International Standard Content Code (ISCC)

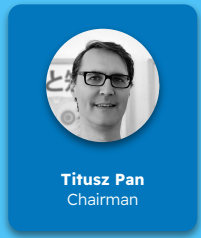
ISO 24138:2024

ISCC - European Galaxy Days (EGD)

2025-10-01, *Titusz Pan*

Who is the ISCC Foundation

The **ISCC Foundation** is a non-profit, dedicated to developing, standardizing and promoting open-source technology for universal content identification.



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TC 46 - Information and Documentation
SC 09 - Identification and Description

ISCC

ISO 24138:2024

Conceived
2016-06-29

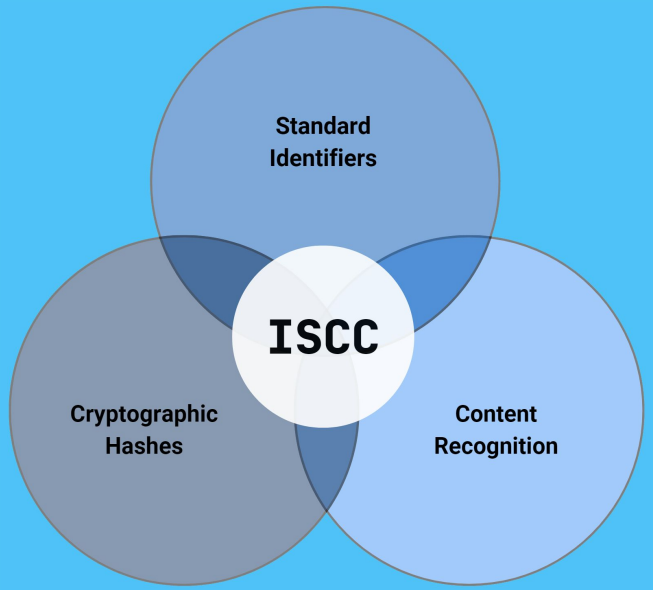
WG 18 Started
2019-10-29

Published
2024-05-15

ISO 2108:2017	ISBN	International Standard Book Number
ISO 3297:2022	ISSN	International Standard Serial Number
ISO 3901:2019	ISRC	International Standard Recording Code
ISO 15706-1:2023	ISAN	International Standard Audiovisual Number
ISO 15707:2022	ISWC	International Standard Musical Work Code
ISO 27729:2012	ISNI	International Standard Name Identifier
ISO 26324:2022	DOI	Digital Object Identifier System
ISO 24138:2024	ISCC	International Standard Content Code

ISCC

At the Intersection of Digital Content Identification



The **ISCC** combines properties from multiple content identification paradigms:

- **Standard Identifiers:**

  Identifies abstract works

- **Content Recognition:**

  Clusters "*similar*" content

- **Cryptographic Hashes:**

  Verifies media asset

ISCC

The DNA of your digital content

Estimate similarity using ISCC-CODEs

`ISCC:KED572P4AOF5K6QXQA4T6OJD5UGX7UBPFW2TVQNTHBCKFRFCANCZARQ4K6NSFZQSH4GQ`

Meta-Code	Semantic-Code	Content-Code	Data-Code	Instance-Code
AAA572P4AOF5K6QX	CEAYAOJ7HER62DL7	EEA5ALZNWU5MDMZY	GAAUJIWEUIBULECG	IAARYV43ELTBEPYN

Abstract & Persistent — Concrete & Volatile

Metadata Similarity	Semantic Similarity	Syntactic Similarity	Data Similarity	Data Integrity

Components are self-describing and can be used standalone or in combination and at different length

CCDFPFc87MhdT | CTWAGYJ9HZGj1 | CDhydSjQXDXVk | CRd5bk4SrBpzt

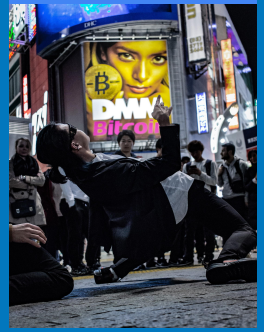
Content-Code (Image)

Similarity hash over normalized generic data. Self-Describing and media-type specific.

If we want to identify “Content” we cannot compare on encoded “Data”:

- Two “identical” images
- Yet the data is completely different
- Due to different file formats
- ISCC encodes information structure - not raw data

Layer 3 - Perceptual Identification

JPG Image	JPG Data	JPG SHA1	JPG Content-ID
	49 74 27 73 20 6e 6f 74 20 61 62 6f 75 74 20 62 61 6e 6b 69 6e 67 20 74 68 65 20 75 6e 62 61 6e 6b 65 64 2e	7b 24 1f 77 f0 f2 96 df 73 b5 e0 38 97 6a 5e 3b d0 12 bd 23	CYHa5UMqq1iQS
=	≠	≠	=
PNG Image	PNG Data	PNG SHA1	PNG Content-ID
	54 68 65 20 43 75 72 72 65 6e 63 79 20 75 73 65 64 20 6f 6e 20 43 6f 62 6c 6f 20 69 73 20 43 68 61 72 6d 2e	7e bd c5 c5 c0 30 d5 4c 30 c0 31 df 4c 9e ff d5 b2 ad e8 2d	CYHa5UMqq1iQS

Why is ISO 24138:2024 a significant publication?

- Open-source and interoperable content identification & fingerprinting system
- One universal code for digital text, image, audio and video
- Cross-sector standard (publishing, science, arts, etc.)
- A neutral, transparent and interoperable content identification system

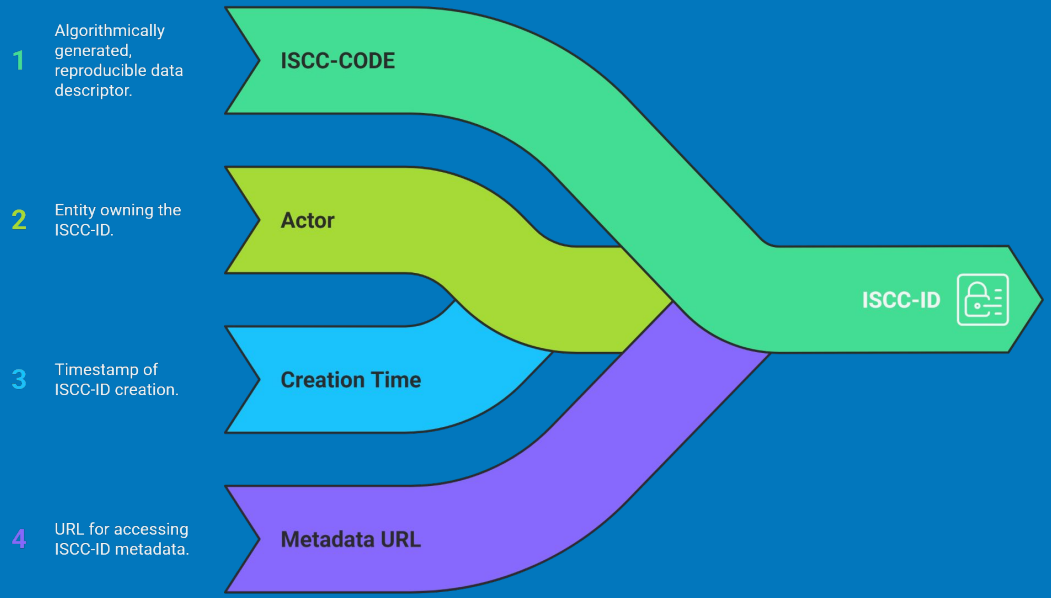
What does ISO 24138:2024 NOT standardize (yet)?

- **Who** created an ISCC
- **When** was an ISCC created
- **Where** do I find metadata

ISCC

ISCC-ID - A new ISCC Type

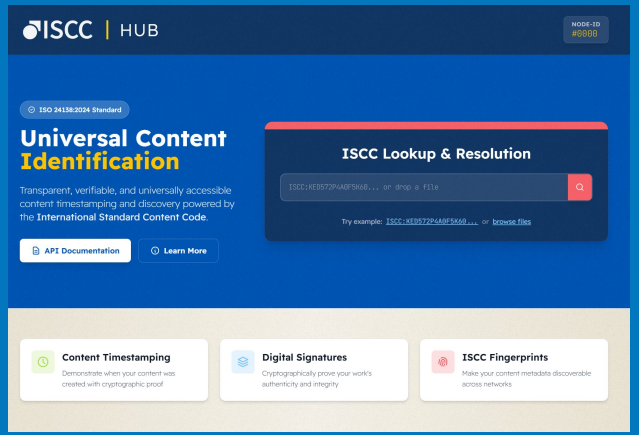
for binding data, actor, time and metadata



ISCC

Current Development
ISCC Discovery Protocol (IDP)

ISCC-HUB - An open-source web service implementation of the IDP



A neutral & transparent infra for:

Fingerprinting

help others find your metadata based on content matching

Digital Signing

cryptographically prove authenticity of data

Timestamping

demonstrate when your data was first created

The **ISCC Discovery Protocol** creates a federated infrastructure of neutral core services for efficient and interoperable **discovery of content-related metadata**, services and actors.

ISCC-HUB

What is it and what can it do

- An open-source web-service
- Timestamps ISCC-CODEs
- Issues ISCC-IDs as W3C VCs
- Finds and resolves ISCCs to metadata
- Provides a public transparency log
- Provides content-aware replication
- Institutions can run their own ISCC-HUB

OSCARS
Open Science Clusters' Action for Research & Society

Funded Project

Enhancing AI-Readiness of Bioimaging Data with Content-Based Identifiers (BIO-CODES)

Sylvia Le Dévédec, Leiden University, ORCID: 0000-0002-0615-9616

Implemented by

Universiteit Leiden

ISCC Foundation

Funded by the European Union

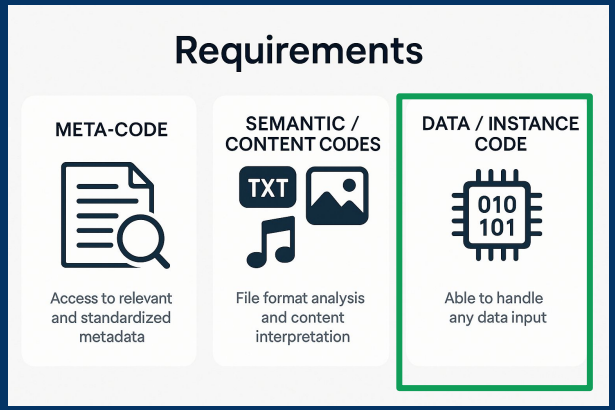
Challenge

Processing Bioimaging Data at Scale

- Modern bioimaging datasets: TB-scale files
- ISCC processing bottleneck: Reference implementation too slow
- Need: Fast, reliable content identification for BIO-CODES workflows

ISCC-SUM

High-Performance Implementation for BIO-CODES



- Fast, reliable ISCC-SUM generation for bioimaging workflows (50-130x speedup)
- Memory-efficient streaming
- Implements FastCDC & MinHash algorithms
- Integrated single-pass processing
- Rust library + Python bindings + CLI tool
- 165 commits, 12.636 LOC, 100 % test coverage
- GitHub: github.com/bio-codes/iscc-sum

Thank you
for your attention

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