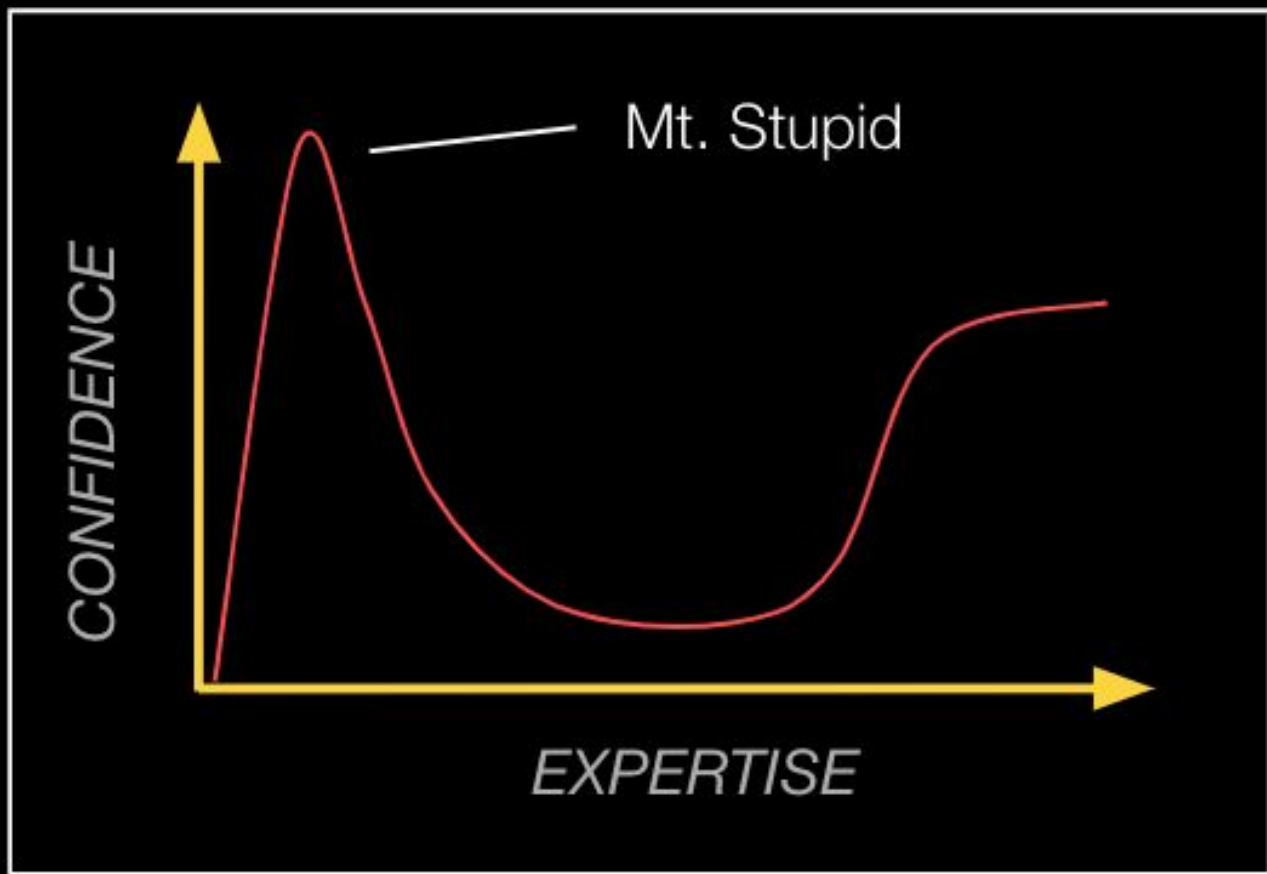
**WHAT YOU  
ACTUALLY  
KNOW**

# DUNNING-KRUGER EFFECT

**BITCOIN**  
ESSENTIAL  
CONCEPTS

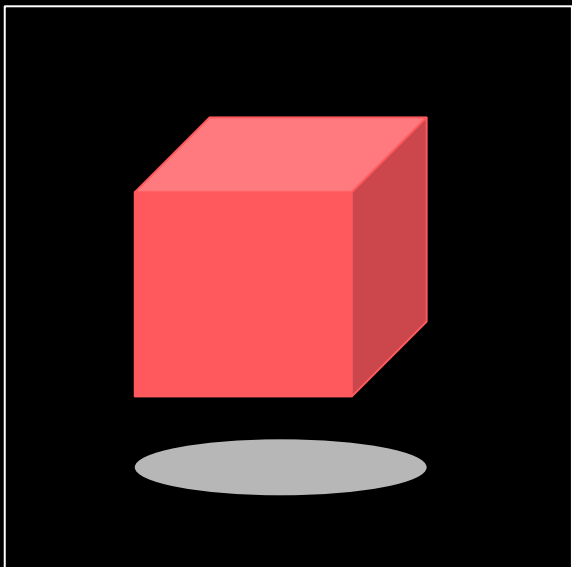


*Overestimating your  
knowledge in a specific area  
leads to erroneous decisions*



# CATEGORY ERROR

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Assuming an individual  
property of something is  
representative of its whole,  
leading to misattribution*

Store of  
Value

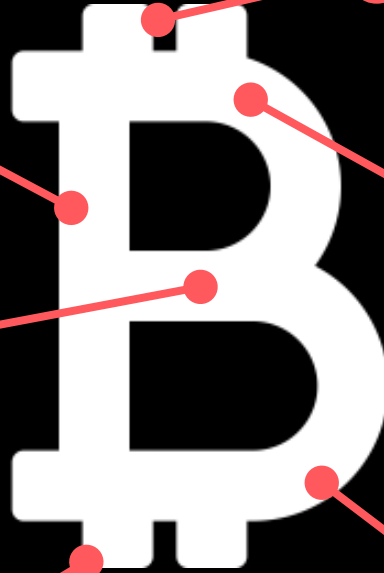
Commodity

Payment  
Rail

Unit of  
Account

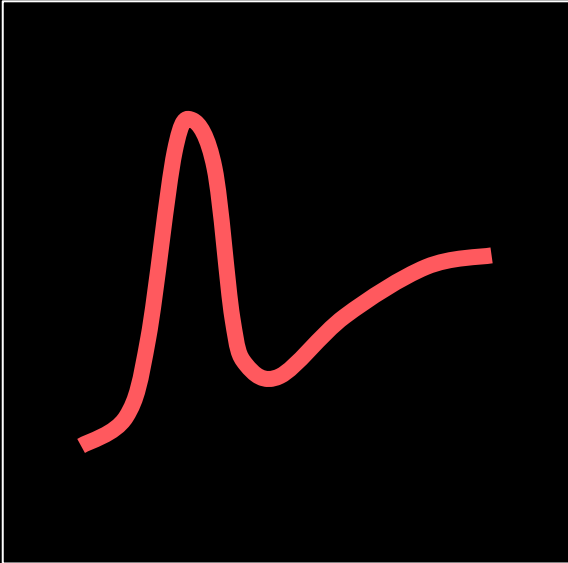
Software

Network



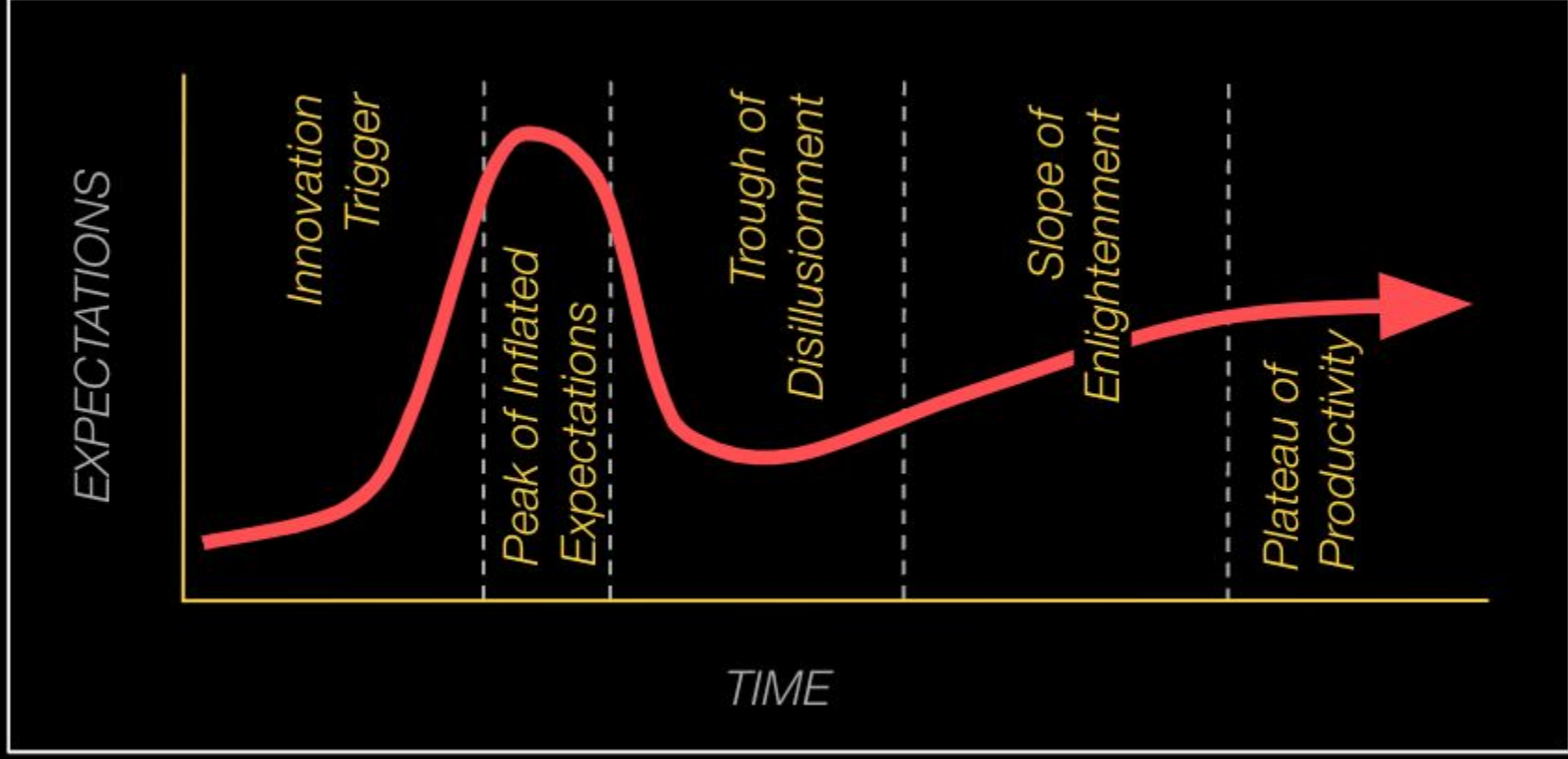
# GARTNER HYPE CYCLE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



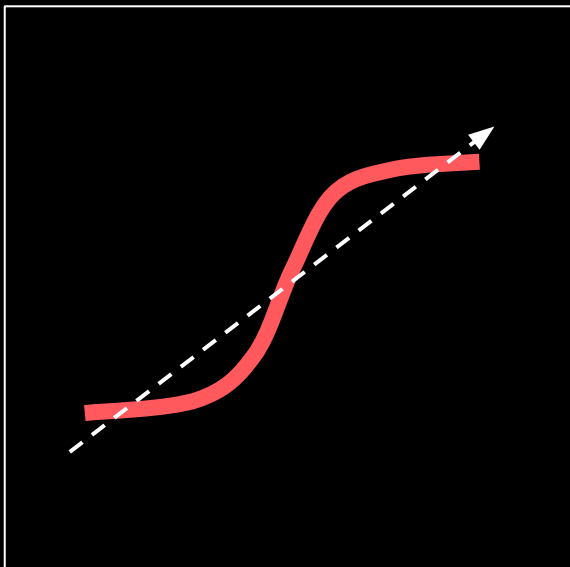
*A methodology for ascertaining  
the maturity and adoption of  
new technologies and  
applications*



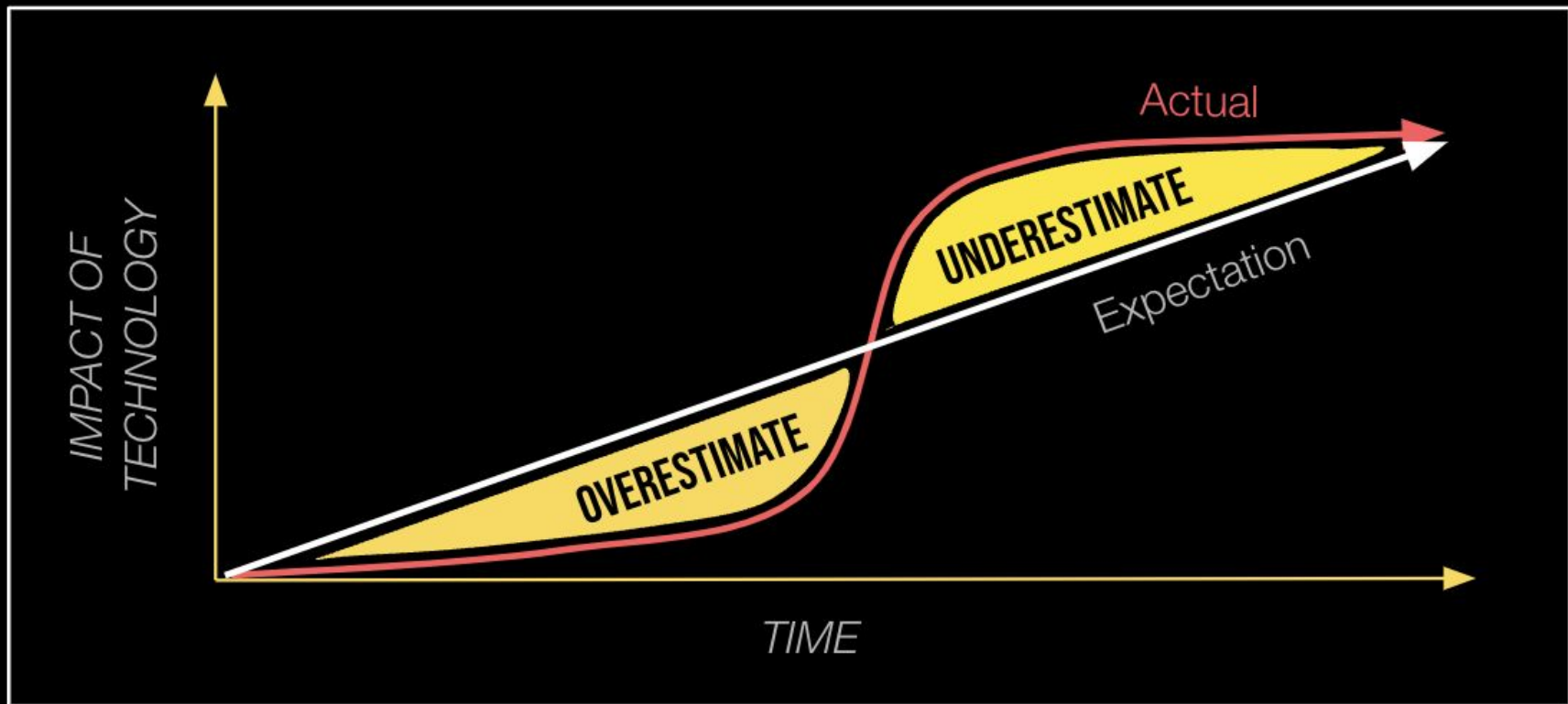


# AMARA'S LAW

**BITCOIN**  
ESSENTIAL  
CONCEPTS

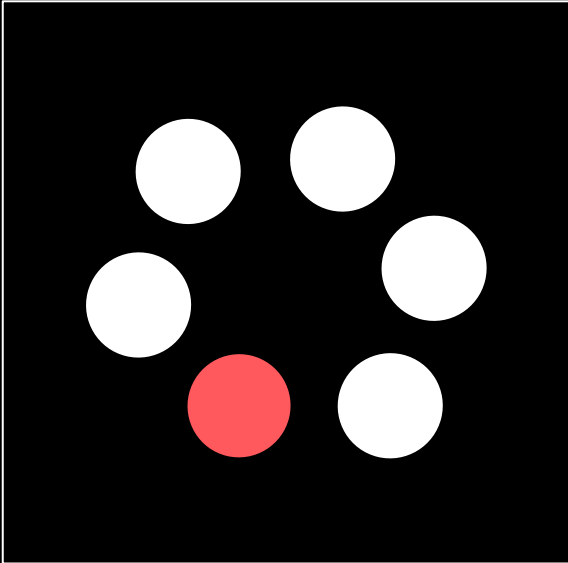


*We tend to overestimate the impact of new technologies in the short term and underestimate it in the long term*

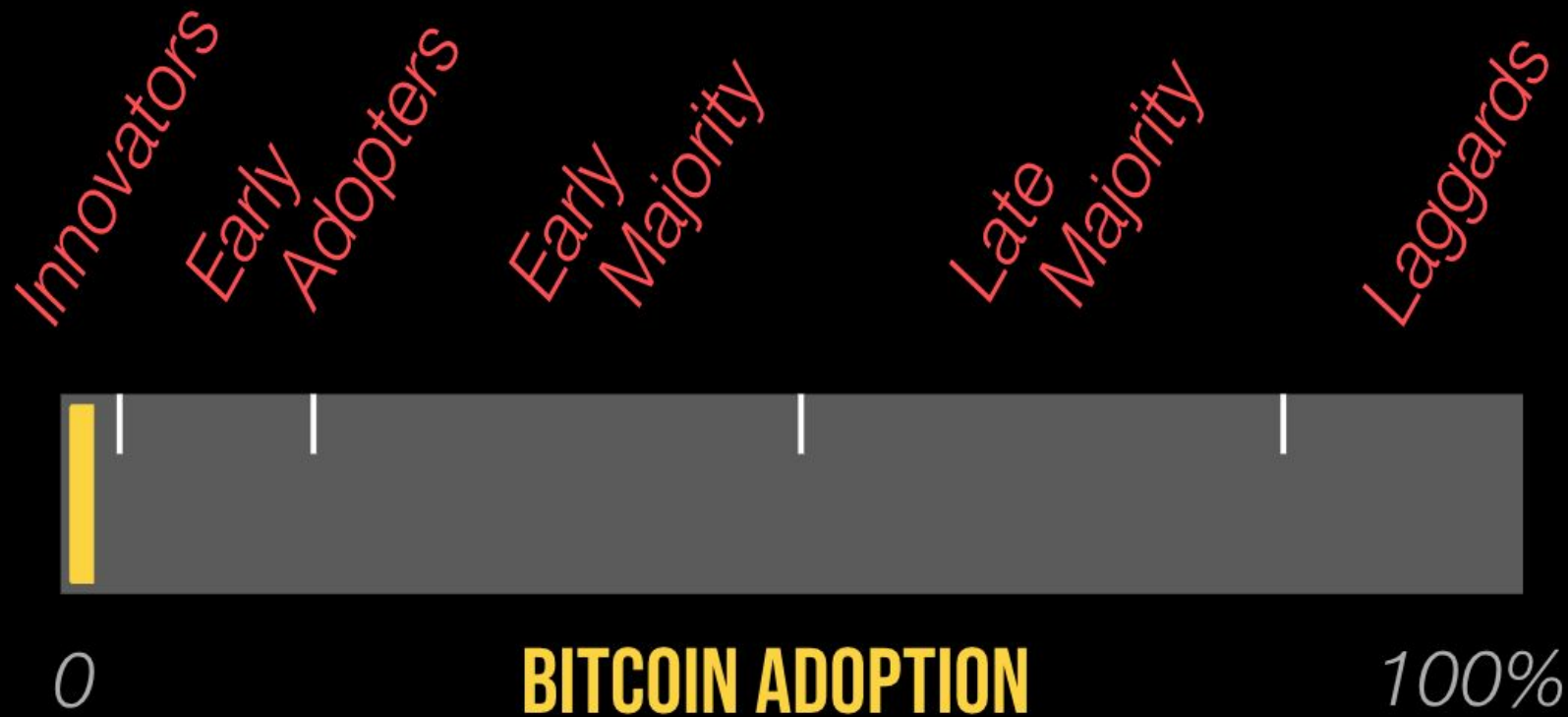


# INTRANSIGENT MINORITY

**BITCOIN**  
ESSENTIAL  
CONCEPTS

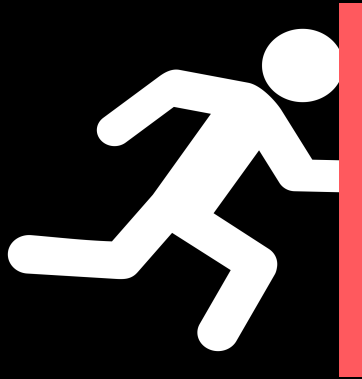


*When a few individuals shape the preferences of the majority by their unwillingness to submit to the default option*



# INEQUIVALENCE THEOREM

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*When economic conditions become excessively burdensome, individuals with the capacity will permanently exit a jurisdiction*



*“In the Information Age.. the rational person will not respond to the prospect of higher taxes to fund deficits..*

*Sovereign individuals and other rational people will flee jurisdictions with large unfunded liabilities.”*

**—JAMES DALE DAVIDSON & WILLIAM REES-MOGG**

# GELL-MANN AMNESIA

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*Observing errors in reporting of  
a topic, yet trusting the same  
source in areas where you are  
less knowledgeable*



**Newsweek**

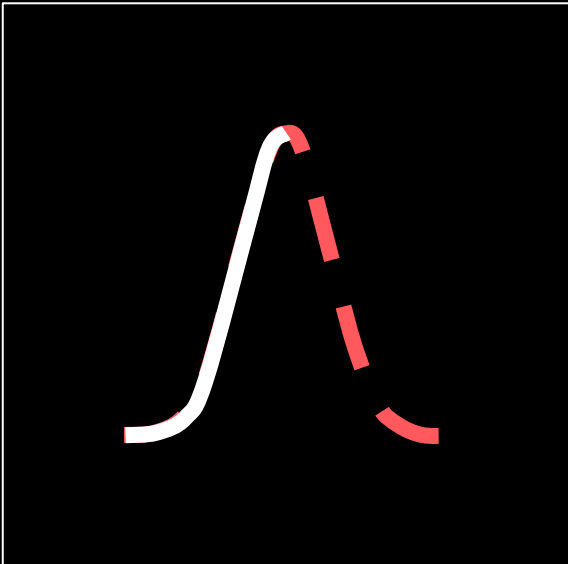
**Bitcoin Mining on Track to  
Consume All of the World's  
Energy by 2020**

ANTHONY CUTHBERTSON 12/11/17



# THE LINDY EFFECT

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*The theory that the lifespan  
of non-perishable things are  
proportional to their current  
age*

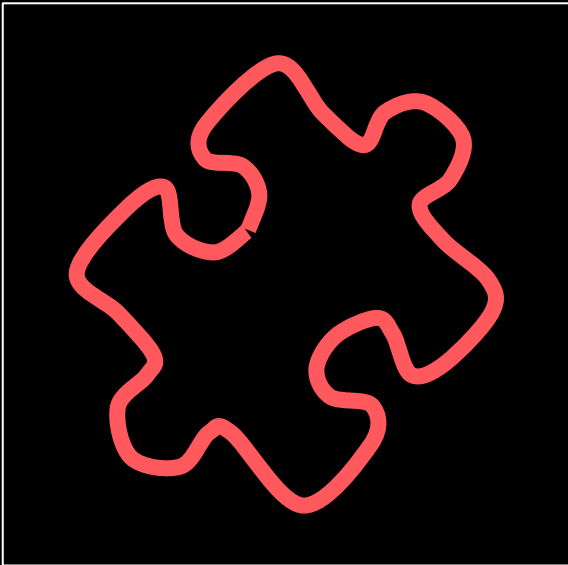
# 3,468

**DAYS SINCE THE BITCOIN  
NETWORK HAS BEEN DOWN**

As of 8 September 2022

# EMERGENCE

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*When novel dynamic structures arise from the interaction of individual components and becomes self-regulating*

*“Bitcoin is currently transitioning from the first stage of monetization to the second stage.. No one alive has seen the real-time monetization of a good (as is taking place with Bitcoin), so there is precious little experience regarding the path this monetization will take.”*

**—VIJAY BOYAPATI**

**COLLECTIBLE**

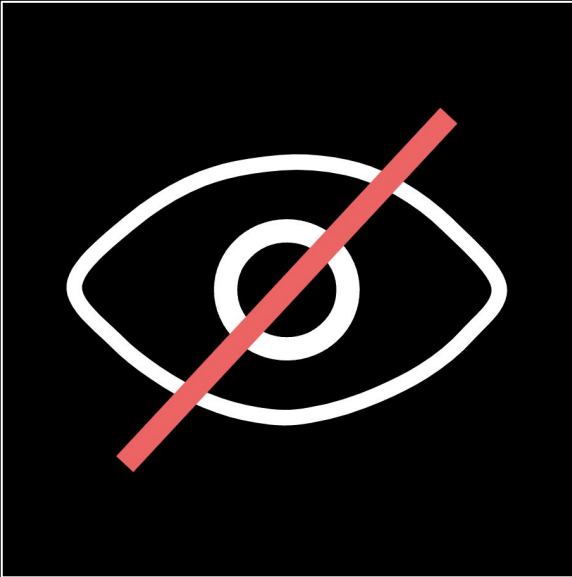
**STORE OF  
VALUE**

**MEDIUM OF  
EXCHANGE**

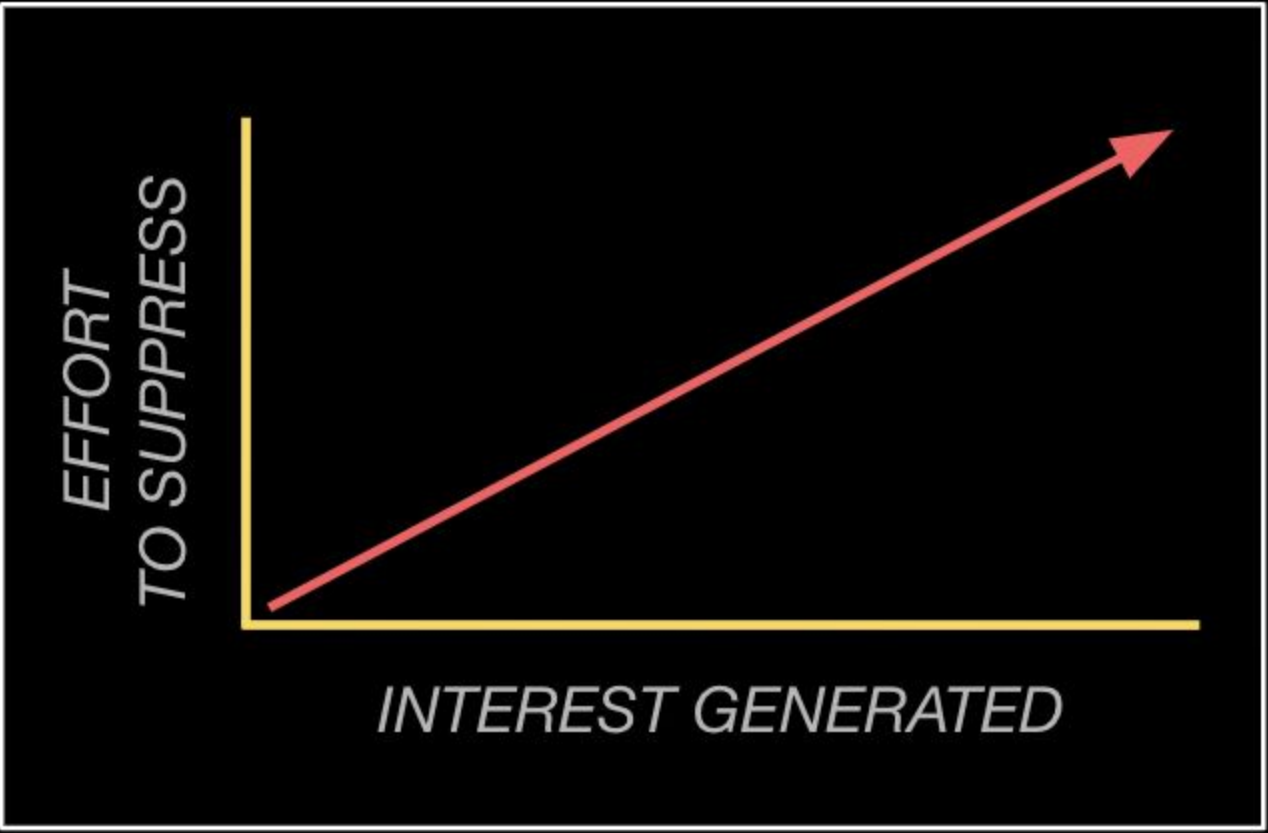
**UNIT OF  
ACCOUNT**

# STREISAND EFFECT

**BITCOIN**  
ESSENTIAL  
CONCEPTS

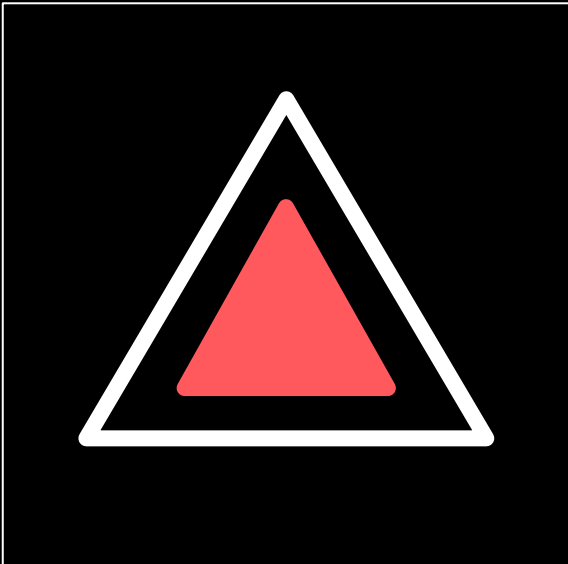


*Attempting to hide, remove,  
or censor something has the  
unintended consequence of  
publicizing it more widely*



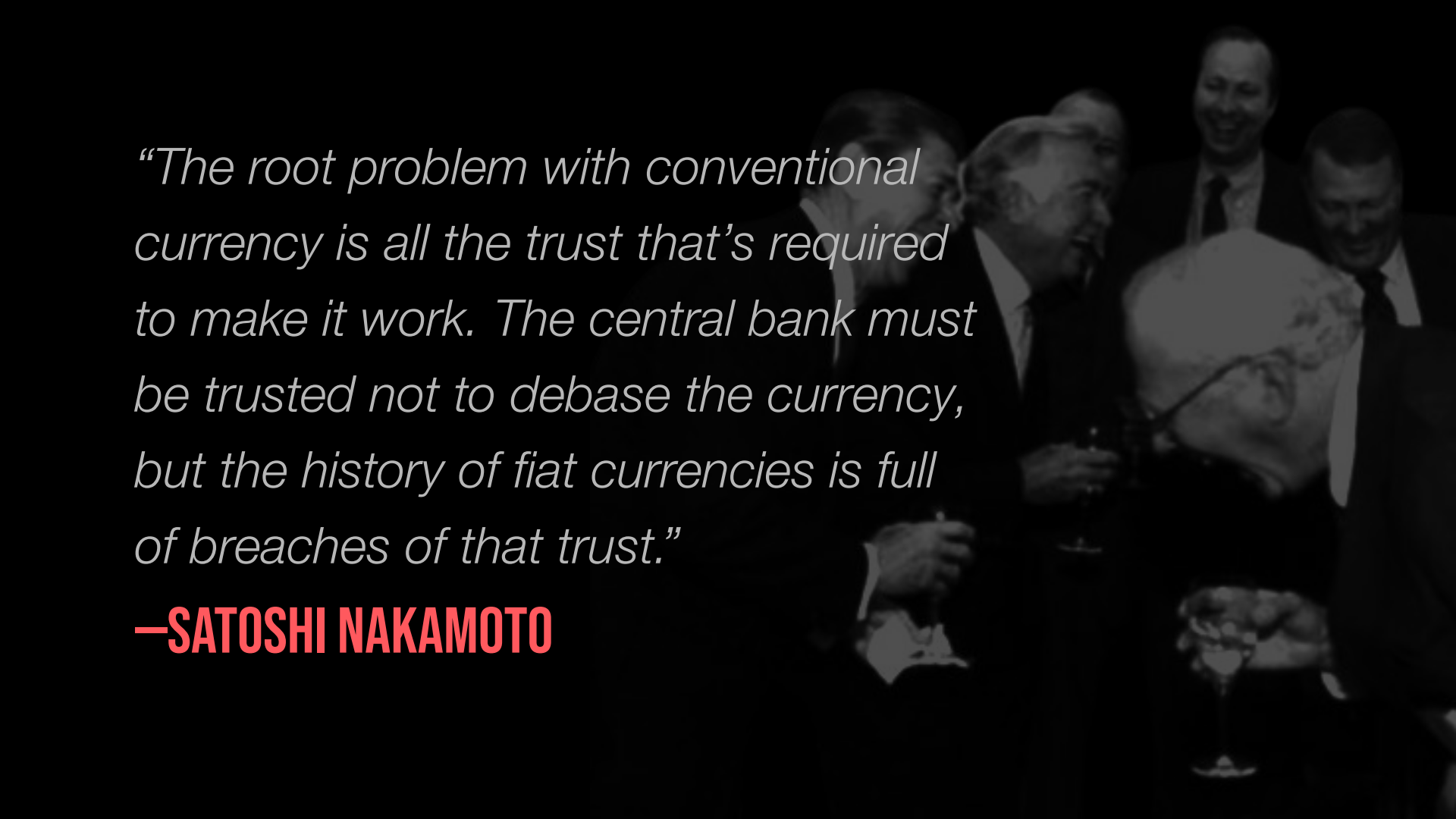
# MORAL HAZARD

**BITCOIN**  
ESSENTIAL  
CONCEPTS



*When a party has a duty to serve the interests of others, but instead places its own interests first*

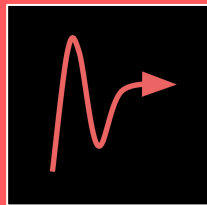
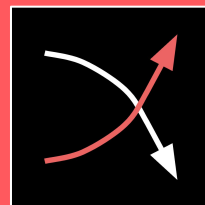
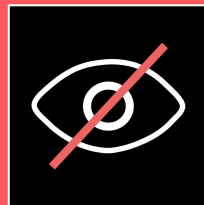
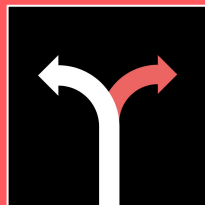
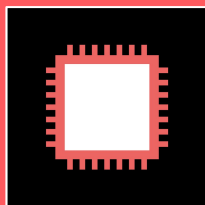
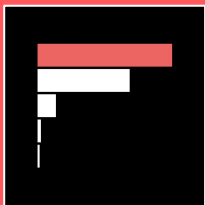


A black and white photograph of a group of men in suits at a formal event. One man in the foreground is holding a large, round cake. The background is dark, and the lighting is focused on the group.

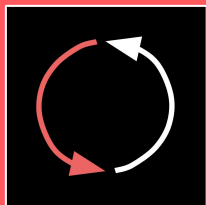
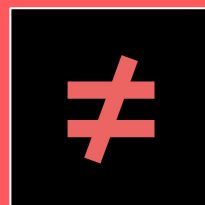
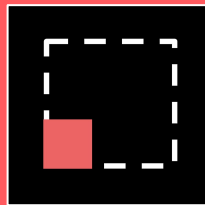
*“The root problem with conventional currency is all the trust that’s required to make it work. The central bank must be trusted not to debase the currency, but the history of fiat currencies is full of breaches of that trust.”*

**—SATOSHI NAKAMOTO**

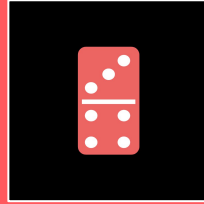
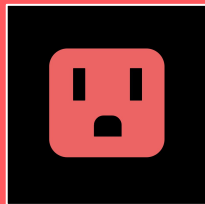
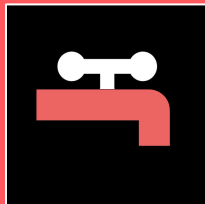
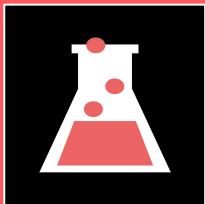
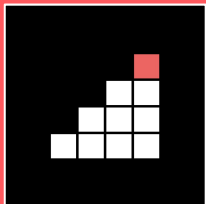
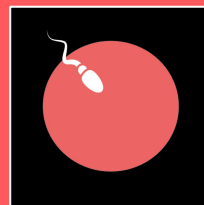
# BITCOIN:



# ESSENTIAL



# CONCEPTS



**ANIL**  
@ANILSAIDSO



Anil

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