Universities at the Crossroads:
Technologies, values and the role of the institution

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Catalan Pedagogical Society

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The Crossroads

- Technology
- Institutions
- Values

My objectives are to:
- offer clear and understandable descriptions of three current technologies (metaverse, blockchain, artificial intelligence)
- discuss how they will impact the traditional role and function of universities
- describe the application of the conference themes to these technologies with respect to these roles

The Crossroads

- Technology
  - The Metaverse
  - Blockchain and Crypto
  - Artificial Intelligence
- Institutions
- Values

The Crossroads

- Technology
- Institutions
  - Teaching and Learning
  - Research and Development
  - Innovation and Growth
- Values

The Crossroads

- Technology
- Institutions
- Values
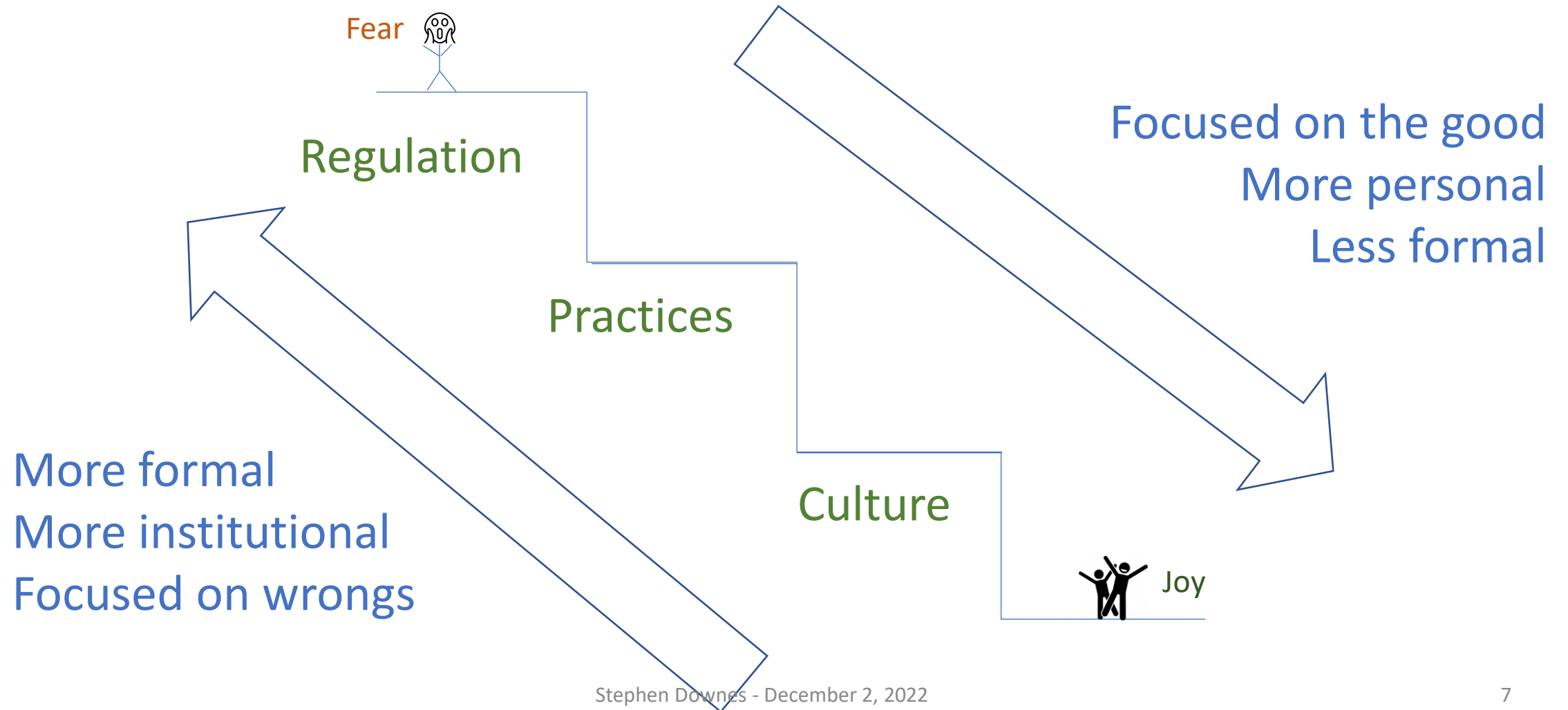 - Inclusion
  - Sustainability
  - Ethics

Values

- Inclusion
- Sustainability
- Ethics

→ Other Themes?
- Autonomy and Agency
- Integrity and Honesty
- Openness
- Care and Respect
- Value and Benefit
  etc

Values and Practices

Fear

Regulation

Practices

Culture

Joy

Focused on the good
More personal
Less formal

More formal
More institutional
Focused on wrongs

Technology

- The Metaverse
- Blockchain and Crypto
- Artificial Intelligence

These technologies are *here now*. In the future we will face the same decisions with future technologies.

The Metaverse

- Virtual Reality
- Augmented Reality
- Mixed Reality

Values

- Accessibility
- Environmental Sustainability
- Benefits and Outcomes

The Metaverse
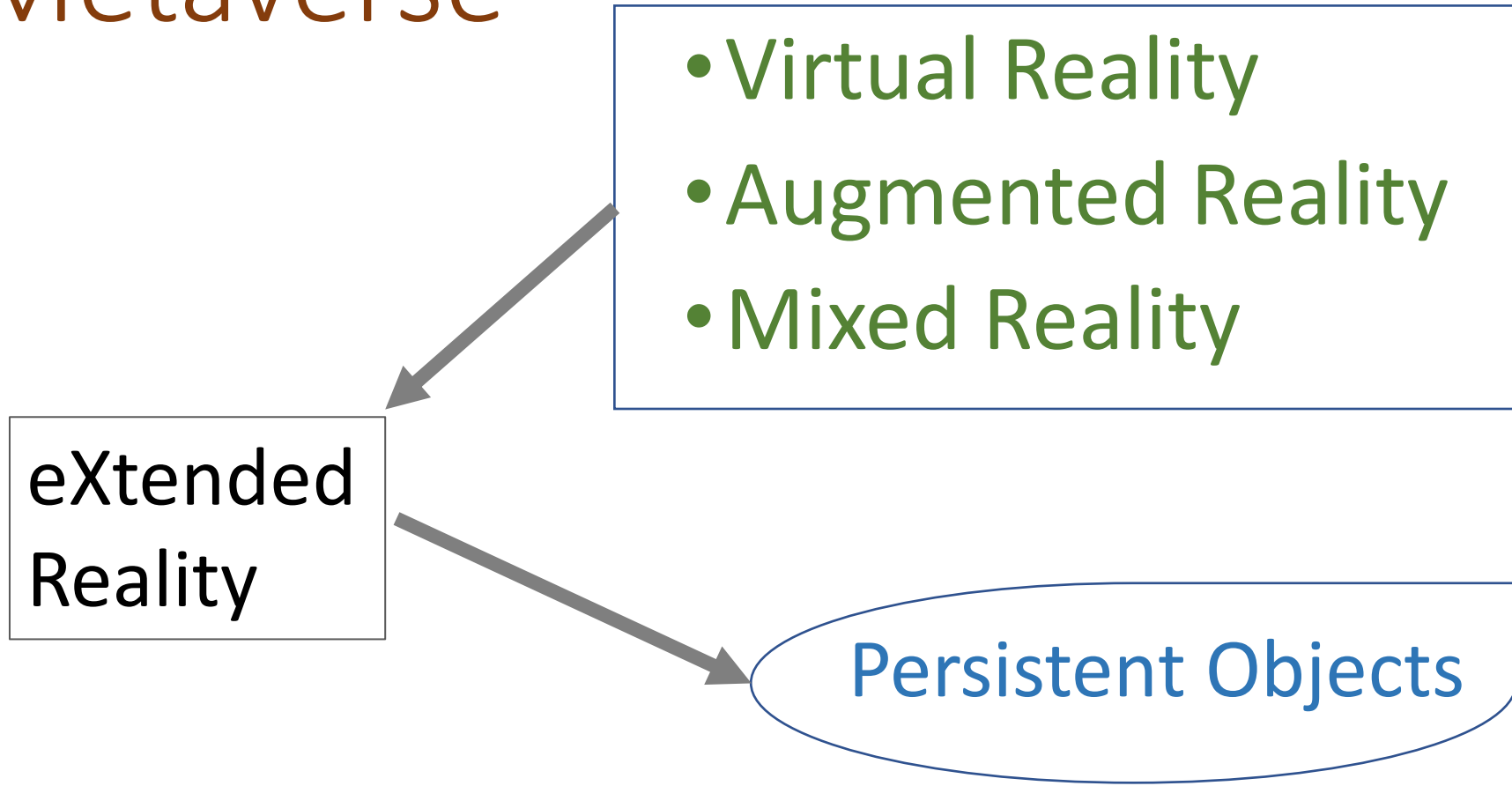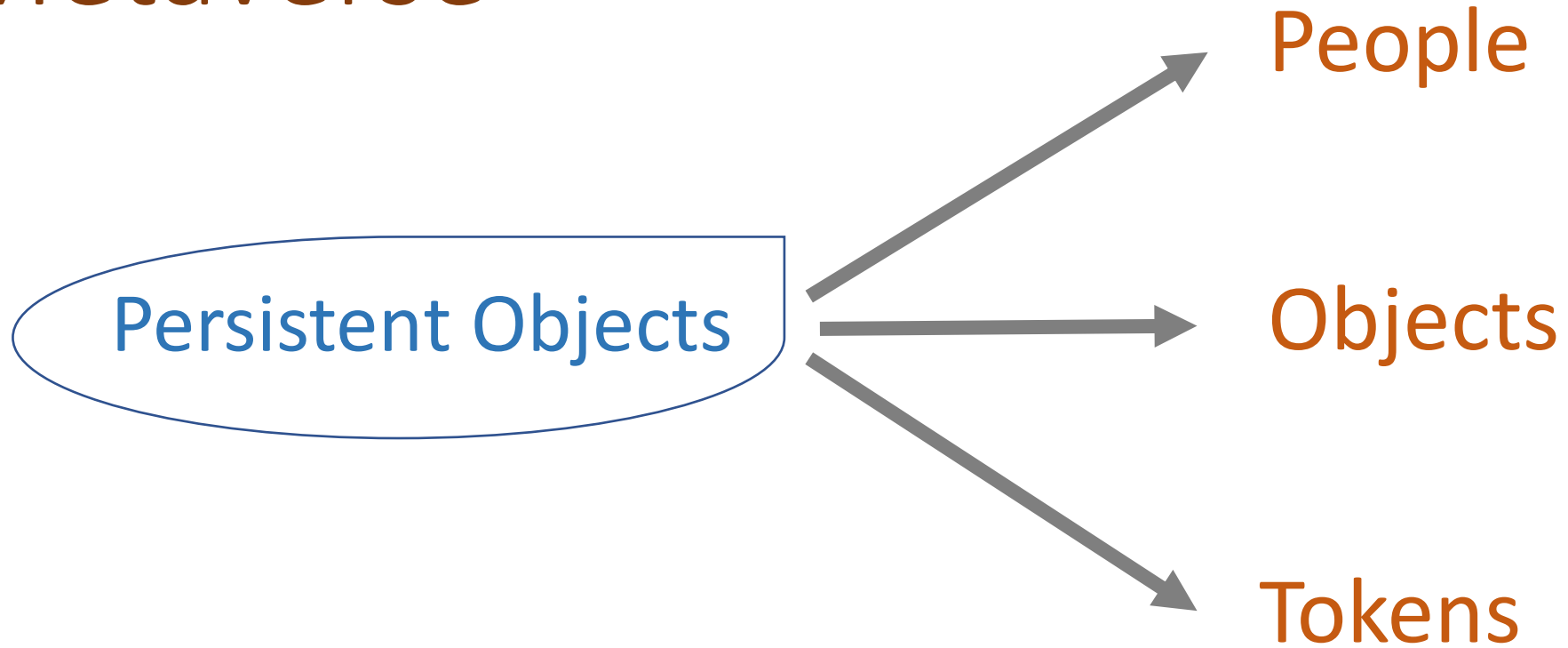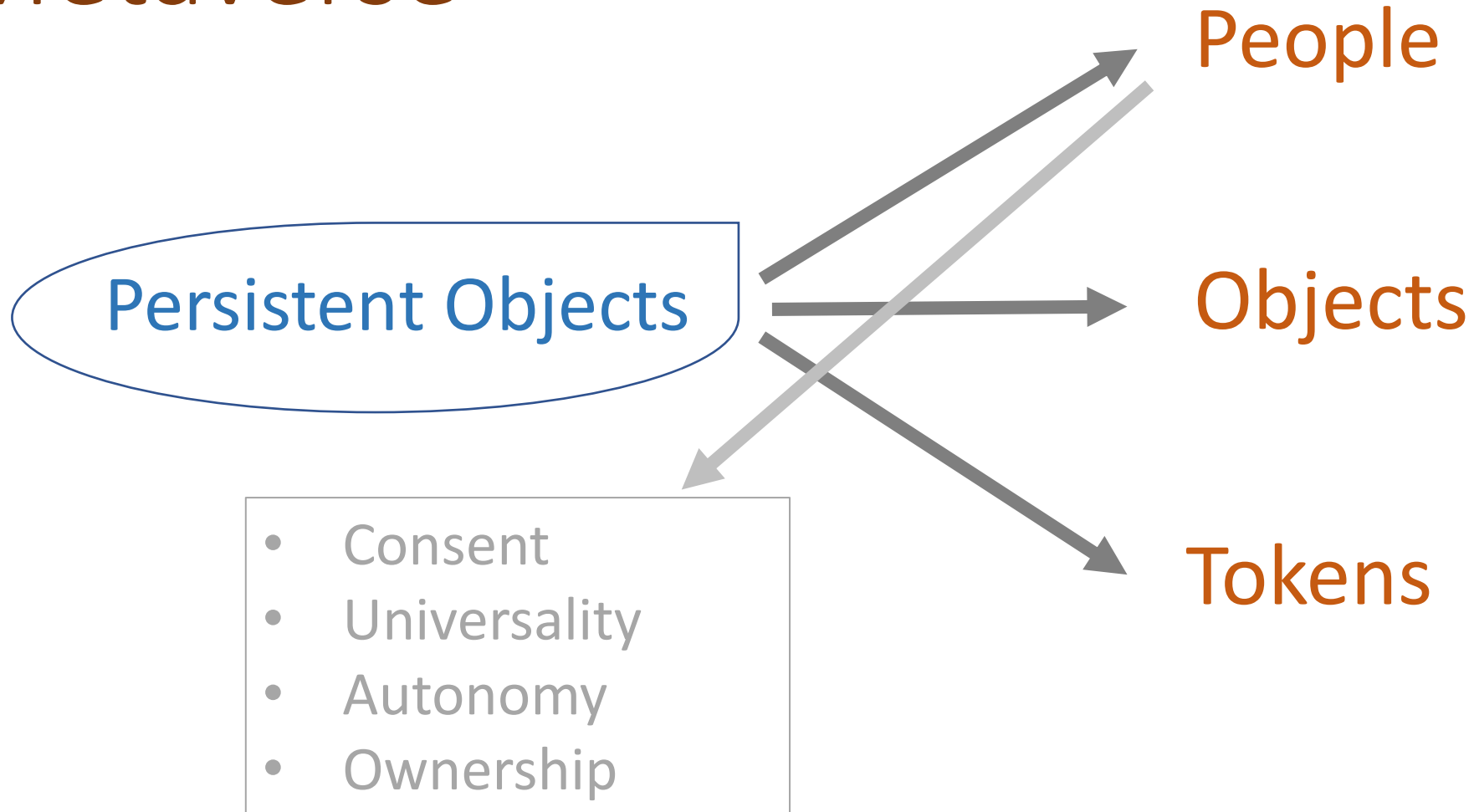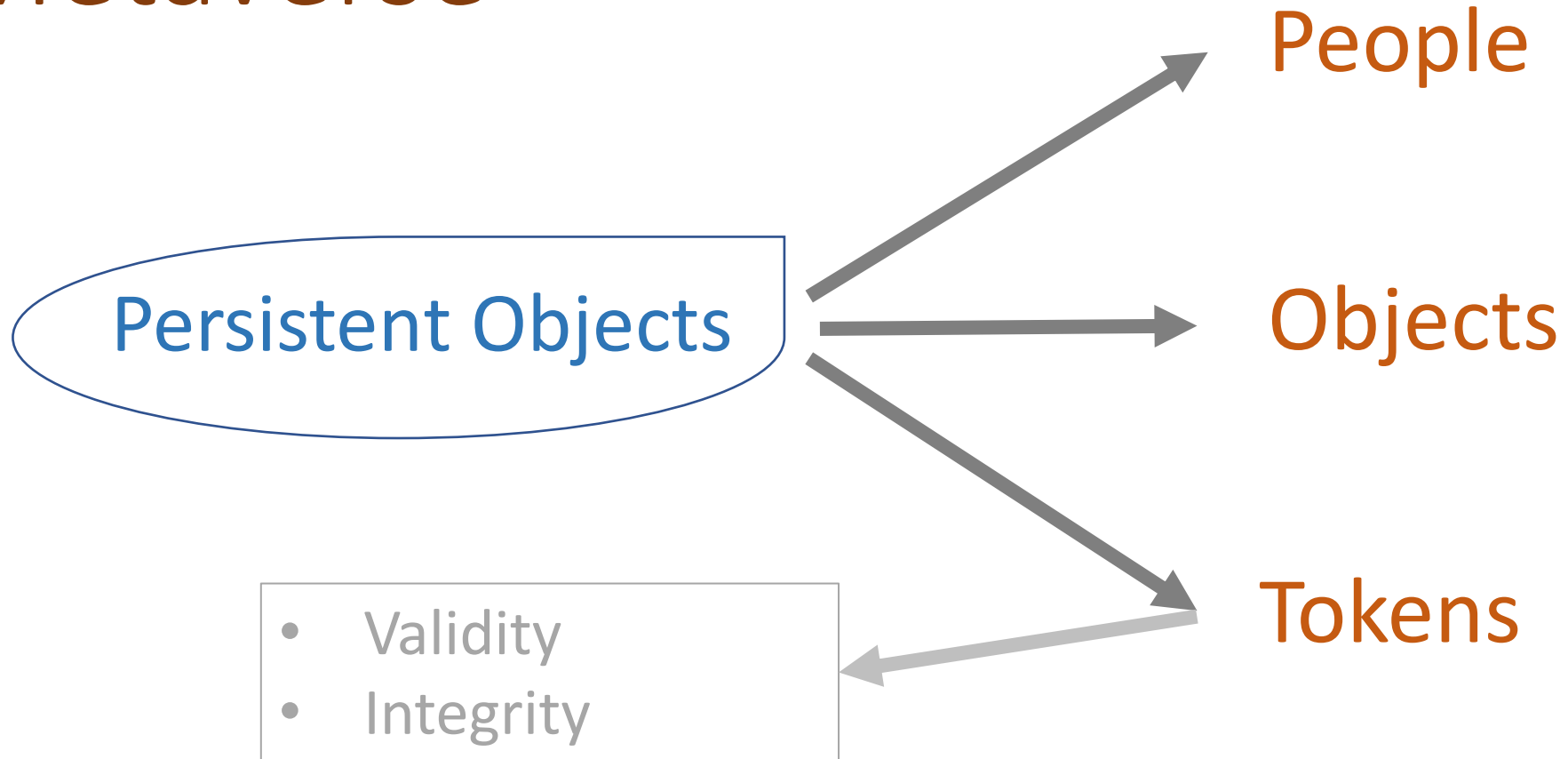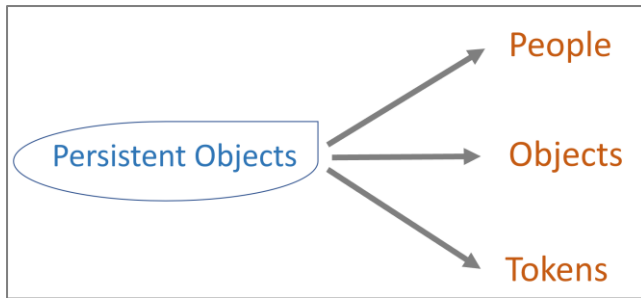
- Virtual Reality
- Augmented Reality
- Mixed Reality

eXtended Reality

Persistent Objects

The Metaverse

Persistent Objects

→ People

→ Objects

→ Tokens

The Metaverse

Persistent Objects

People

Objects

Tokens

- Consent
- Universality
- Autonomy
- Ownership

The Metaverse

People

Persistent Objects

Objects

Tokens

- Validity
- Integrity

Blockchain

Persistent Objects → People, Objects, Tokens

How?

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus

Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus

Input

| Fox |

Digest

cryptographic hash function

```
DFCD 3454 BBEA 788A 751A
696C 24D9 7009 CA99 2D17
```

The red fox jumps over the blue dog

cryptographic hash function

```
0086 46BB FB7D CBE2 823C
ACC7 6CD1 90B1 EE6E 3ABC
```
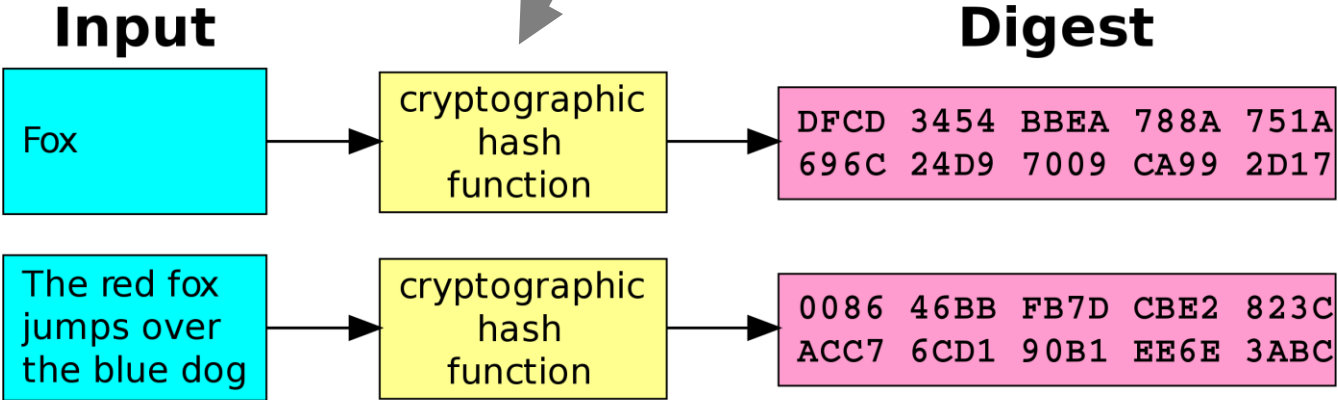
Address

Blockchain

Provenance
Ownership

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus

Input

| Fox |

cryptographic hash function

Digest

DFCD 3454 BBEA 788A 751A
696C 24D9 7009 CA99 2D17

| The red fox jumps over the blue dog |

cryptographic hash function

0086 46BB FB7D CBE2 823C
ACC7 6CD1 90B1 EE6E 3ABC

Address

- Openness
- Access

Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus

Habcd=H(H(ab)+H(cd))

Hab=H(H(a)+H(b))

Hcd=H(H(c)+H(d))

H(a)

H(b)

H(c)

H(d)
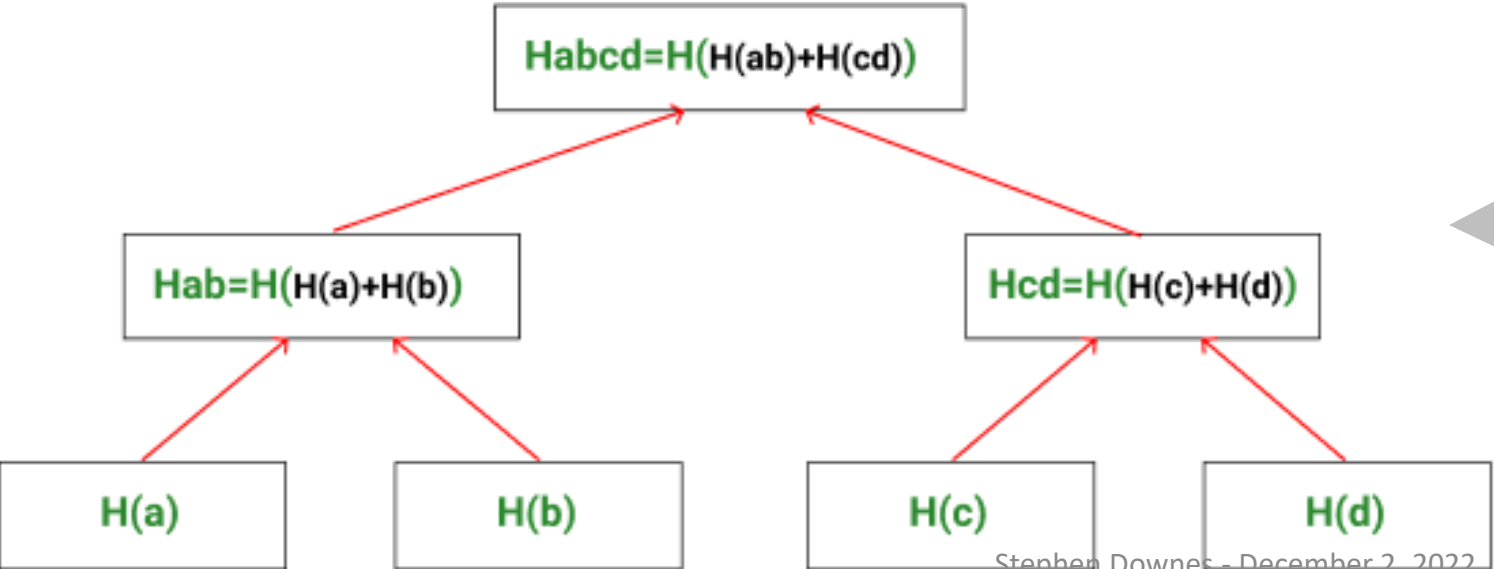
- Findable
- Accessible
- Interoperable
- Reusable

Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus
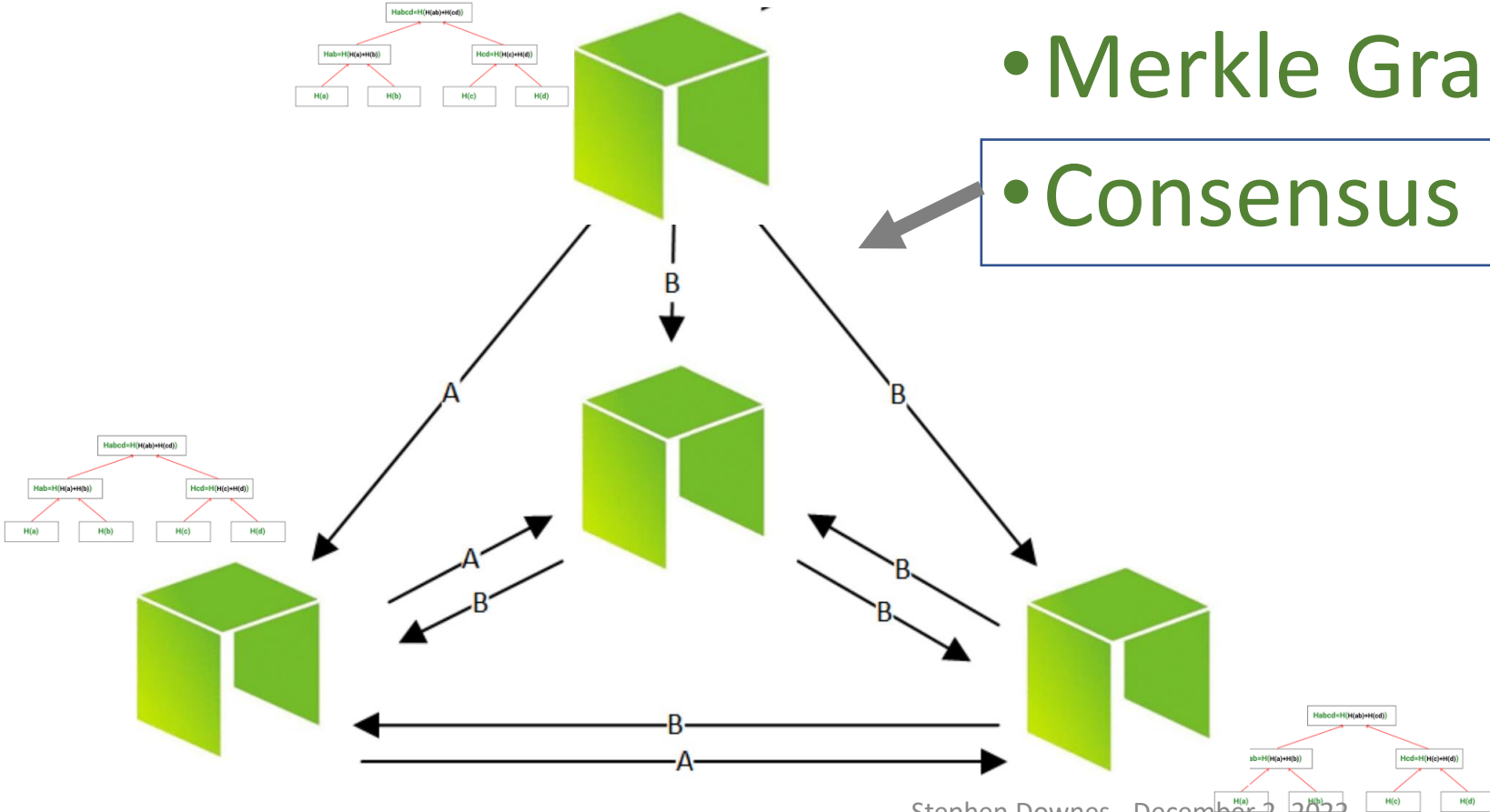
Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
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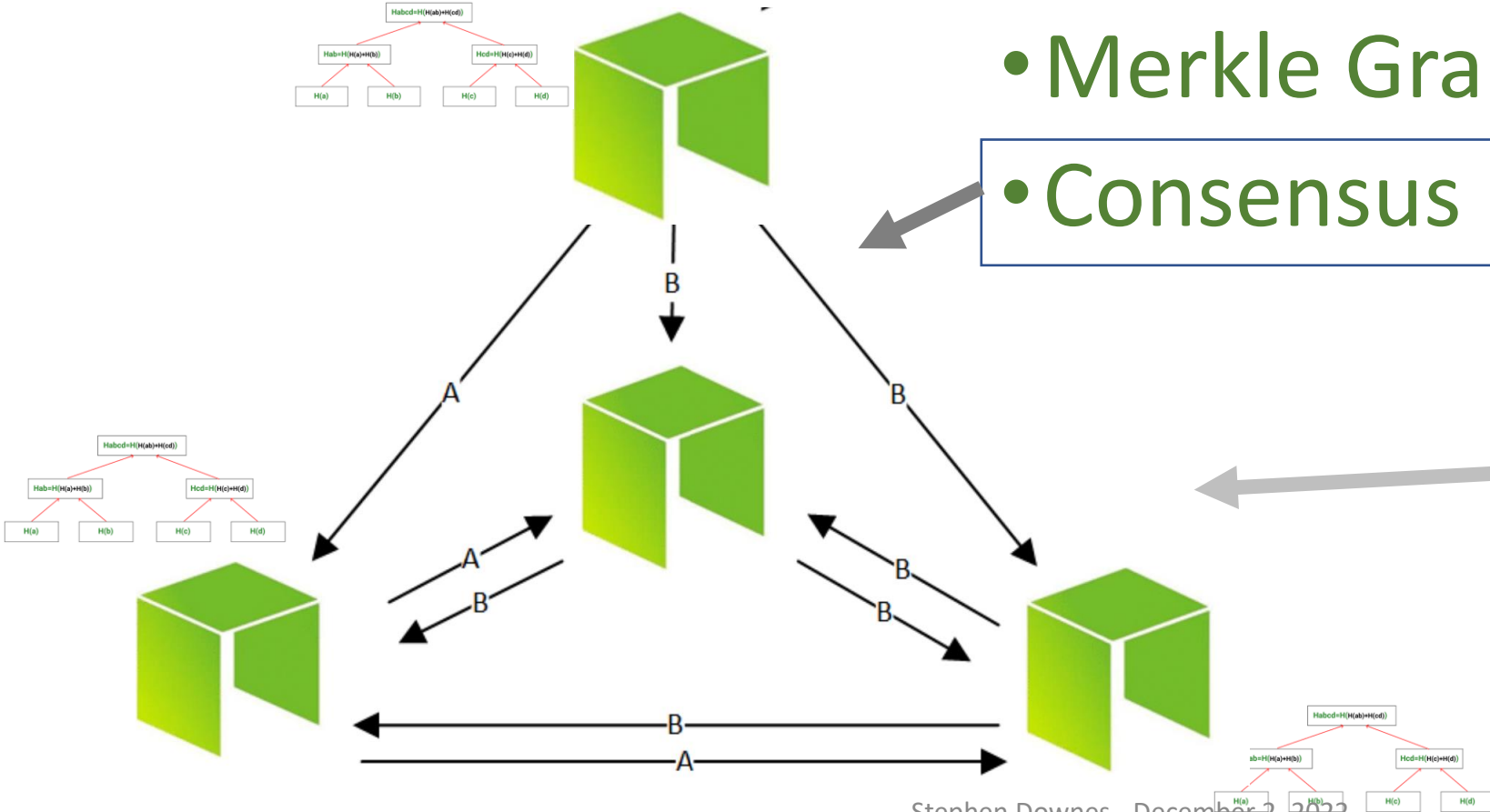
- Data Federation Issues & Principles

Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus
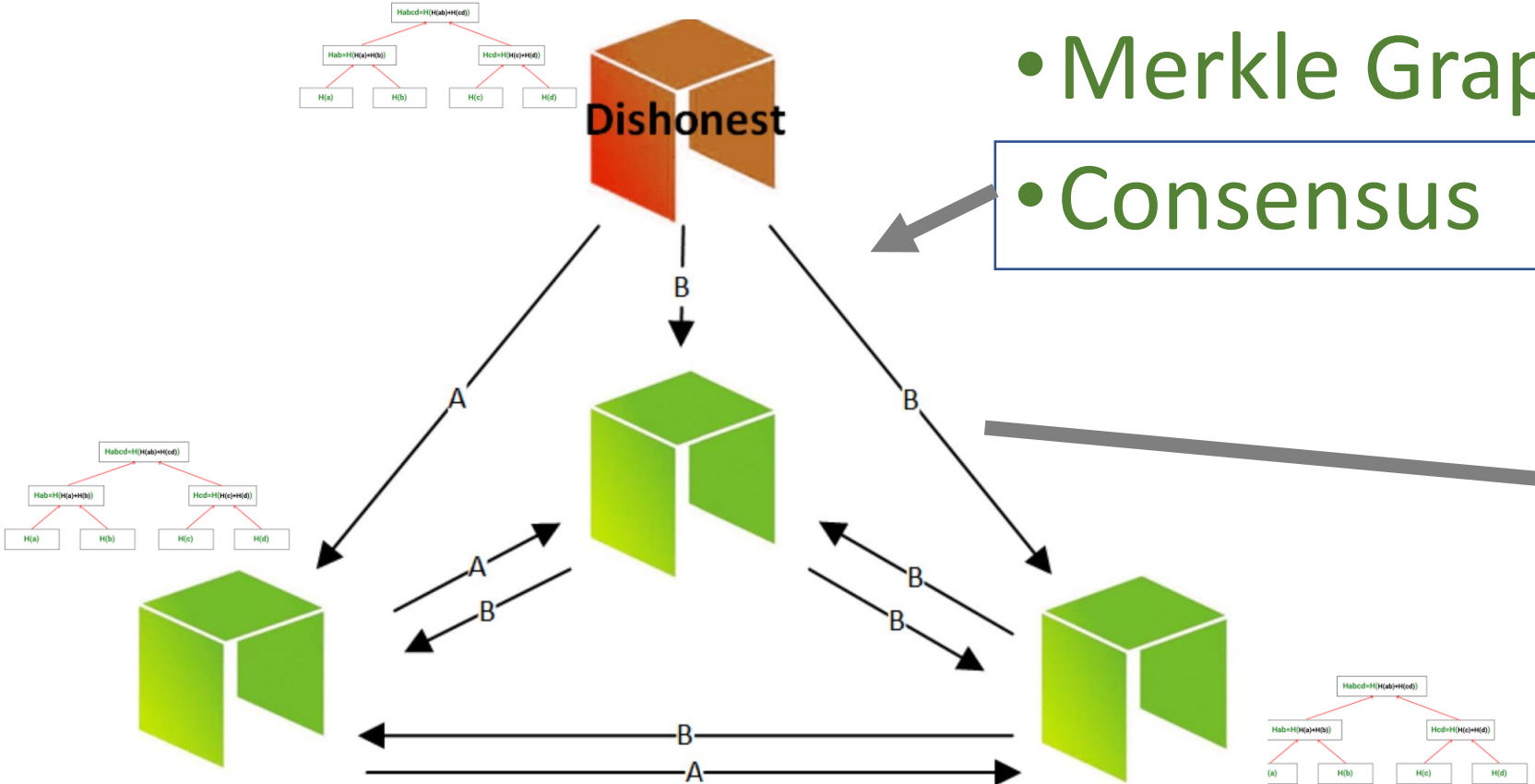
- Proof of Work
- Proof of Stake
- Proof of Authority

Blockchain

- Content Addressing (Blocks)
- Merkle Graphs (Chains)
- Consensus
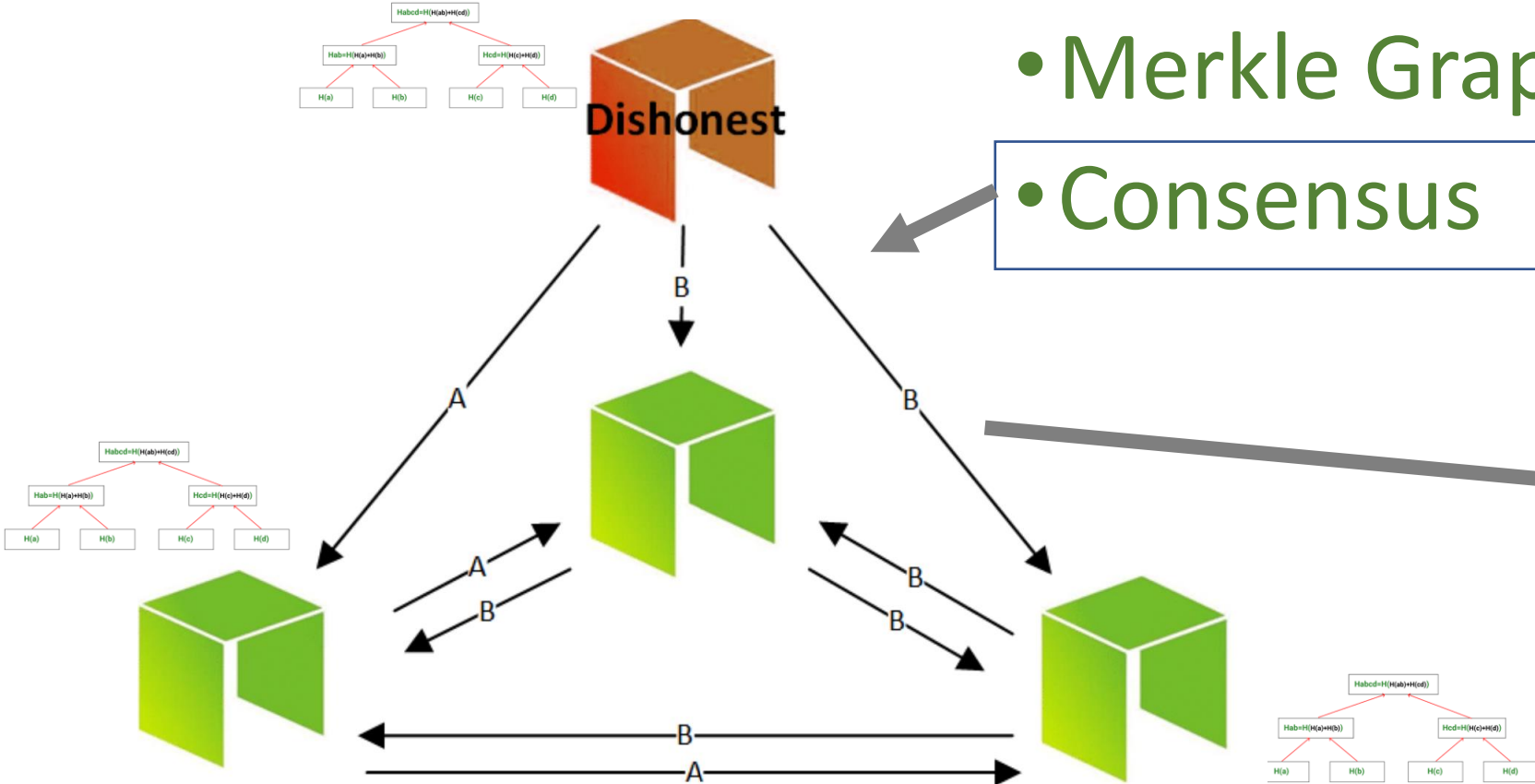
Environment

- Proof of Work
- Proof of Stake
- Proof of Authority

Inclusion

Trusted Data   vs   Untrusted Data
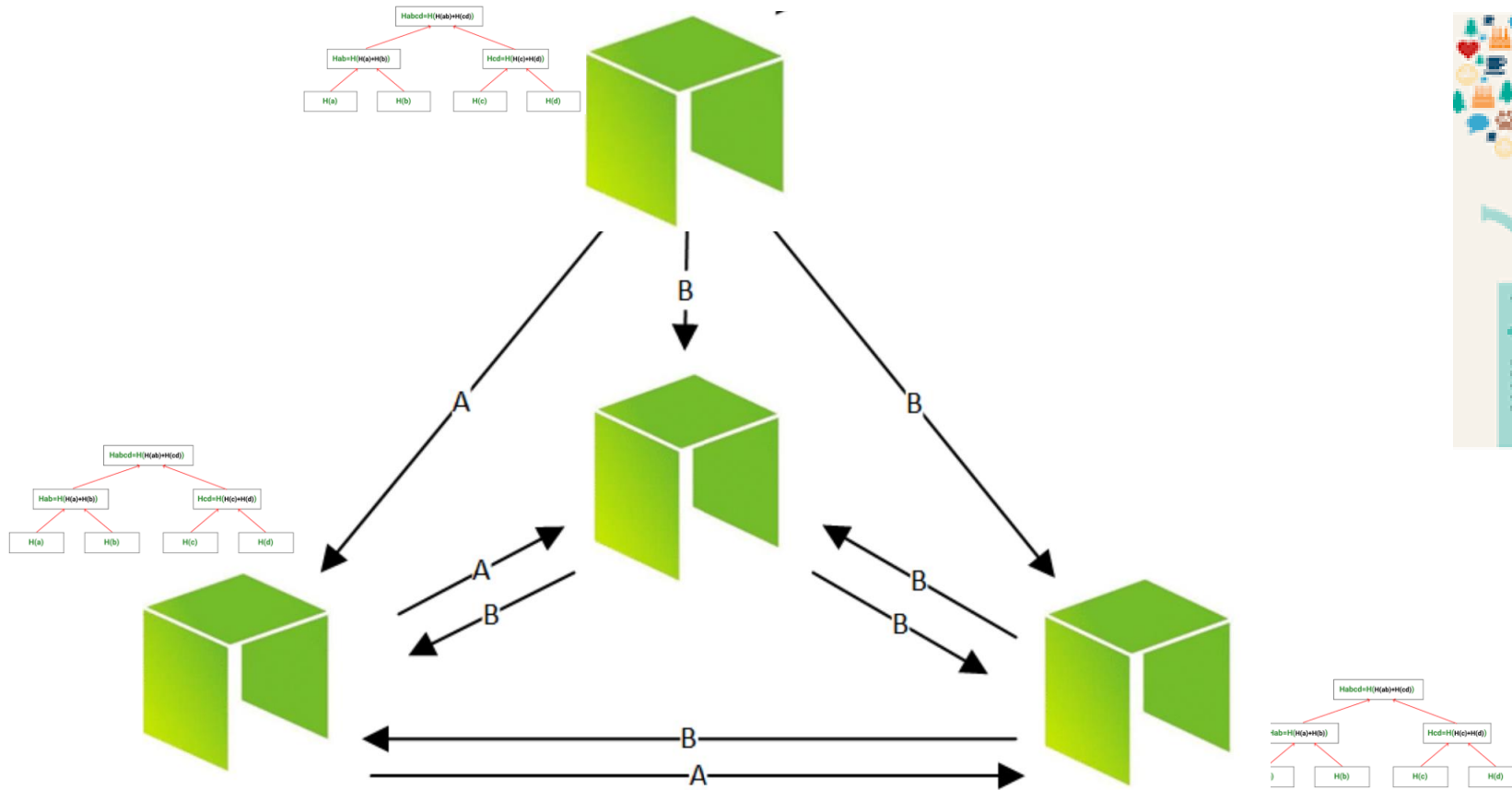
Trusted Data vs Untrusted Data
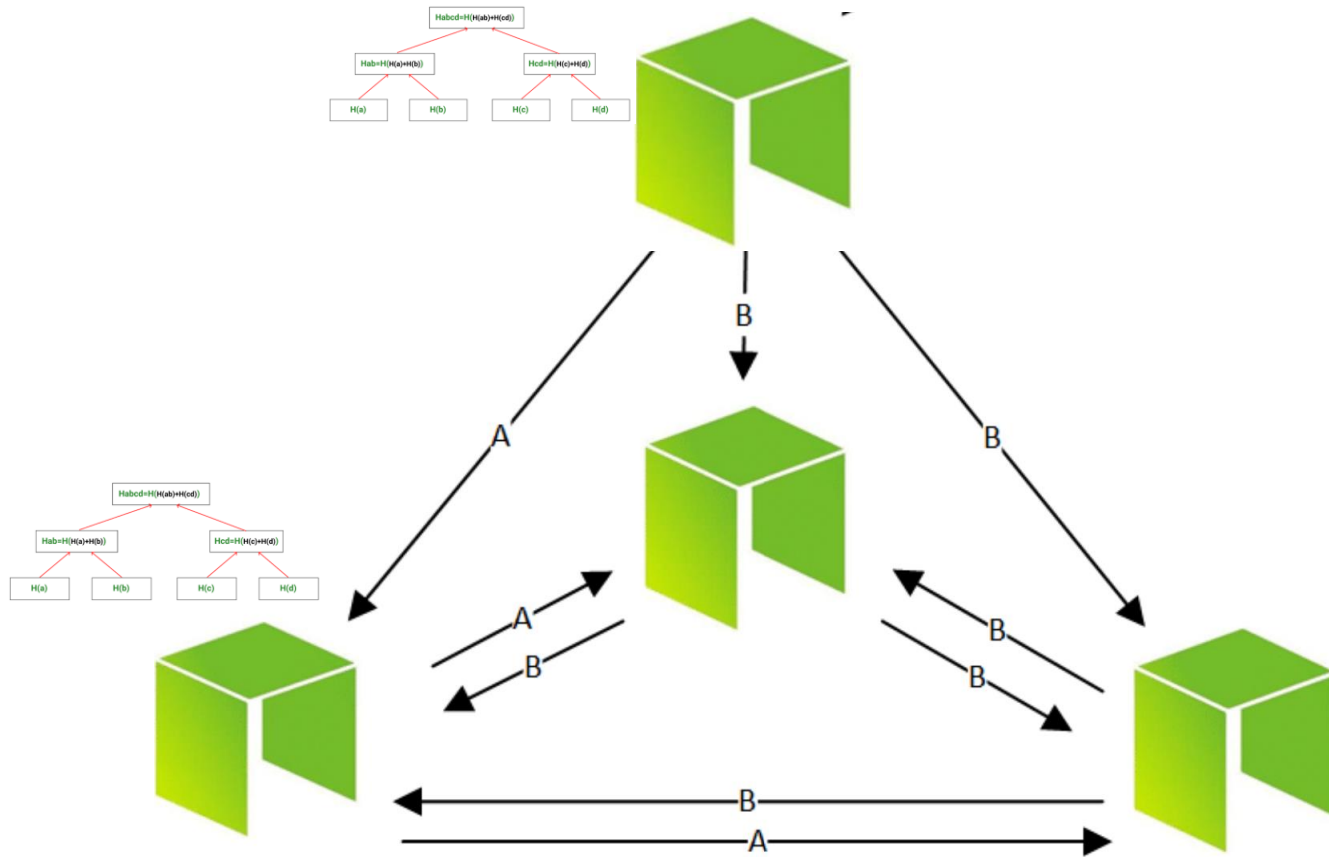
Data bias, representation, consent and inclusivity

Artificial Intelligence
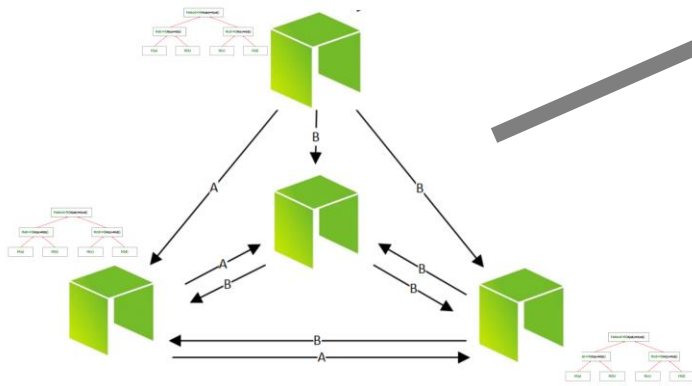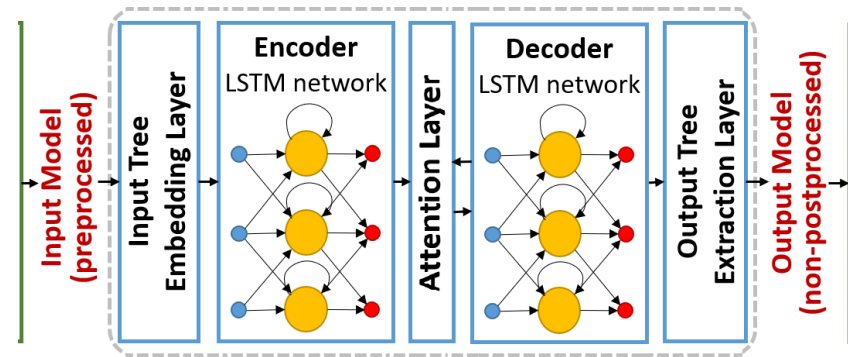
Trusted Data

- Data Models
- Algorithms
- Application

Artificial Intelligence

Trusted Data

- Data Models
- Algorithms
- Application
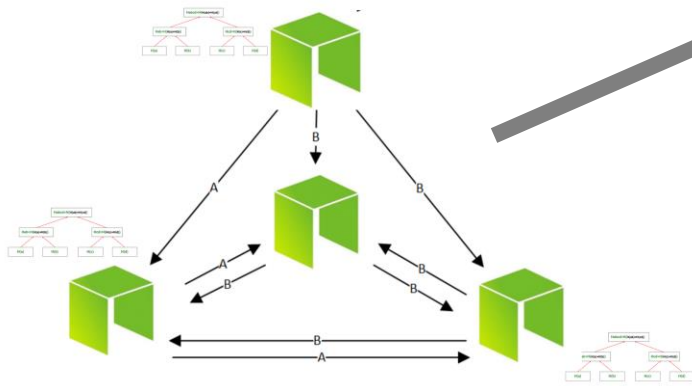
Model Selection
Explainability
Appeal and Accountability

Input Model (preprocessed)

Input Tree Embedding Layer

Encoder
LSTM network

Attention Layer

Decoder
LSTM network

Output Tree Extraction Layer

Output Model (non-postprocessed)

Artificial Intelligence

Trusted Data

Untrusted Data
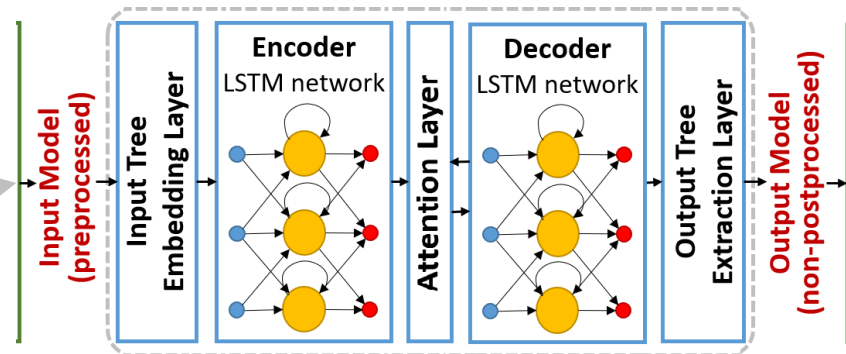
- Before this year: descriptive, diagnostic, predictive, prescriptive
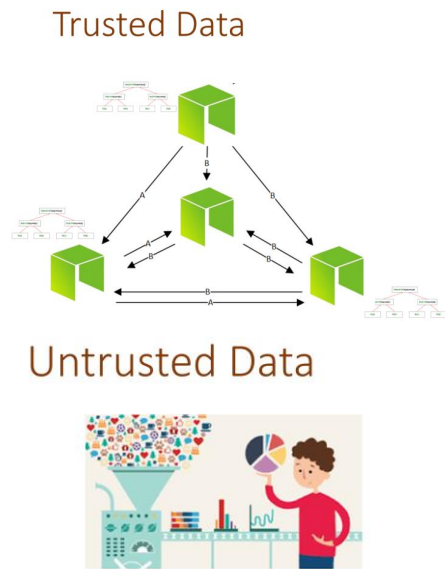
- After this year: generative
- Future: deontic analytics

The domain of universities?
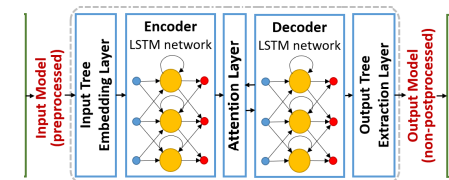
Artificial Intelligence
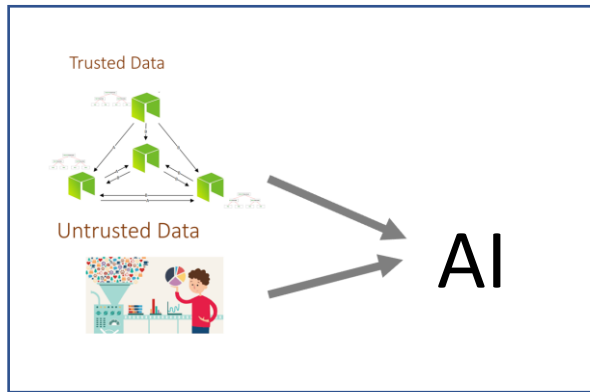
- ## Generative Analytics
  - *Generative* Pre-trained Transformer 3 (GPT-3)
  - *Generative Adversarial Network* (GAN)
  - *Contrastive Language-Image Pre-training* (CLIP) e.g. DALL-E 2

Images   Music   Software   Text   Research

Artificial Intelligence

Trusted Data

Untrusted Data

AI
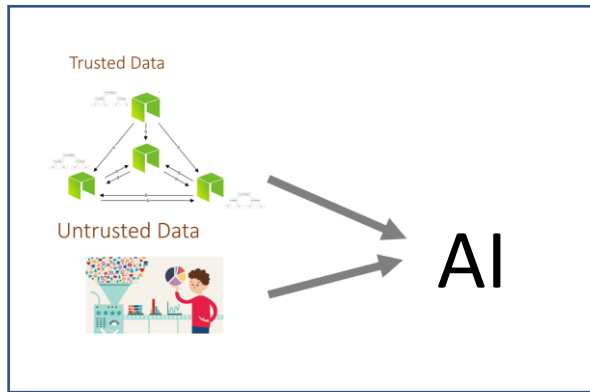
What do we do when everything we do, and everything we teach people to do, can be done using artificial intelligence?

Research

Images   Music   Software   Text
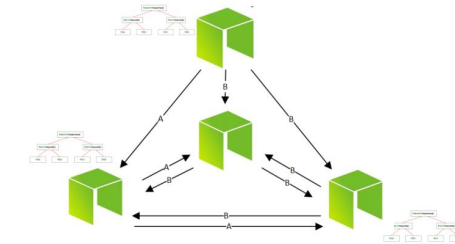
Institutions

- Teaching and Learning
- Research and Development
- Innovation and Growth
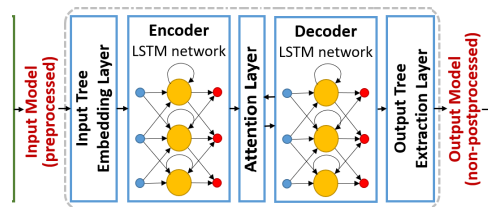
Institutions
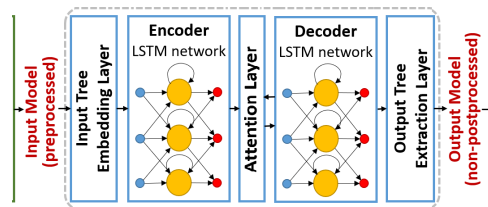
- Teaching and Learning
- Research and Development
- Innovation and Growth

Our roles are changing

Teaching and Learning
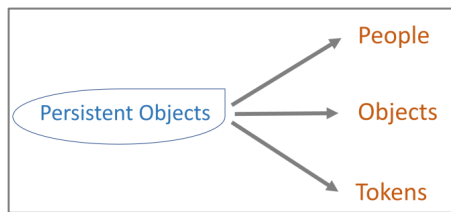
Persistent Objects
- Distributed ID (DID)
- Open Educational Resources
- Badges and Credentials
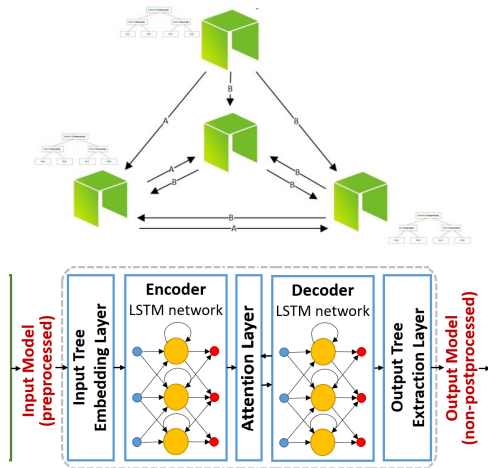
Teaching and Learning
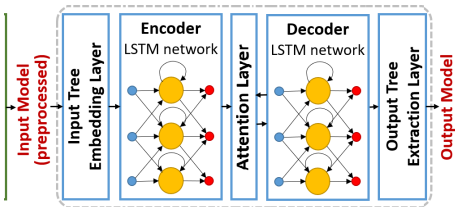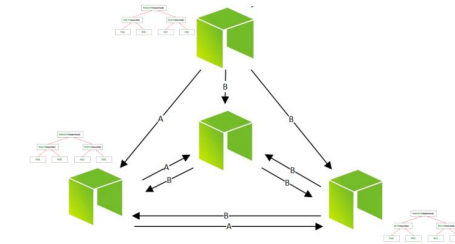
Persistent Objects

- Distributed ID (DID)
- Open Educational Resources
- Badges and Credentials

- Ensuring individual agency and autonomy
- Ensuing diversity, equity and inclusion

Teaching and Learning
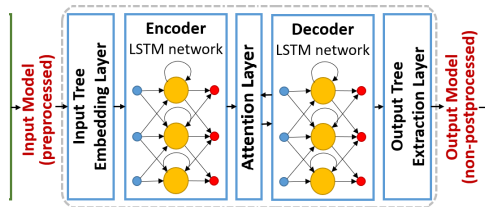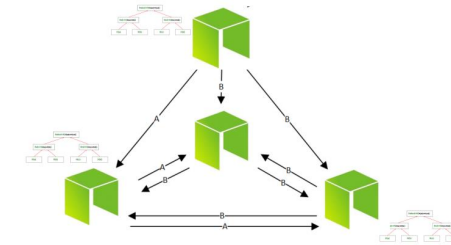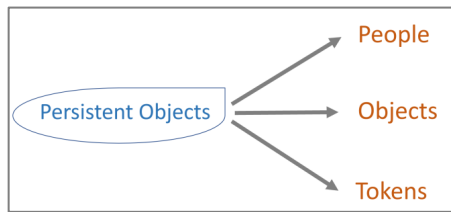
Persistent Objects
- Distributed ID (DID)
- Open Educational Resources
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- Accessible and usable learning resources
- Support for informal and lifelong learning

Teaching and Learning
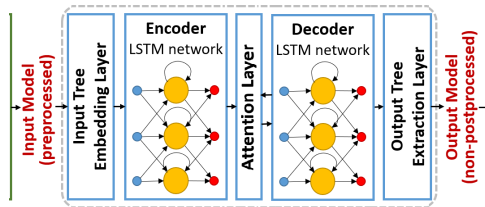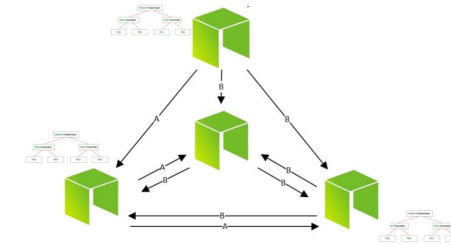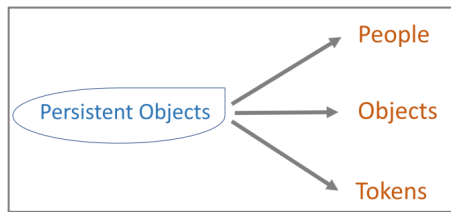
Persistent Objects
- Distributed ID (DID)
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- Bridging the link to employability
- Facilitating knowledge recognition networks

Teaching and Learning
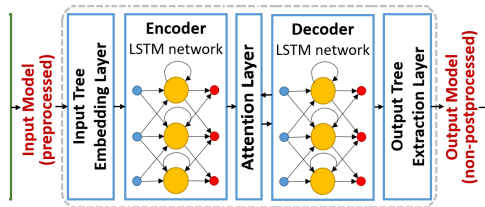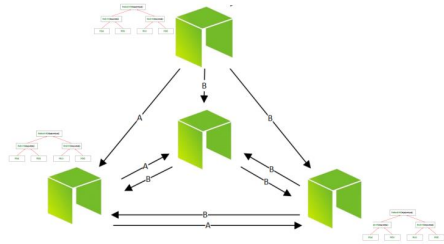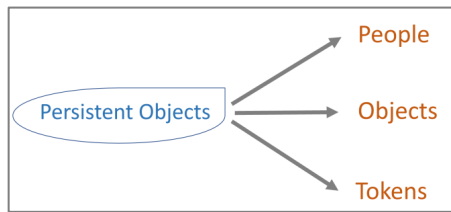
Consensus
- Peer Networks
- Fediverse (Mastodon)
- Open Community

Teaching and Learning

People

Objects

Tokens
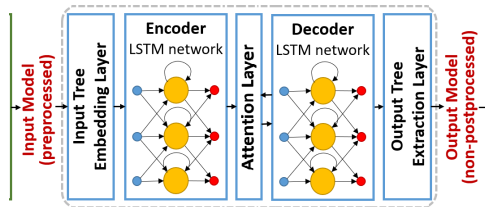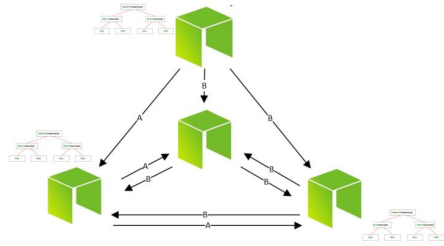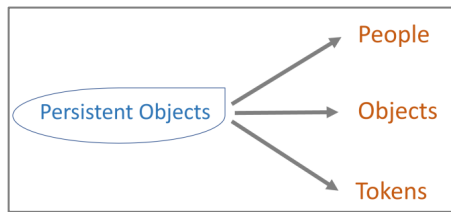
Consensus

- Peer Networks
- Fediverse (Mastodon)
- Open Community

- Building and facilitating mechanisms for people to support their own learning
- For example, Personal Learning Environments

Teaching and Learning
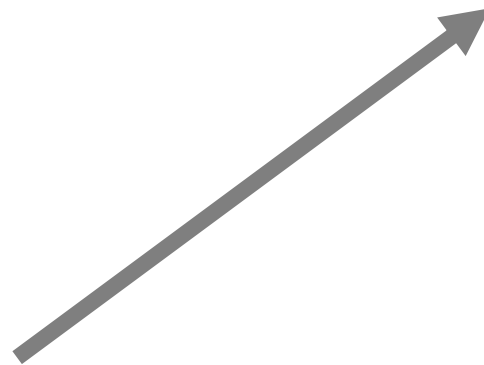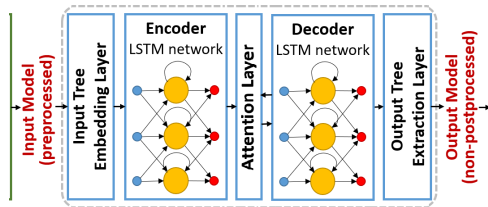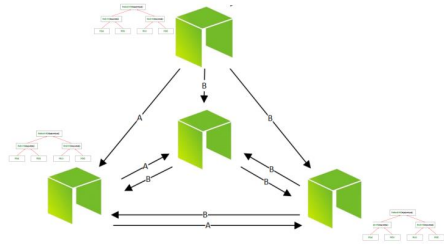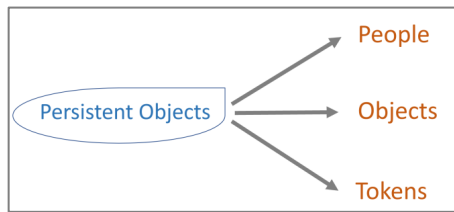
Artificial Intelligence
- Resource Creation
- Coaching and Tutoring
- Automated Assessment

Teaching and Learning
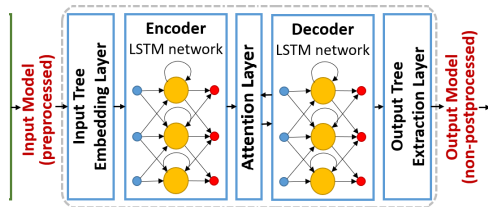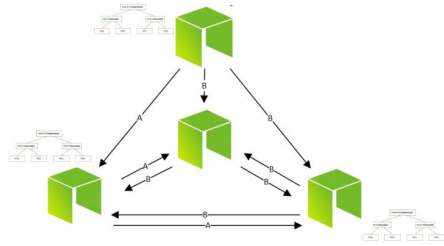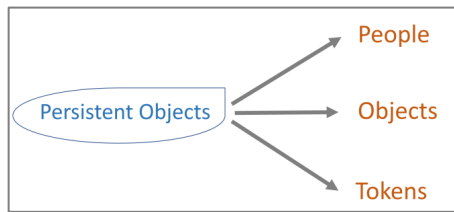
Artificial Intelligence
- Resource Creation
- Coaching and Tutoring
- Automated Assessment

- Build quality trusted data networks
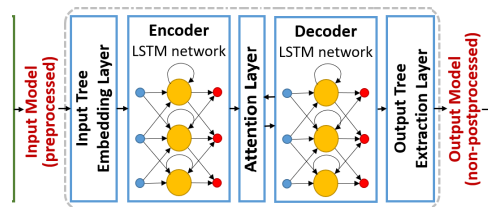- Assess and validate AI models
- Automated resource development
- Support public access to the technology

Research and Development

Persistent Objects
- Open Access Publications
- Open Data

Research and Development

Persistent Objects

People
Objects
Tokens
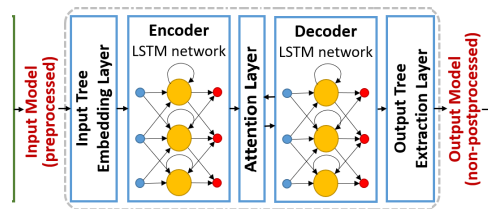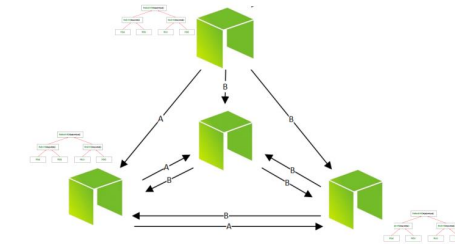
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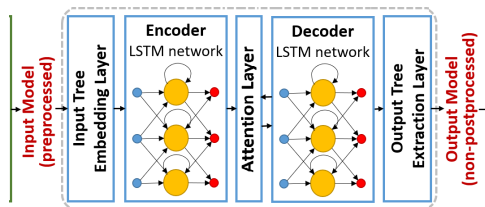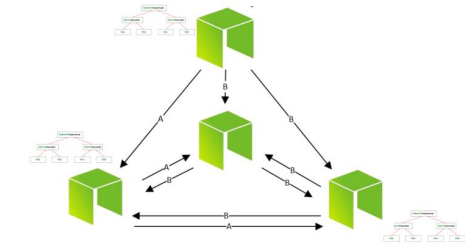
The university's new role: as *stewards* rather than creators and owners

- Findable
- Accessible
- Interoperable
- Reusable

Encoder
LSTM network

Decoder
LSTM network

Input Model (preprocessed)
Input Tree Embedding Layer
Attention Layer
Output Tree Extraction Layer
Output Model (non-postprocessed)

Research and Development

Consensus
- Research Networks

Research and Development

Persistent Objects
- People
- Objects
- Tokens
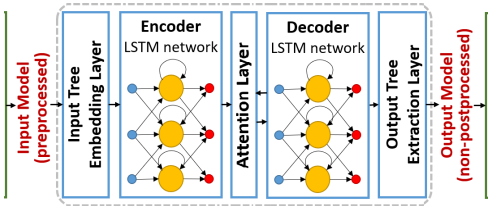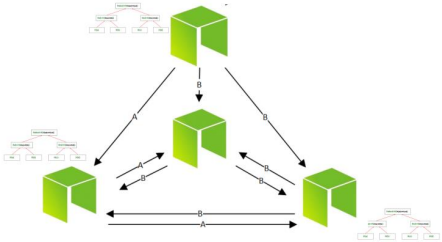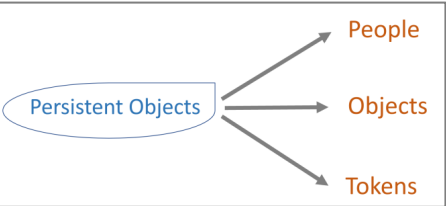
Consensus
- Research Networks

We face an immediate and pressing need to redefine how *consensus* about facts and truth are determined in society
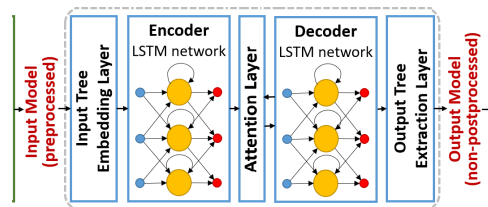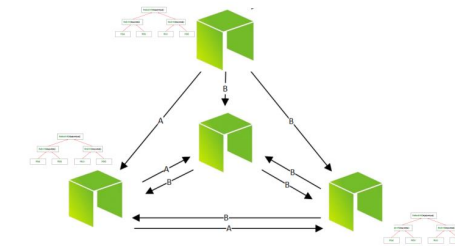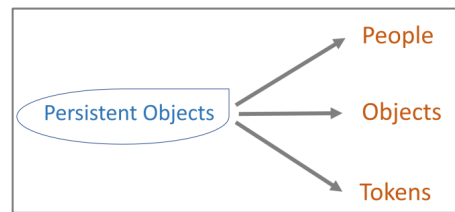
Research and Development

Persistent Objects → People, Objects, Tokens
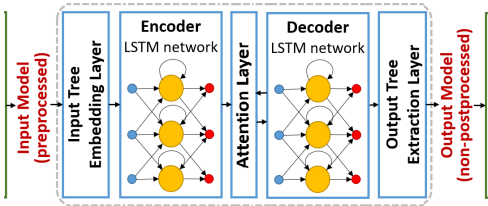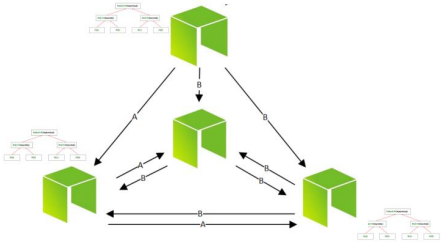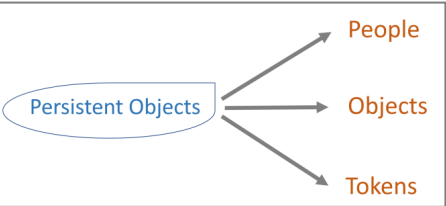
Consensus
- Research Networks

- Transparency and open research networks
- Include the public in the research process
- Ensure the benefits of research are shared by all, not only corporations

Research and Development

Artificial Intelligence
- Software Development
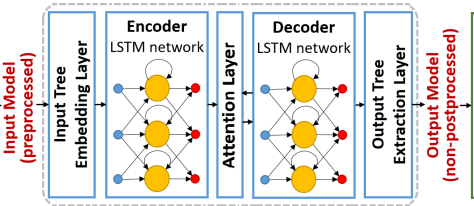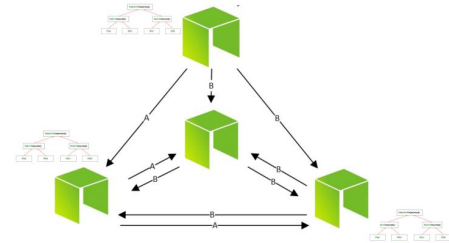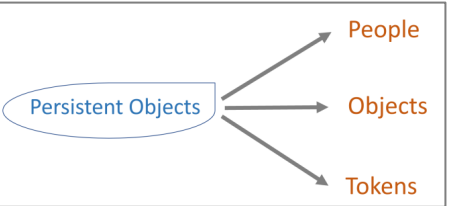- Concept Formation
- Prediction

Research and Development
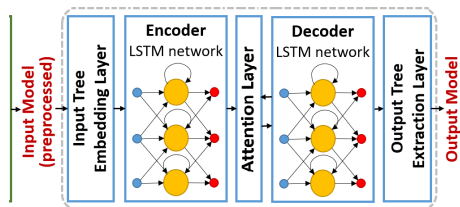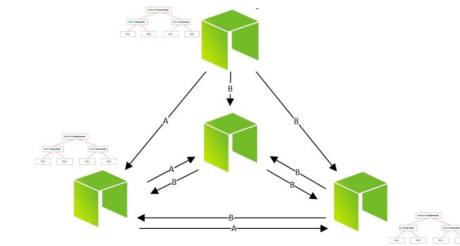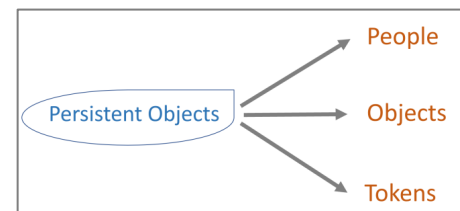
Artificial Intelligence

- Software Development
- Concept Formation
- Prediction

- Software validation techniques
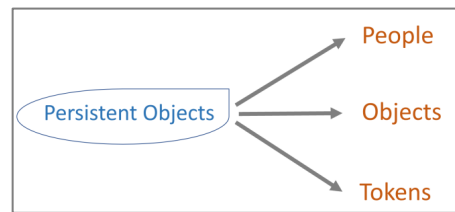- Optimization and efficiency
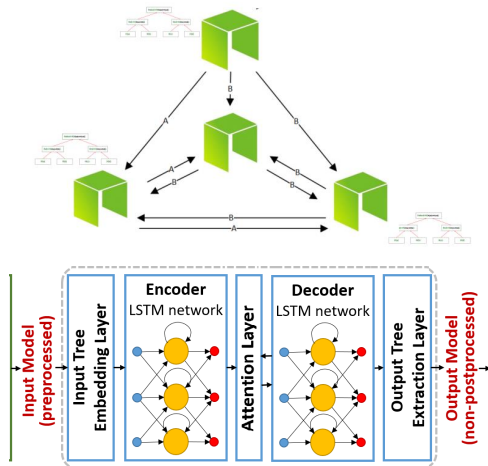
Research and Development

Artificial Intelligence
- Software Development
- Concept Formation
- Prediction

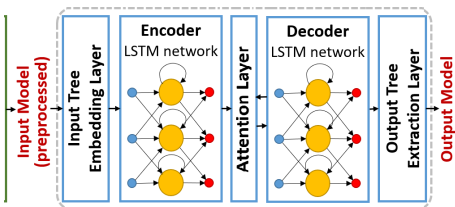- Research ethics review
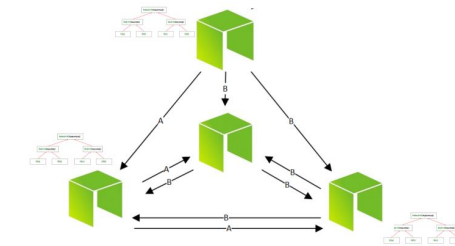- What we need *vs* what we want *vs* what we can do

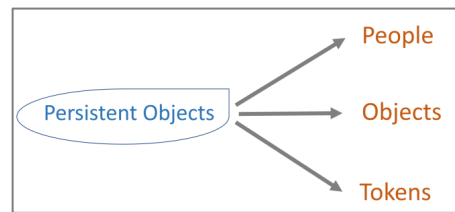# Innovation and Growth

Persistent Objects → People, Objects, Tokens

- Market and Assets
- Performance Indicators
- Tokens and Recognition
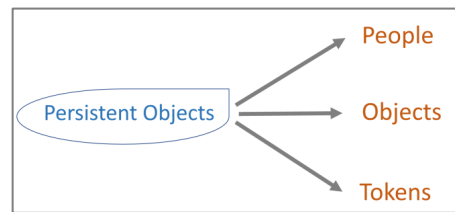
Innovation and Growth

- **Market and Assets**
- **Performance Indicators**
- **Tokens and Recognition**

- Based on consent and inclusion
- Definition of non-monetary assets, e.g., happiness, sustainability
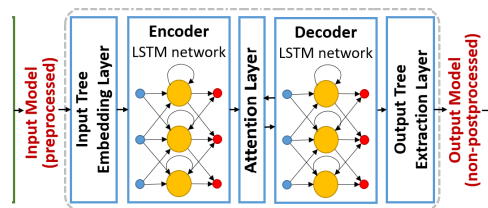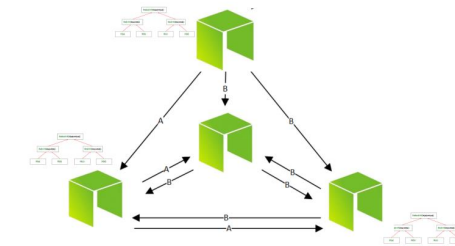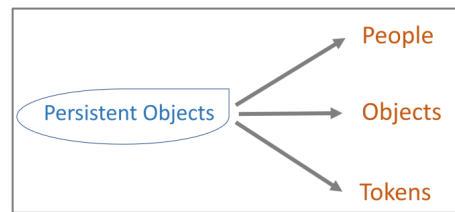- Reflection of these in data

Innovation and Growth
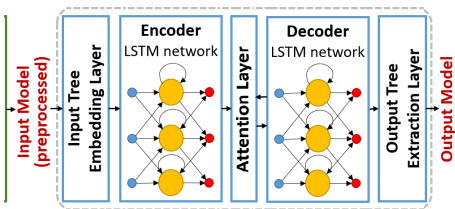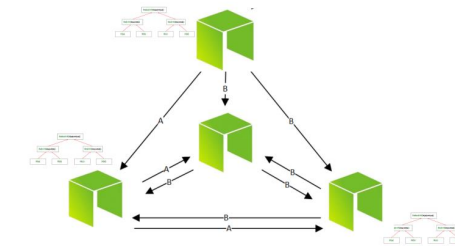
- **Market and Assets**
- **Performance Indicators**
- **Tokens and Recognition**

- How can we include non-quantitative?
- Diverse perspectives, contexts
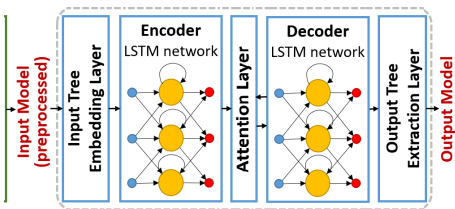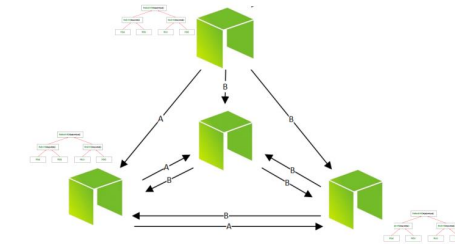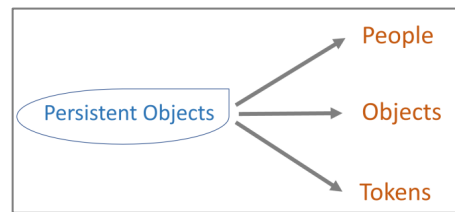- Monitoring and feeding into data

Innovation and Growth

- Market and Assets
- Performance Indicators
- Tokens and Recognition

- Redefining wealth as a negative indicator
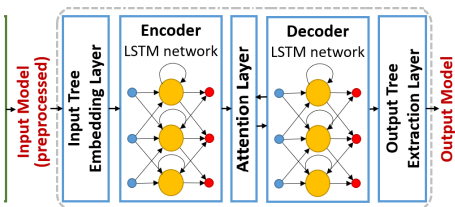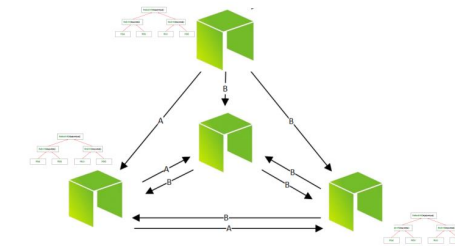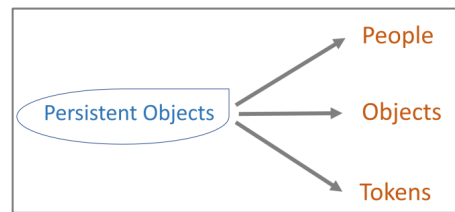- Social good (vs. 'social credit')

Innovation and Growth

Consensus
- Innovation Networks
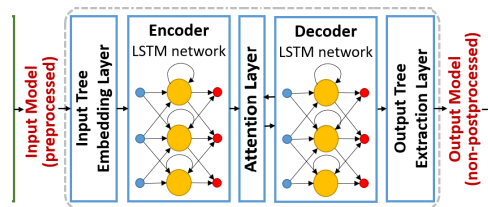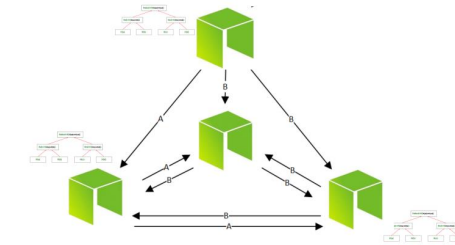- Needs Assessment
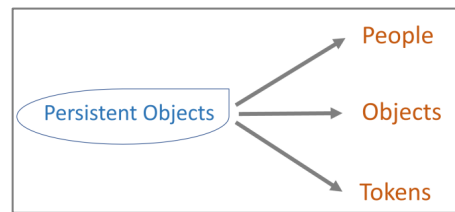
Innovation and Growth

Consensus

- Innovation Networks
- Needs Assessment

- Redefinition from *how* to innovate to *what we want* from innovation
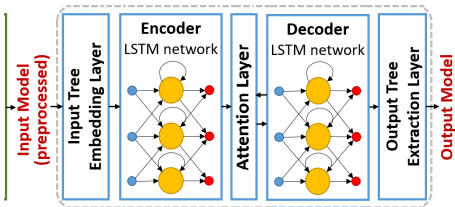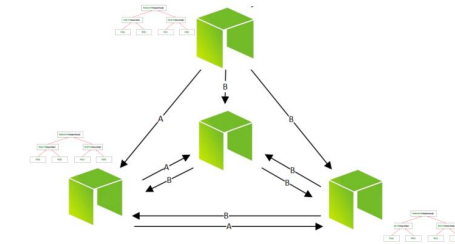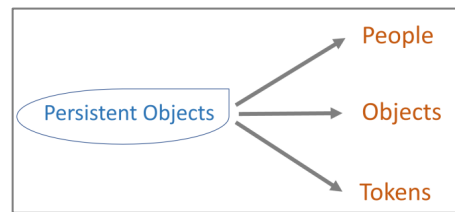- Key role for access and inclusion

Innovation and Growth

Artificial Intelligence
- Product Development
- Logistics and Distribution
- Management and Admin
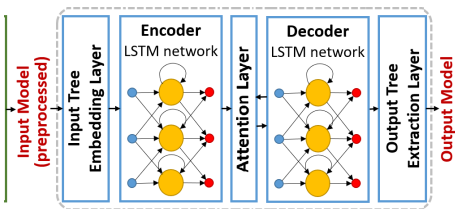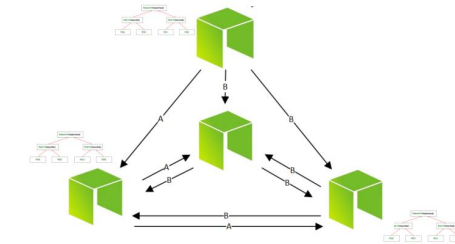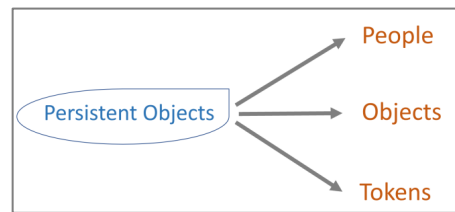
Innovation and Growth

Artificial Intelligence

- Product Development
- Logistics and Distribution
- Management and Admin

- Redefining 'productivity' and share of benefits
- Require definition of entire product cycle
- Consider impact on communities

Persistent Objects
- People
- Objects
- Tokens

Input Model (preprocessed)
Input Tree Embedding Layer
Encoder LSTM network
Attention Layer
Decoder LSTM network
Output Tree Extraction Layer
Output Model (non-postprocessed)
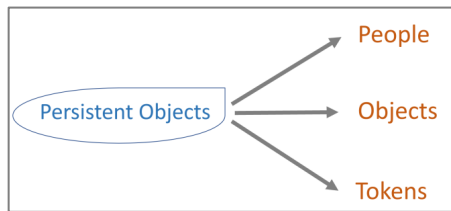
Innovation and Growth
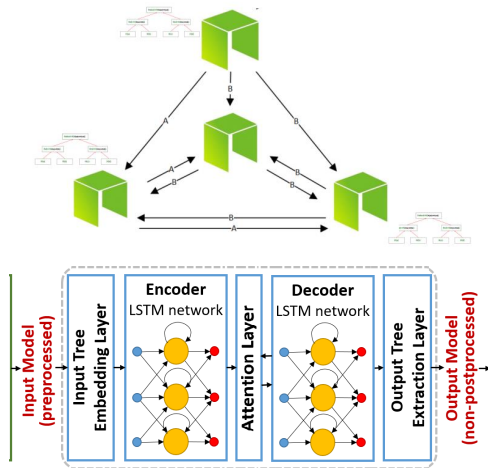

Artificial Intelligence
- Product Development
- Logistics and Distribution
- Management and Admin

- Management for sustainability
- Redefine wages as benefit, not cost
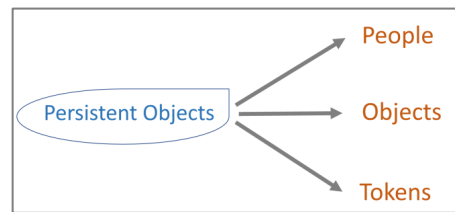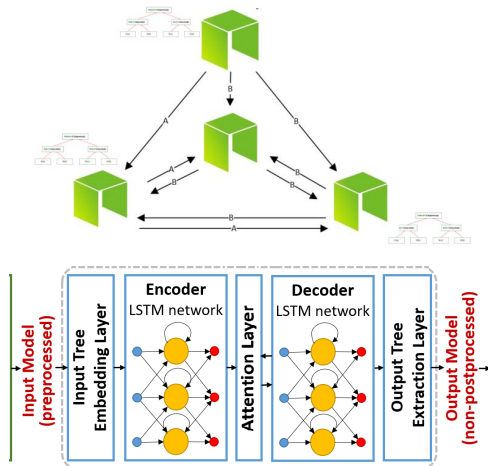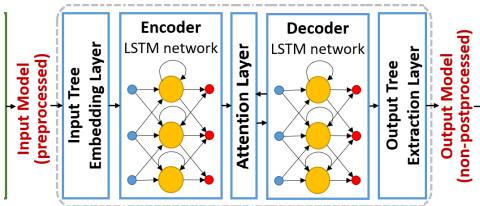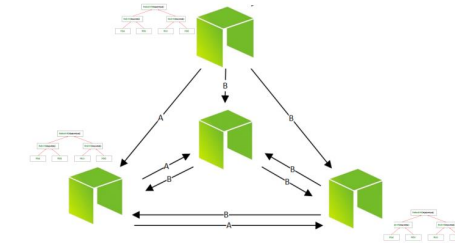- Consider impact on communities

Concluding Remarks

This is us

Concluding Remarks

Everything this does depends on what we do

Concluding Remarks

People

Persistent Objects → Objects

Tokens
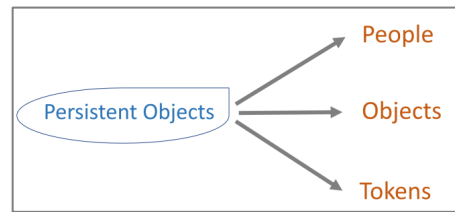
If we want a more inclusive, sustainable and ethical society, we must make inclusive, sustainable and ethical decisions

Stephen Downes

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stephen@downes.ca