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Complex Information: A Conceptual Extension of Classical Information Models for Human Decision Contexts

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Abstract

Classical information models have proven highly effective for the design and operation of machine-based communication and computation systems. These models intentionally abstract away meaning, interpretation, and human decision-making in order to achieve formal clarity and computability.

This document describes a conceptual extension to classical information models, referred to as complex information, which represents information as consisting of two components: a real component, suitable for machine processing, and an imaginary component, representing human context, meaning, and non-computable decision factors.

The proposed concept does not replace existing information theory, nor does it define new protocols or standards. Instead, it provides a descriptive framework for reasoning about information systems that interact with human decision processes, trust, and interpretation.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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This Internet-Draft will expire on 22 July 2026.

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1. Introduction

Modern information systems increasingly participate in contexts that extend beyond pure data transmission and computation. These systems influence decision-making processes affecting individuals, organizations, and societies.

Classical information theory intentionally excludes semantic meaning and interpretation. While this abstraction enables reliable and scalable systems, it provides no formal representation for human decision context.

2. Terminology

2.1. Classical Information

Classical information refers to information as defined in mathematical information theory, where information is represented as a function of symbol probabilities and is independent of semantic meaning or interpretation.

Classical information theory is commonly associated with the work of [Shannon1948].

2.2. Physical Information

Physical information refers to the treatment of information as a physical quantity bound to thermodynamic processes, including energy dissipation and irreversibility.

Physical interpretations of information are commonly linked to [Landauer1961].

2.3. Complex Information

Complex information is a conceptual model in which information is described as having two components: a real component and an imaginary component.

2.4. Decision Space

Decision space refers to choices or judgments that cannot be fully derived from computable information alone and therefore require human interpretation or responsibility.

3. Problem Statement

When classical information models are applied directly to human-facing decision contexts, structural issues arise due to the absence of formal representation for non-computable decision factors.

4. Proposed Concept: Complex Information

The complex information model preserves existing computational models while explicitly acknowledging non-computable components relevant to human decision-making.

5. Implications

The model supports clearer analytical separation between computation and interpretation, without introducing new protocols or requirements.

6. Security Considerations

Failure to distinguish computable and interpretive components may lead to misattributed authority, misleading representations, or algorithmic overreach. This document defines no security mechanisms.

7. IANA Considerations

This document has no IANA considerations.

8. Informative References

[Shannon1948]
Shannon, C. E., "A Mathematical Theory of Communication", 1948.

[Landauer1961]
Landauer, R., "Irreversibility and Heat Generation in the Computing Process", 1961.

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