CSPRI Blockchain–DRR Research Themes
What DRR Can Learn from Blockchain

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Race between escalation of disaster impact and means to mitigate impact

**DRR Target before COVID-19**
- Hurricanes
- Fires
- Floods

**DRR Target after COVID-19**
- COVID-19 – 100K Deaths / week
- Climate - > millions of people affected
- Famine / Water - millions of people affected
- Cyber – Millions of networked systems

**New Technologies**
- Blockchain, Dapps, Web3
- Machine Learning
- CRISPR-Cas9
- MRNA / and other molecular vaccine innovation
- Social network analysis

**Disaster Incidents**

**Governance**

**Social behavior**

**Potential outcomes**
1) Manageable Loss
2) Unacceptable Catastrophe
Challenge of untrustworthy information overwhelming human processing power

New disorder: Toxic Entropy Exposure

Entropy Management Systems
(Immune systems for disorder)

Tolerable Level of Entropy Exposure

- Data – words, images, sounds
- Decision demands
- Demands for events and scheduling
- Exposure to uncertainty and surprise
What have we learned from the COVID-19 experience?

Simple behaviors make a huge difference in disease incidence

- Screening
- Masking
- Hygiene
- Distancing
- Testing
- Contact tracing
- Vaccination

But bad actors and a cooperative media complex can construct alternative realities

- The virus will disappear
- Treat the virus with bleach and light
- Logistics? It’s the states’ responsibility

*In the US, the cost is hundreds of thousands of lives – worldwide, millions at risk.*
Key role for trust – “Trust the science.”

Trust in a shared reality
- Validation methods (clinical trials)
- Authorities (Tony Fauci)
- Respected institutions
- Media
- Common narratives
- Group identity

Beneficial behaviors
- Vaccinations
- Inhibition of communicable disease
- Change in energy use
- Low impact infrastructure and commuting practices

Enables

Feedback
Evolution of trust – Methods of reducing uncertainty

Trust in science
- Aristotle, Euclid
- Astrology, alchemy
- Ptolemaic astronomy
- God said, ‘Let Newton be!’ and all was light.
- Experimental objectivity
- Statistical validation
- Peer review consensus processes*

Trust in governance
- Hunter / gatherer
- Land-based hierarchy
- Trial of Socrates (democratic justice)
- Divine law
- Monarchies
- Enlightenment, devolution of power
- Democratic clockwork (balance of competing interests)
- Return of autocracy?

Trust in transactions
- Barter
- Seashells
- Rare metal coins
- Paper currency
- Double-entry accounts
- Administrative law and regulation
- Centralized accounts
- Electronic payments
- Distributed transaction governance and blockchain

* See Naomi Oreskes, *Why Trust Science*, The University Center for Human Values Series, 2021
How blockchain creates trust

**Blockchain Consensus** - A fault-tolerant method to determine a valid data set (e.g., transactions) or network state among distributed systems

- Variety of methods including Proof of Work, Proof of Stake, Delegated Proof of Stake, ...
- “Smart Contracts” can embody consistent business rules.
- *Blockchain consensus creates a “social” system in which there is an economic cost to disinformation.*

Limitations and lessons

- Just because data is on the chain doesn’t mean it is accurate. Blockchain does not solve the problem of interfacing with real-world external data.
- Lack of governance means there is no responsible party to adjudicate disputes.
- Consistent, trustful data is a necessary but not sufficient condition to achieve human trust and behavioral response.
What blockchain can do for DRR

- Connect behavior with incentives
- Provide interoperable access to data and to people
- Provide trusted record of responsive actions
- Incentivize behavior change in networked populations
- (Maybe) reduce Toxic Entropy Exposure

Goal: To reduce the information needed to manage behaviors in populations
Means: Synchronization and Consensus (what blockchain is good at)
“Remember son, there’s no future in big antlers.” — wise mother elk.