



The Blockchain Ethical Design Framework

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THE
BLOCKCHAIN
ETHICAL DESIGN FRAMEWORK

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**The Blockchain Ethical Design
Framework –**
Driving social impact and ethics
into blockchain design by
focusing on outcomes and users
with ethical intentionality.

Officially launched June 2018

<http://beeckcenter.georgetown.edu/wp-content/uploads/2018/06/The-Blockchain-Ethical-Design-Framework.pdf>



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The research was done in collaboration with IEEE as a workstream under the Industry Connections program on Digital Inclusion for Trust & Agency.

Why is ethical design
important?

Foundational Assumptions on Ethical Design

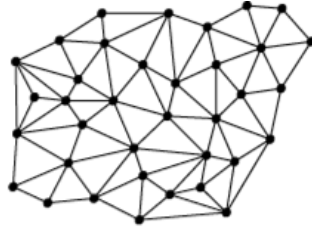
- We live at a unique point in human history – where emerging technologies are ubiquitous and affordable enough to be leveraged at a massive scale across the globe
- There is a driving imperative to leverage technology for the good of humanity, to create effective governance, and for broad inclusion in the development and benefits of technology
- Technology is not neutral – it has values embedded in its design and implementation
- **Seemingly innocuous design choices can have resounding impacts on people's lives**
- It is important to have a framework for the ethical design of technology
- Technology is a tool that is used by and affects people, so a diverse array of people and stakeholders need to be involved in its creation

Why is blockchain
unique?

What are the Key Attributes of Blockchain?



DIGITAL



DISTRIBUTED



LEDGER



TRUST



TRANSPARENT



IMMUTABLE

Blockchain: A Family of Technologies



Permissioned vs. Permissionless Nodes



Private vs. Public Ledger

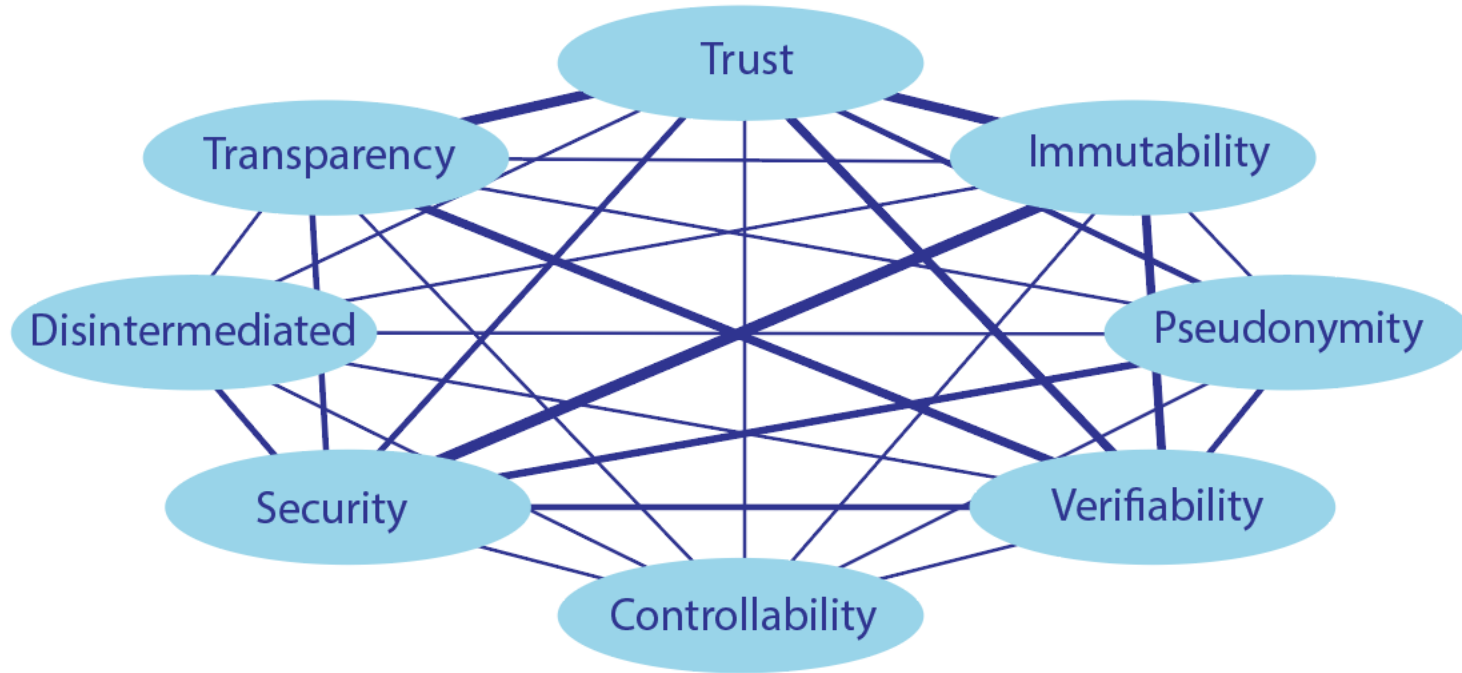


Choice of Consensus Algorithm



Where is Data Stored?

The Interconnected Attributes of Blockchain



The Potential of Blockchain



DIGITAL
IDENTITY



ASSET
TRACKING




ENTERPRISE
EFFICIENCY



SMART
CONTRACTS

But, the same characteristics that make blockchain potentially so interesting also introduce challenges.



Creating the Blockchain Ethical Design Framework

Our Process

Build Community 

Understand the Challenges 

Develop an Actionable Framework 

4 Major Project
Convenings



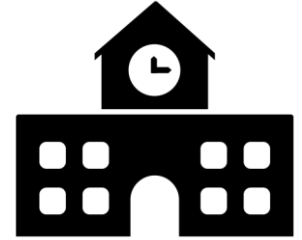
75+

Organizations Engaged



10+

Key Academic
Collaborations



Discussions with
Experts 100+



Across 3
Continents



Guiding Principles to Building the Framework

Outcomes Focused 

User Centric 

Iterative Design Process 

Introducing an intentional ethical approach to the design process

Defining the Approach

DEFINE THE PROBLEM
AND DESIRED OUTCOMES

IDENTIFY THE
ETHICAL APPROACH

ASSESS THE
OUTCOME ECOSYSTEM

DETERMINE THE
DESIGN PHILOSOPHY

- Define the problem and the desired outcome
- Identify the ethical approach
- Assess the outcome ecosystem
- Determine the design philosophy

What are the elements
of an outcome
ecosystem?

Ecosystem Assessment



Is blockchain the right technology choice for this outcome? If so, what kind of blockchain?

Decision Point

- Before proceeding with design, it is important to assess whether blockchain is a viable option
- Our approach is not overly prescriptive, but provides guidance as to whether blockchain may be appropriate

	QUESTIONS	YES
PARTICIPANTS	Does the solution require a database?	<input type="checkbox"/>
	Will there be multiple writers inputting/updating information?	<input type="checkbox"/>
	Is there a lack of trust among participants?	<input type="checkbox"/> *
	Is there a lack of trusted intermediary?	<input type="checkbox"/> *
RULES	Can a consistent set of rules help achieve the outcome?	<input type="checkbox"/>
	Will the governing rules be consistent over time?	<input type="checkbox"/> *
	Is transparency of the transactions an important feature?	<input type="checkbox"/> **
DATA	Is an immutable, auditable record of transactions important?	<input type="checkbox"/>
	Are transactions dependent or interrelated?	<input type="checkbox"/>
	Can a distributed infrastructure reduce the risk of censorship or attack?	<input type="checkbox"/>

LESS LIKELY MORE LIKELY

0/10 10/10

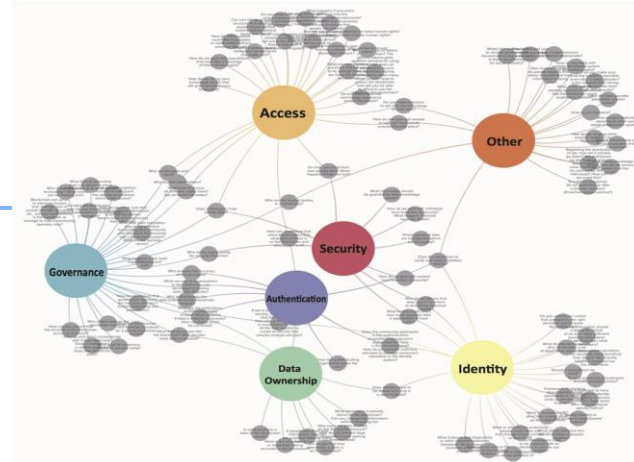
* Consider a permissions blockchain

** Consider a public ledger

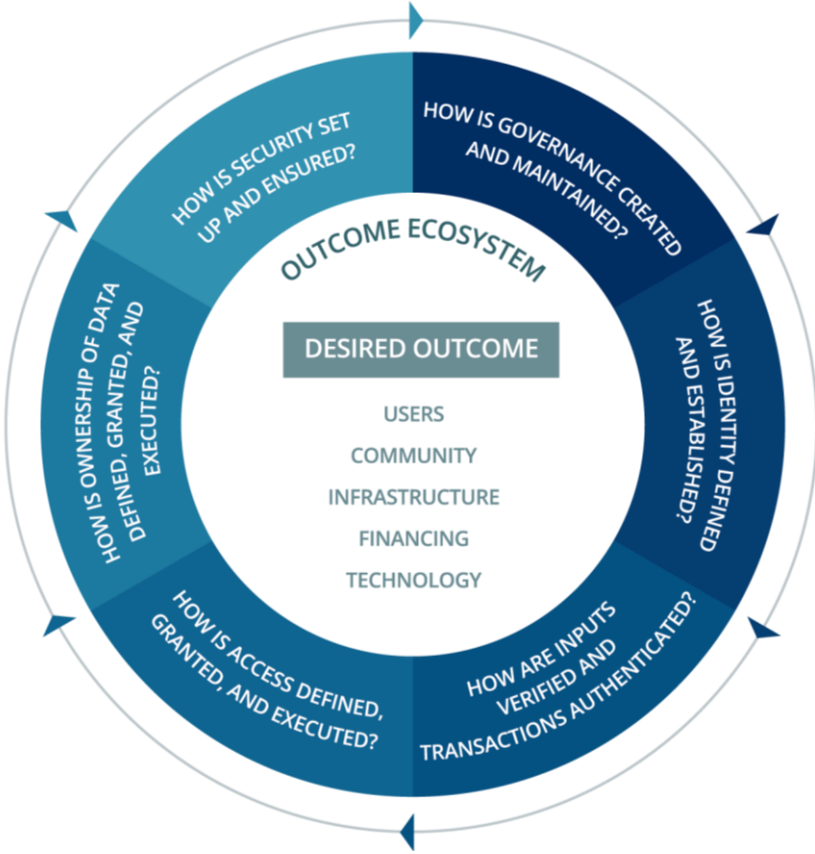
What are the key design questions specific to blockchain?

Overarching Questions

- How is **governance** created and maintained?
- How is **identity** defined and established?
- How are inputs **verified** and transactions **authenticated**?
- How is **access** defined, granted, and executed?
- How is **ownership of data** defined, granted, and executed?
- How is **security** set up and ensured?



Framework Design Spiral



Governance

Overarching Question: How is **governance** created and maintained?

Governance refers to the rules and regulations of the blockchain. It includes questions such as who sets up the rules and regulations, who maintains the system, how the rules are executed in practice, and how a blockchain system would be closed out.

WHO	WHAT	HOW
Who are the stakeholders and what are their roles? Who sets up the governance? Who decides on changes to the governance?	What are the technical rules that govern the system? What are the capabilities of nodes and other stakeholders in the system?	How do stakeholders interact and communicate? How does the system continue or close out if key stakeholders exit?

Identity

Overarching Question: How is **identity** defined and established?

Identity in this context refers to the collection of identifiers needed to adequately affirm that an end-user is who he or she says. The underlying premise is that some level of identity is necessary for users to access certain services.

WHAT LEVEL OF IDENTITY?	WHICH IDENTIFIERS?
Foundational OR Transactional? What components of identity are necessary in a transactional context?	Which identifiers establish that 1) the identity claimed is real and unique and 2) the user claiming the identity is the rightful owner of that identity? Is there a set of minimally-viable identifiers that can be used? Could exposure of any of these identifiers put end users at risk?

Access

Overarching Question: How is **access** defined, granted, and executed?

Access refers to any stakeholder's ability to use the system. Access includes both of physical access such as read and write permissions as well as more intangible questions around digital literacy.

WHO	WHAT	HOW
Who determines who has access to the blockchain? Who has access to write information? Who has access to view or read information?	What technology is needed to access the system? What understanding of the system is needed to use it effectively?	How do users get access to their own information?

Authentication

Overarching Question: How are inputs **verified** and transactions **authenticated**?

Authentication refers to the verification of information and transactions both as they are entered onto the system and also as they occur. Authentication includes questions such as who completes the verification and the method by which it's done.

WHO	HOW
Who authenticates the veracity of input data? Who authenticates transactions on the blockchain?	How is authentication done? <ul style="list-style-type: none">● For the zero state?● For follow on data input?● For transactions? How do you ensure that all relevant stakeholders trust the authentication process?

Data Ownership

Overarching Question: How is **ownership of data** defined, granted, and executed?

Data ownership refers to exercise of control over data. It addresses questions such as who owns the data, who exercises control over the data, where and how the data is stored, and how adjustments are made to incorrect information.

WHO	WHAT	HOW
Who has nominal ownership of data? Who has physical control of data?	What effective control over data do different stakeholders have? Who benefits? Where is data stored? Is it on the blockchain or linked to from an external source?	How do end users exert ownership over their data, if they have it? How do end users have incorrect information on the blockchain fixed?

Security

Overarching Question: How is **security** set up and ensured?

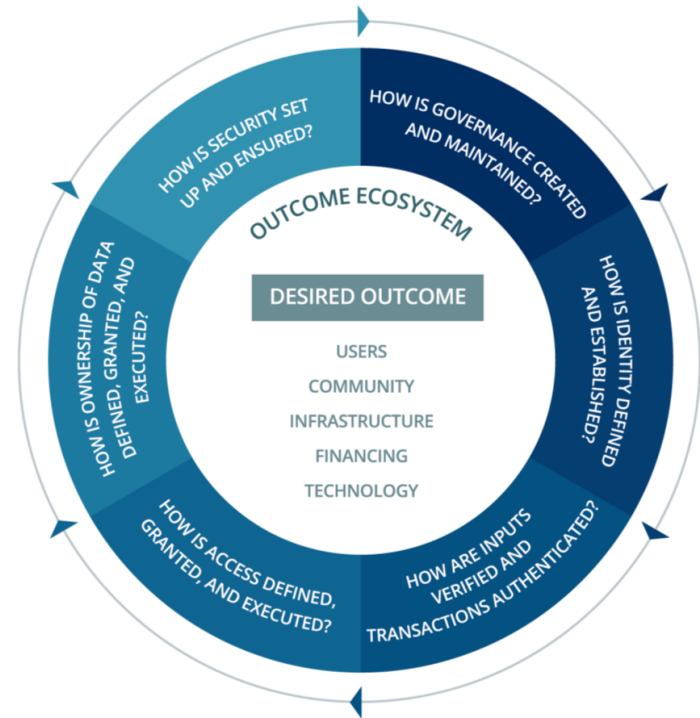
Security refers to the protection of information from potential threats. At an individual level, this refers to a user's understanding of potential risks as well as private key management. At the system level, this refers to potential vulnerabilities within and at the periphery of the system.

WHO	HOW: SYSTEM LEVEL	HOW: INDIVIDUAL LEVEL
Who sets up, maintains, and updates security? Who is responsible for potential breaches?	How do you ensure that vulnerable data is protected as cryptographic and hacking technologies evolve? How could peripheral connections to a blockchain be vulnerable to security threats?	How do you ensure that individuals are aware of and can protect themselves against potential security threats? How do you ensure that users maintain effective and safe access to private keys?

Putting it All Together

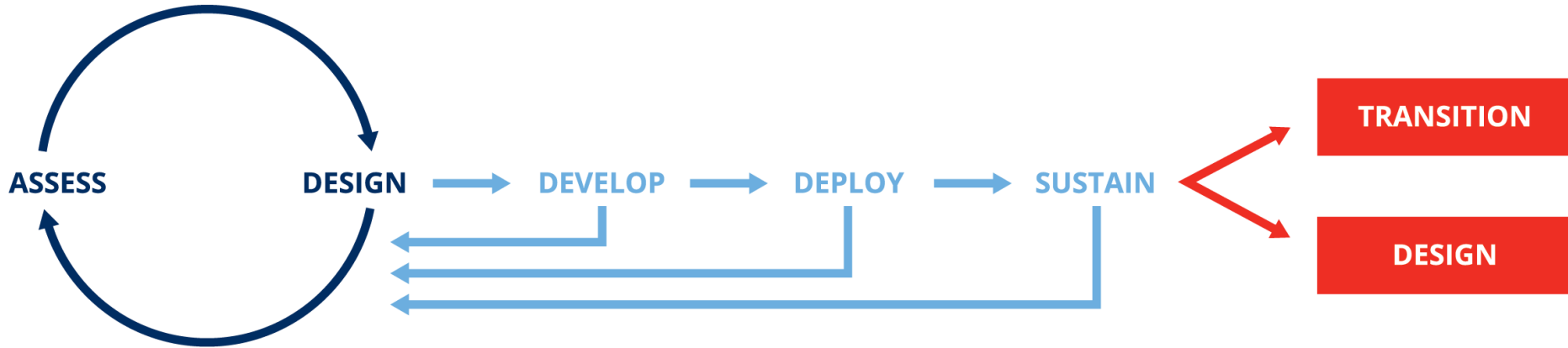


YES



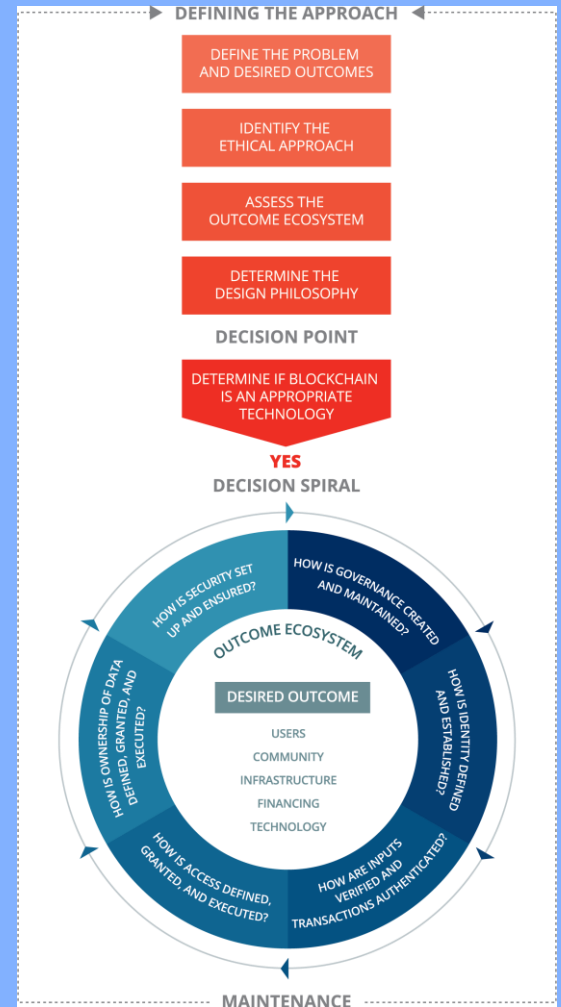
Maintaining the Blockchain

Iterative Design and Assessment Process



- Context changes over time, so the Framework is revisited at periodic points across the project lifecycle

Moving Forward



Where We Are Going

- The Blockchain Ethical Design Framework is a tool for decision makers to drive ethical intentionality and social impact into blockchain
- Working on widespread dissemination, implementation, and feedback
- Working with blockchain stakeholders to implement the framework
- Developing sector specific versions of the framework
- Working with IEEE on establishing an organization for evolving the work into a blockchain ethical technology design certification process

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Questions? Comments?

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