

MANAGING DIGITAL INFORMATION ON BLOCKCHAINS AND DISTRIBUTED LEDGERS AS EVIDENCE

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**1. DEFINITIONS OF
BLOCKCHAIN**

2. WHAT IS EVIDENCE

**3. TRUSTING RECORDS AS
EVIDENCE – AN ARCHIVAL
THEORETIC VIEW**

**4. THEORY AND SOLUTION
BUILDING**



CONTEXT

- Fake news, copyright violation, media forensics, privacy and security are emerging challenges for digital media
- Datification - a process of atomization of the components of records to enable transformation and manipulation of data – has contributed to the issues noted above
- Blockchains are designed to be tamper resistant and to create final, definitive and immutable ledger records



Definitions of blockchain

- From JPEG Whitepaper (citing World Bank):

“**Blockchain** technology [1] is an open distributed ledger technology (**DLT**) that records details of all transactions in chained and signed ‘blocks’. DLT provides a platform to record and share data in a distributed manner.”

- From CD of ISO/IEC 22739:

blockchain

“distributed ledger system with confirmed blocks organized in an append-only, sequential chain using cryptographic links

Note 1 to entry: blockchains are designed to be tamper resistant and to create final, definitive and immutable ledger records.”

Supporting Definitions

- Definition of Block from CD ISO/IEC 22739:
- Ledger records from CD ISO/IEC 22739:

“block

data structure comprising ordered ledger records and a block header

Note 1 to entry: Ledger records within a block are sometimes referred to as comprising the body of the block to differentiate them from the block header

Note 2 to entry: A block may sometimes contain no ledger records.”

“ledger record

record comprising transaction records or references to transaction records recorded on a blockchain or distributed ledger system

Note 1 to entry: A reference may be implemented as a cryptographic link.”

What is Evidence



evidence - all means by which any alleged matter of fact, the truth of which is submitted to investigation, is established or disproved in a legal proceeding.

[Canadian standard CAN/CGSB-72.34-2017, *Electronic records as documentary evidence*, 3.31]

evidence - <demonstrate truth> everything that is used to determine or demonstrate the truth of an assertion [ISO/TS 21089:2018(en), 3.64.1]

evidence - information which is used, either by itself or in conjunction with other information, to establish proof about an event or action [ISO/IEC 13888-1:2009(en), 3.11]

evidence - that which tends to prove or disprove something.

[Glossary of The Law Society, UK, <https://www.lawsociety.org.uk/for-the-public/legal-glossary/#E>]

evidence, in its broadest sense includes everything that is used to determine or demonstrate the truth of an assertion.

[Wikipedia, [https://en.wikipedia.org/wiki/Evidence_\(disambiguation\)](https://en.wikipedia.org/wiki/Evidence_(disambiguation))]



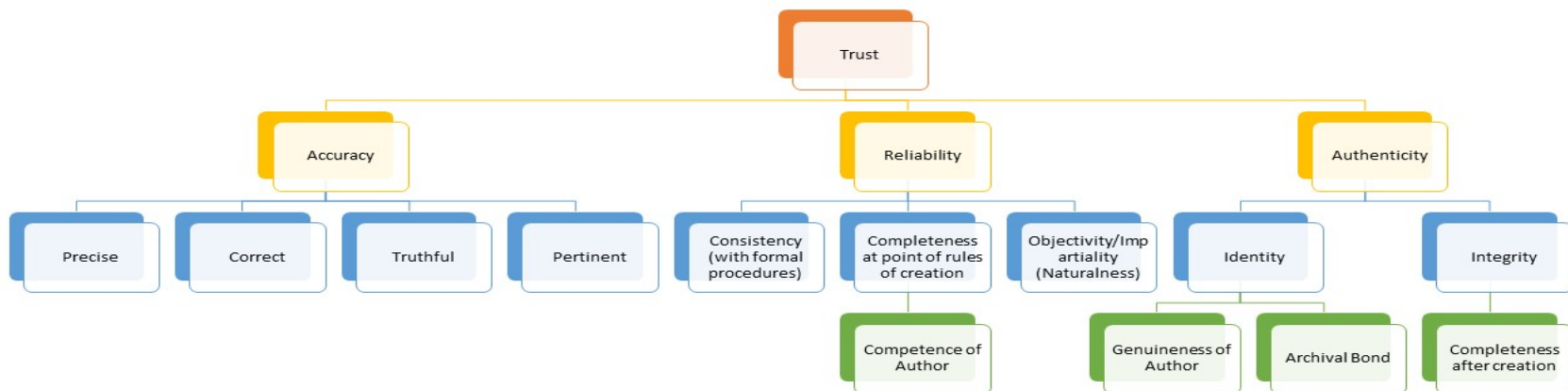
- ❖ *Concerned with determination of the authenticity of records as evidence of acts (e.g., transfers of land)*
- ❖ Early form of “proof of fact”
- ❖ Concerned with the preservation of authentic evidence



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The ***Taxonomy of Trust***

(An archival theoretic evaluation framework)



Long-term Preservation



Comparing with JPEG concepts

Concept	JPEG Whitepaper	Archival Science
<i>Accuracy</i>	Does not discuss accuracy	Discusses the requirement for the content of records to be precise, correct, truthful and pertinent
<i>Reliability</i>	Does not discuss explicitly, but mentioned in the context of image (production) tracking	Discusses in relation to the context and processes of creation of a record, e.g., procedurally complete, created by competent authority
<i>Authenticity</i>	Essential feature in many use cases to ensure and check the integrity of image data and/or embedded metadata to establish rightful claim of all stakeholders of any digital asset.	Identity: of creation; of document (archival bond) Integrity: not bit level integrity but semantic integrity
<i>Protection</i>	protection tools to protect parts of any type of JPEG images; handling of hierarchical levels of access and multiple protection levels for metadata and image protection; file carving systems (e.g. resynchronisation points).	Does not discuss directly, but is achieved via reliability (e.g., the security of the creation system) and protection of the authenticity the record (e.g., preservation).

Records in the Chain Project



**Records in the
"Chain"**

- What are the types of records being generated in different blockchain solutions and platforms?
- How are these records being accessed, managed, secured and preserved?
- What is the distributed technological ecosystem upon which these solutions rely?
- What are the interdependencies among these systems?
- What is the context (i.e., provincial, juridical-administrative, procedural, documentary, and technological) of creation and management of records in these blockchain systems?

A Series of Case Studies on Blockchain Recordkeeping

[HOME](#)

[ABOUT THE RECORDS IN THE "CHAIN" PROJECT](#)

Real Estate Transaction Recording on the Blockchain in British Columbia (RCPA-02) – Case Study 1

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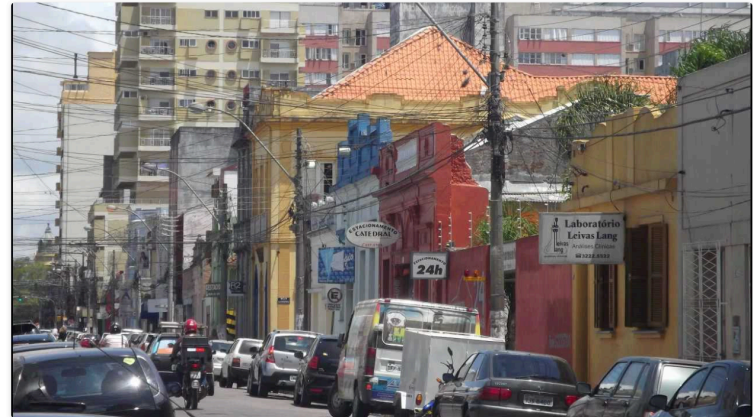


This document reports on a design challenge competition proposed by the Digital ID & Authentication Council of Canada (DIACC) and the Land Title and Survey Authority of British Columbia to offer students and professionals the chance to contribute ideas for a real world, industry application of digital identification in the context of land title transfers within the Canadian province of British Columbia. The design challenge was a collaboration between DIACC, the Land Title and Survey Authority of British Columbia, IdentityNORTH, and the University of British Columbia.

[Blockchain Case Study_FINAL](#)

Real Estate Transaction Recording in the Blockchain in Brazil

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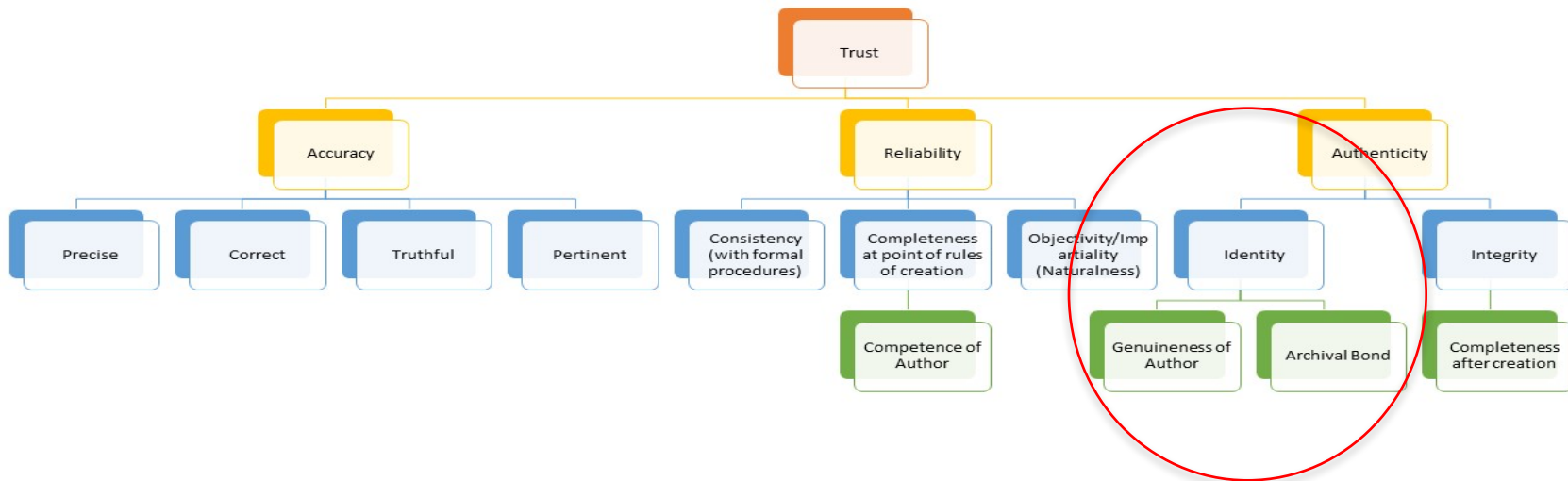
This case study reports on a pilot study of the application of Blockchain technology to land transaction recording in the Municipality of Pelotas, Rio Grande do Sul, Brazil. It was carried out between May to September, 2017 as part of the University of British Columbia's "Records in the Chain" Project and CNPQ UFSM Ged/A Digital Records Research Group.



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Long-term Preservation



ACTS OF BONDAGE



Archival Bond	Link the procedural context of the record and between other records implicated in the same procedure
Recording Bond	Bond between the record and the writer of the record, which may, in fact, be a machine or a platform, not a individual human
Chain of Preservation Bond	Bond between the record at time t and all the other versions of the same record at subsequent times (t_1 , t_2 , t_3), however granularly time is defined
Bond of Integrity	Bond between a record and the version of the record (i.e., a hash) created to establish its integrity.
Authorial Bond	Links the author of the record to the record the author has created
Data Subject Bond	Link between the record and data subjects of the record (purpose is data privacy and protection)

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