A Worldwide Attribution Ledger for Content

An Idea Whose Time Has Come



PRESCIENT INSIGHTS

Executive Summary

Over the past 30 years, the Web has sparked wonderful innovations that moved human society ahead. But not everyone benefited equally.

In fact, the creators who provide much of the best content available on the Web have achieved new heights in popularity, while their income has slipped to depressing new lows.

Artists, musicians, writers, agents, and publishers have traded yesterday's analog dollars for today's digital pennies.

That wasn't supposed to happen. The Web was intended to help people share information across incompatible silos of technology. But that didn't happen for creators.

As we stand on the brink of Web 3.0, creators and rightsholders face a choice:

- Will we be passed over and see our work devalued even further?
- Or will we pioneer a solution to the attribution problem that will restore the value of online content, reconnect creators to audiences, and deliver proper financial rewards to rightsholders?

We believe a likely solution is the **Attribution Ledger**: a shared database of verified rights information recorded on an immutable blockchain available to anyone, anywhere, at any time.

This would enable all stakeholders in creative content to confirm the status of any piece of content quickly, easily, and at scale. It would frustrate many bad actors and help restore trust in online content.

Work on this ledger has been started by Prescient, a creator-focused innovation lab in Toronto.

We propose that many stakeholders in the creative industries come together to move this project forward. The rest of this white paper goes into more detail on these ideas.

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Note on usage: Throughout this paper, the term "creator" includes both an original creator of a work and any agent, publisher, distributor, or other rightsholder with a legitimate right in that work. In some places, we use the term "creator" alone, simply for reasons of space or grammatical clarity.

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Online Distribution Thrives as Creator Income Dives

Over the past 30 years, the Web has sparked wonderful innovations that moved human society ahead in many ways. The Web links people from around the world, supports a thriving ecosystem and puts a vast trove of information at our fingertips.

But for all that we've gained from the Web, something else has been lost.

While creative work is being enjoyed by more people than ever before, the income of most creators and rightsholders is dropping.

Artists, musicians, writers, agents and publishers have essentially traded yesterday's analog dollars for today's digital pennies.[1]

Consider these two examples:

Musicians: By 2009, the music business was cut in half by file-sharing.[2] Today online streaming may save it. Yet payments to musicians have never recovered. For example, 700,000 streams on Spotify's free music service generates $100 in royalties.[3] At that measly rate, only a handful of megastars can ever hope to earn a living.

Writers: A quarter-million newspaper staff have been laid off in the U.S. since 1990,[4] as most people stopped reading printed newspapers. Many magazines that once paid for content have closed their doors; most of the rest are thinner than ever before. Once-esteemed publications from *Forbes* to *Sports Illustrated*[5] have begun to rely on volunteer bloggers.

It wasn't supposed to happen that way. The Web was supposed to help everyone.

To understand why it hasn't, let's take a quick look at how the Web evolved.

The original vision for the Web

Many early pioneers of computing were motivated by a desire to help people share information.



Figure 1: Ted Nelson, Inventor of Hypertext

For example, Ted Nelson has been a techno-visionary from the 1960s who foresaw a world of cross-linked information where people could easily hop between related pieces of content.

And he coined the word "hypertext" to describe it.[6]

For decades, Nelson has predicted that hypertext will help people share information better than ever before. Most see Nelson as a direct inspiration for the Web.

When Tim Berners-Lee invented HTML in 1989, his goals were similar to Nelson's.

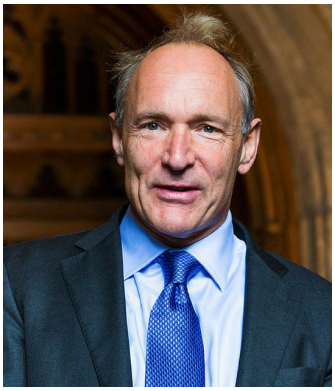


Figure 2: Tim Berners-Lee, Inventor of the Web

He wanted to help researchers share information locked up in incompatible platforms—Macintosh, Windows, UNIX and mainframes—at the CERN research center in Europe where he worked.

When he open-sourced the code for HTML, the first Web server and the first Web browser, that was a fundamental moment in human history, almost like the discovery of fire.

"Any really powerful thing can be used for good or evil," wrote Berners-Lee. "Let's use the Web to help people understand each other."[7]

The Web quickly took off and exploded with innovation. Information-sharing evolved at breakneck speed ever since. And an entire new economy emerged online that never before existed.

In the past 30 years, we've evolved from a select few using desktop computers to more than 60% of the world's population[8] accessing 1.5 billion websites on affordable portable devices that fit in their pockets.

Three generations of the Web

Many consider that the Web has three distinct generations:

- Yesterday's original version or Web 1.0
- Today's current version or Web 2.0
- The coming version of tomorrow or Web 3.0

Table 1 sums up these three generations, including their basic characteristics. And while the Web has delivered many benefits to both creators and consumers, it also brought certain drawbacks.

For example, in Web 2.0 we can find oodles of information very quickly—but we can't always trust what we find. The Web is polluted with fake news, alternate facts, and reviewers who are actually paid "influencers." Online content could come from an imposter posing as someone else, or from some shadowy propaganda machine in Russia or North Korea.

And it's not easy to tell the dreck apart from high-quality content from someone we trust.

For his part, Nelson is not impressed with the current design of the Web. He says HTML falls far short of what it could be, with "links going outward only, quotes you can't follow to their origins, no version management, no rights management."[9]

Nelson says that as the Web evolved, the links between a creator and their content have been diluted or lost—and that's too much to leave behind.

	Yesterday: Web 1.0	Today: Web 2.0	Tomorrow: Web 3.0
Era	1990 to 2005	2005 to early 2020s	Early 2020s—
Nickname	Web of information	Web of user interactions	Web of machine-to-machine interactions
Original goals	Utopian vision: Liberate information, eliminate gate–keepers, serve humanity	Mainstream success: Promote interaction, find ways to monetize traffic	The next generation: Smarter, faster access, Internet of Things (IoT)
Main features	Hyperlinks to static web pages with text, graphics, and files to share	User-generated content like blogs, reviews, social media, Wikipedia	AI, augmented reality, smart devices, smarter search
Benefits for creators and rightsholders	Made it faster and easier to share content	Made it faster and easier to create and share rich media like video	Will make it faster and easier to compile information from all sources
Drawbacks for creators/ rightsholders	Rampant unauthorized file-sharing: the music industry was cut in half, many newspapers and magazines closed with huge layoffs	Aggregators grabbed content without paying, Big Tech discovered the value of data, and the attribution problem became serious	The attribution problem may be dramatically amplified, further reducing the voice of creators and the trust of consumers
Benefit for consumers	Access to more content faster than ever before	Access to even more content even faster, and growth of new communities of like-minded people	Access to even more content even faster, assembled from numerous sources by smarter systems
Drawbacks for consumers	Technical limitations reduced metadata stored with content, creating the attribution problem	Fake news, alternate facts, and imposters flooded the Web, consumers began to lose trust in online content	Will the Web's power to bring people together be broken?

Table 1: Three Generations of the Web

Dropping metadata broke the link to creators

In early computer networks, there were constraints on bandwidth and file sizes. Graphics especially were subject to compression: The smaller the graphic, the faster it loaded through a dial-up or early broadband connection.

We can't afford to throw away any letters in a text file or any numbers in a spreadsheet. But we can leave behind some bits from a photo or video, and most people never notice the difference. Some popular file compression standards, like JPEG, throw away some data from an image as they compress it. For that reason, these standards are called "lossy".

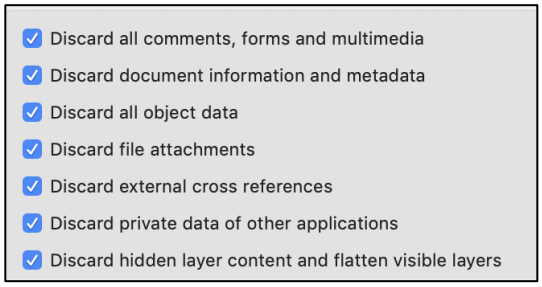


Figure 3: Deleting Metadata in a PDF with Adobe Acrobat

Something else we can throw away without noticing: metadata, also known as "information about information."

For example, Adobe Acrobat can compress a PDF file by deleting all metadata, as shown in Figure 3.

So metadata was seen as "padding" no one needed.

Dropping metadata from content seemed sensible and practical. After all, file sizes should be minimal. People need top speed to transmit data and download webpages. What's the problem with losing useless metadata?

The problem is, metadata contains irreplaceable information that adds value:

- The names of creator(s) of that content
- The creation date
- The identity of the rightsholders
- The location of the creator(s)
- The contact information for the creator(s)
- The software used to create the work
- Any special notes on the content

Metadata is like the "bonus features" on a DVD. You can watch a movie without it. But if you're a big fan, that extra content can add a lot of value to the movie. Metadata creates a link back to the original creator. Without any metadata, that link is broken.

And without any link to the creator, content is suspect. Without reliable metadata, all we have is a claim that someone created something. We can never know that for sure.

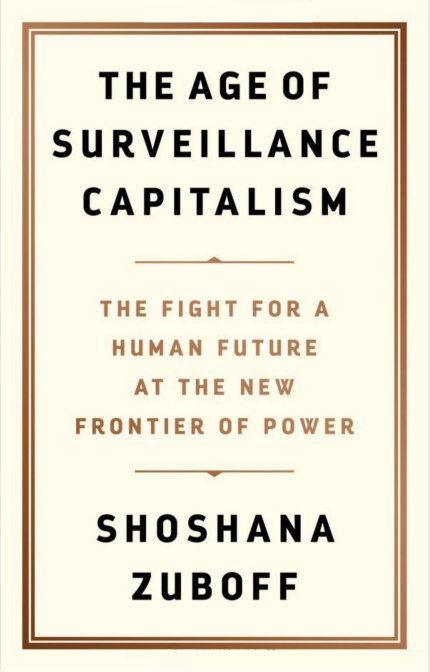
Crowdsourcing won over creation

When the Web began, many small silos of information were locked in incompatible computers.

Today, giant silos of data are controlled by a handful of companies such as Amazon, Apple, Facebook (owner of Instagram), Google (owner of YouTube), Microsoft (owner of LinkedIn), Netflix, Spotify, Twitter, and a few others. We can call them Big Tech.

For the owners of any online platform, one measure generally means more than anything else. It might be clicks, conversions, downloads, likes, shares, subscribes, time-on-page, or views.

Rather than the quality of the content on a website, these metrics are all-important for Big Tech.



As Shoshanna Zuboff explains in *The Age of Surveillance Capitalism*, today's online platforms provide free services like e-mail, networking, search, or storage.

In return they scoop up data about every–one's online behavior: what we search for, where we click, how long we stay on a page, and what price we pay for anything we buy.

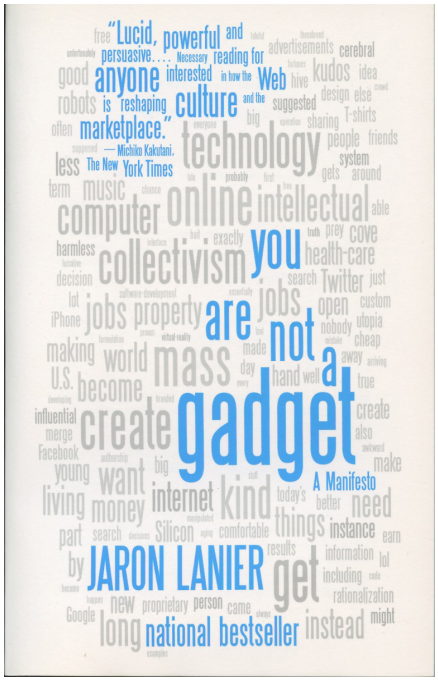
The Big Tech platforms monitor our behaviour "in astonishing detail."[10] Then they monetize that data by targeting us with uncannily precise ads.

"Once we searched Google," says Zuboff, "but now Google searches us."[11]

As Jaron Lanier explains in *You are Not a Gadget,* Silicon Valley argued that "'content' from identifiable humans would no longer matter" since attracting a mass of consumers "was a better business bet than paying people to make movies, books, and music."[12]

For the past 15 years, this message has been delivered over and over to anyone in the content business, expecially creators and publishers.

"I have been in the room too many times to count with Google, Facebook, YouTube, Snapchat and others as they have lectured us on exactly what we need to do to save our business," says Joanne Lipman, the former editor-in-chief of *USA Today*.



"Virtually always, it's to bend our news practices—at our own expense—to their latest algorithm."[13]

The result is that many executives in Silicon Valley now consider content to be just another form of data that should be freely given and freely taken.

After all, that's what happens with every consumer's personal data.

Artists, musicians, writers, publishers, agents, other rightsholders, and the "old-fashioned" notion of copyright have been forgotten in the online goldrush.

Loss of trust hurts everyone

In Web 2.0, everyone was seeking the magic formula to make money online. The Web had just come through the dot-com crash of 2001, when many companies went out of business. The rest wanted desperately to survive.

Traditional publishers were told to attract "eyeballs" and worry about revenues later. Individual creators were told to develop a "platform" by giving away content to gain exposure.

Eyeballs and exposure would ultimately drive revenues.

And that worked for the biggest online platforms that created a brand and aggregated the most content.

But it didn't work that way for everyone, In fact, creators and rightsholders got the first part of the bargain—lots of exposure—without the second part, any added income.

It's enough to make some creators very bitter. For example, established musician David Byrne recently wrote an opinion piece in *The Guardian* headlined, "The internet will suck the creative content out of the whole world until nothing is left."[14]

The unintended consequence of dropping metadata and breaking the link between content and creators has been loss of trust. Without trust, will the Web's power to help people share information be lost?

Even well-intentioned consumers can be tricked

Well-intentioned consumers have no idea who benefits when they buy content online. Even when we shop on recognized sites like Amazon, eBay, or Walmart, we can't be sure we're buying a real book from a legitimate publisher or a cheap knock-off.

For example, a recent investigation by the *New York Times* uncovered a wide range of fake George Orwell books with weird typos and different author names. Some were made in India where Orwell's works are in the public domain, but sold in the U.S. where they're still under copyright.

"This is a complex issue for all retailers," said Amazon in a statement. "There is no single source of truth" for the copyright status of every book in every country.[15]

The company says it invests heavily in prevention and has blocked more than a million bad actors from opening merchant accounts. But that isn't enough.

Clearly, an untold number of counterfeit books are being sold by Amazon.

And in fact, many American-based companies have been driven out of business by counterfeit products sold on Amazon.[16]

The new Project Zero seems like a step in the right direction. But it still relies on creators and publishers to police Amazon's shelves at their own expense.

The Missing Link: Attribution

Something has been lost as the Web evolved. And that leaves an opening where bad actors chip away at the income of anyone with a legitimate claim to a creative work. Those bad actors include:

- **Imposters** who hijack content by posting it to an online service and clicking a checkbox to claim it as their own
- **Pirates** who steal online work to sell through unauthorized channels
- **Copyleftists** who "liberate" content by posting it online for anyone to download, and may even profit by selling ads around that content
- **Misguided consumers** who share content with friends without thinking about how creators will be compensated for their work
- **Big Tech firms** who aggregate content as though it's free data and share only a tiny slice of their revenue—or perhaps none at all—with creators

In every case, creators and rightsholders gain wider distribution without any extra income. How do these bad actors get away with it?

Copyright laws are full of loopholes, or weakly enforced. It has become normal for content to be grabbed by web services and republished online without the creator's consent or even knowledge.

Nearly all web services rely on online forms where anyone can simply check a box to claim that they're the creator or rightsholder to a piece of content. Then these services accept those forms on "blind trust."

Together, the lack of stronger copyright laws and smarter technology has hurt the livelihood of creators and rightsholders.

What can be done about that?

- Online imposter, pirates, and copyleftists must be stopped.
- Consumers need a simple and legal way to share online.
- Web business models must evolve to help creators convert "exposure" into real dollars.
- And content needs to be reliable, so that consumers don't lose faith in the online world.

We believe the missing link in the evolution of the Web is **attribution**. The solution is to add a new function for attribution that will benefit all creators going forward.

This function could be based on metadata, since today's computer networks are far larger and faster, and a few kilobytes of metadata added to a file will not appreciably slow down transmissions, uploads or downloads.

Previous attempts to solve the attribution problem

The creative industries have tried to solve the attribution problem. The two most important attempts are proprietary databases of rights information and updated copyright laws. But neither alone is enough to solve the problem.

Proprietary databases of rights information

Proprietary databases of rights information such as YouTube's Content ID or programs like Brand Registry, Project Zero, and Transparency appear to be steps in the right direction.

These tools have been mildly successful, since at the very least they acknowledge the need to pull together a database of rights information. But neither consumers nor rightsholders can see into these databases. It's impossible to tell whether that data has been validated by an industry-approved authority such as a publisher or rights management organization.

Each company uses a different proprietary design for their database, which creates a massive duplication of time and effort. These proprietary databases do little to build trust or solve the attribution problem. In the end, they simply create more silos.

Updated copyright laws

In recent years, many jurisdictions have updated their copyright laws, trying to keep up with technology.

—The European Union updated its *Copyright Directive*[17] to require websites to filter all uploaded content for copyright.[18] But after an industry backlash, the EU diluted these rules from a binding "regulation" to a voluntary "directive."

—The United States updated its *Copyright Law*[19] to include a "fair use" provision[20] that Web services use to shield themselves from liability for any content uploaded to their sites. This was not the original intent of the provision, but it's now routinely used as protection by Big Tech firms.

—Canada updated its *Copyright Act*[21] to expand the "fair dealing" exception to include education, parody, and satire. Online services are now using to shield themselves from liability. It's unclear whether that was the intent of the exception or not.[22]

These updates alone are not robust enough to solve the attribution problem. Creators and rightsholders must still police the Web by ourselves, site by site and item by item.

Legislators face a challenge balancing the interests of creators with the expectations of consumers, the vast scale of digital service providers, and the fast-moving technologies of the Web.

That balance has not yet been reached.

What happens if we never solve the attribution problem?

If we never solve the attribution problem, three possible scenarios follow. None would be favorable for creators or rightsholders—nor for anyone who wants to access trusted, original work and reward the actual creators.

Scenario #1: Digital services continue to rely on blind trust

If today's manual system of blind trust carries on, the chaos continues.

When Web 3,0 arrives, it completely overwhelms the system of blind trust. The online world becomes unmanageable for creators, with no effective way to sort out any claims or counterclaims. Creator incomes sink to new lows.

Scenario #2: Digital services build proprietary data silos

More digital service providers—perhaps pushed by regulations—create new proprietary rights databases. Only the largest companies can afford to build these; the rest seek shelter behind "safe harbor" or "fair use".

This piecemeal approach is costly, inefficient, and time-wasting. Creators and rightsholders cannot see how their rights are tracked and managed by these data silos. Many imposters and counterfeiters abuse the system. Creators incomes sink to new lows.

Scenario #3: Big Tech becomes the rights service provider

Big Tech companies begin to offer online rights management services through their proprietary rights databases, such as YouTube's Content ID.

These huge companies become the industry-standard rights managers for the Web, enabling every other company to minimize payments for creative works like art, music, and writing.

In each of these three scenarios, creator incomes sink to new lows.

What's needed to solve the attribution problem?

For the creative industry to remain viable, we need to bring attribution to digital content. Without a quick, easy, trustworthy way to see the source of a piece of content, all these negative trends will continue:

- Imposters, pirates, and copyleftists flourish while creators suffer
- Creators never manage to convert online exposure to income
- Fake news and propaganda is hard to distinguish from authentic work
- Web content loses its integrity and is worth less and less to consumers

Until now, creators have watched as technologists designed and built technologies that—either by accident or by design—did not serve us well.

As we stand on the brink of Web 3.0, the creative industries must take hold of our future and design and build technology that works for us.

Yet we need to solve the attribution problem in a way that satisfies all stakeholders in creative content. That's a big challenge, because here's what different stakeholders want:

- **Creators** and **rightsholders** want to convert exposure into income
- **Online service providers** want an efficient process that makes it easy to identify and compensate the correct creators, and that works at scale with minimal human effort
- **Consumers** want to reward valid creators and make sure they get an original, quality version of the work

We need the right combination of enlightened legislation, purpose-designed technology, and strong industry voices to balance, manage, and monitor creative works.

An effective process for Web 3.0 must ensure that accurate information on who created and who holds the rights to a creative work is readily accessible by everyone.

Let's Find a Solution Together

Finding an ideal solution to the attribution problem will be a challenge. Each stakeholder group has valid concerns and requirements. This is why we think an industry consortium is best positioned to guide the search for and implementation of the best solution to this problem.

We believe all stakeholders can agree that the ideal solution must meet three key requirements:

1. Provide **strong attribution** of content claims for creators around the world
2. Produce definitive **authentication** of all claims and handle all disputes
3. Use **machine-readable formats** to deliver fast, cost-effective, and scalable performance

Meeting these three requirements will deliver the following benefits:

Trustworthy content

Each file could be verified for authenticity by anyone in the creative community, including digital service providers, media organizations, and institutions that deal with digital content.

Verified attribution

All stakeholders could be confident in their use of the work. Rightsholders would be assured of receiving payment for each sale or license; digital service providers would only sell legitimate copies of works; and consumers could trust the authenticity of all the content they buy.

Savings in time, money, and effort

From staking a claim to maintaining rights to challenging an invalid claim, everyone in the process could see everything that's going on. Machine-readable rights claims would speed up all processing. And this transparency would save everyone time, money, resources, and effort.

Introducing the Attribution Ledger

As we stand on the brink of Web 3.0, creators and rightsholders have a choice:

- Will we be passed over again and see our work further devalued?
- Or will we pioneer a solution to maintain the value of online content, reconnect creators to audiences, and deliver proper financial rewards to rightsholders?

Our proposed solution is an **Attribution Ledger**, a robust shared database of content rights information that is rigorously verified.

These verified claims would be recorded as immutable records on a blockchain available any time, anywhere, to anyone in the world.

Using the latest technologies available, this purpose-designed solution would support an ecosystem of software apps that stakeholders could use to verify any piece of online content.

This system would handle any form of content: articles, books, images, songs, videos, and more.

This system would be maintained by a global, independent organization of stakeholders whose members provide governance, direction, and funding.

Finally, the system would include an open and transparent way to resolve disputes that would be accepted by all legitimate stakeholders.

Why an Attribution Ledger?

The goals of the Attribution Ledger are to provide verified attribution for creative works in a way that:
—is secured by strong cryptography
—respects the privacy of creators
—uses machine-readable formats to run efficiently at scale.

As shown in Figure 4, this would create an immutable connection between a creative work, the metadata about that work, and the creator or rightsholder—either a person or an organization—authorized to monetize that work.



Figure 4: The Immutable Links of Attribution

Four actors in the attribution process

A global-scale Attribution Ledger would require different participants to play different roles. As shown in Figure 5, four main actors would be involved in the attribution process:

1. **Claims registrants** would submit a claim to a certain piece of content. For example, these could be independent authors, e-book publishers, or visual artists.
2. **Attestation providers** would assess each claim, do rigorous due diligence, and then "attest" to its authenticity.

   For example, these could be copyright or reprographic collectives with successful track records in maintaining creator rights databases such as Access Copyright or CARFAC.
3. **Content arbitrator** would manage any disputes or counterclaims about any content. Again, this actor could be a copyright or reprographic collective with access to the definitive database of rights information for certain content.

   Each content arbitrator must have absolutely no conflicts of interest in resolving claims. Everyone on the network would have to accept the rulings of these content arbitrators.
4. **Users** would access the verified rights database for various purposes. Whether a user was a person or a corporation, they would quickly find the legitimate creator(s) or rightsholder(s) of a certain work.

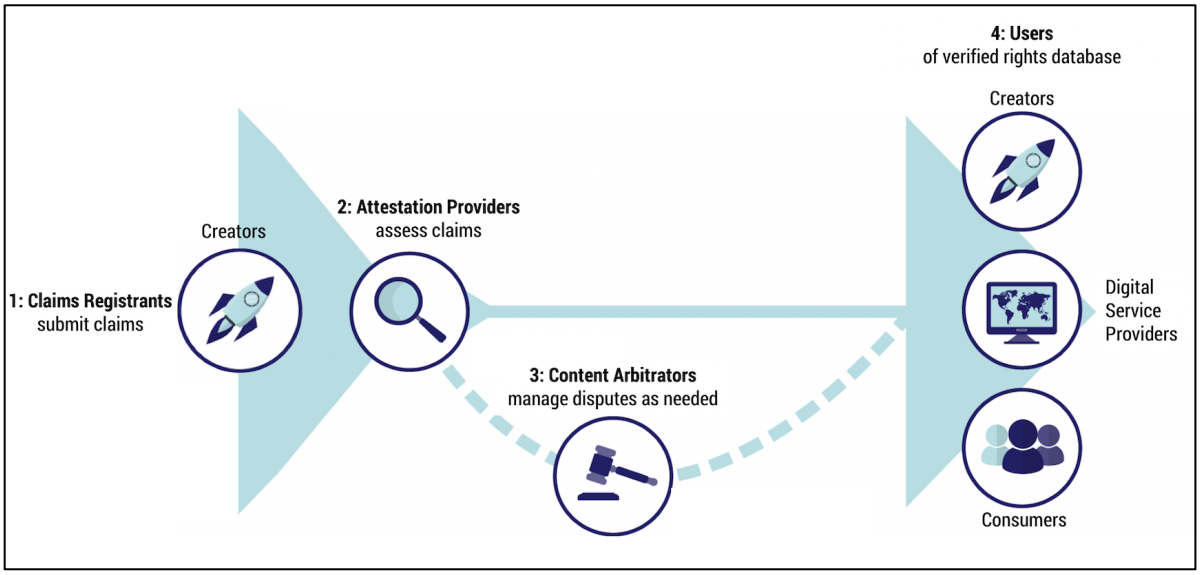


Figure 5: The Four Actors in the Attribution Process

For example, a creator could check the rights to a book they were thinking about translating.

A digital service provider could license a certain work and pay the appropriate royalties to the proper creator(s) or rightsholder(s).

And consumer such as an art collector could check the provenance of a certain painting to confirm its authenticity.

Since all four actors would be legitimate known entities, and the database would use a tamper-proof blockchain, this system would create a whole new level of trust in online content.

The foundation of a rights-based ecosystem

The Attribution Ledger would combine the work itself, the digital file of the work, and the attribution metadata for the work. This would support some powerful functions.

In effect, the file for each piece of content would act as a "self-contained business" for creators and rightsholders. That content would "know" its creator or rightsholder and could "tell" this to anyone who wanted to use it.

Once the Attribution Ledger is created and put into use, it would be the foundation for a rights-based tech ecosystem driven by the creative industry. As shown in Figure 6, new applications could be built to further new use cases that no one else had ever proposed.

For the first time in decades, creators would be at the forefront of a technological revolution, and could shepherd it in a way that benefits all stakeholders in content fairly.

For example, Amazon or YouTube could use the Attribution Ledger to verify the attribution of any content uploaded to their sites before publishing it.

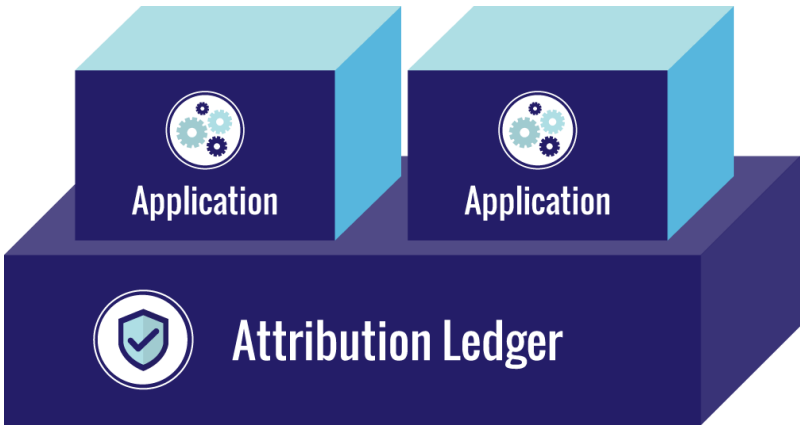


Figure 6: The Attribution Ledger Supports Future Applications

They could reduce the number of counterfeit products available for sale, and the number of spurious infringement claims and counter-claims made by alleged rightsholders.

Verifying the rightsholder for any content would happen almost immediately, vastly reducing the time, money and effort that companies would need to invest in rights management.

A robust attribution-based tech ecosystem would also benefit the smaller players in the creative industry. Individual license seekers would need less time to validate their rights information because they could use a software application already integrated with the Attribution Ledger.

Of course, no technology can prevent any possible pirate from uploading any content to any website anywhere. Yet an Attribution Ledger would likely frustrate many bad actors.

What is blockchain?

A blockchain is a new type of database shared across a network of computers. Instead of the database sitting at one central site, each computer in the network maintains a copy of the entire database. And each computer helps to protect its integrity.

While blockchains are often associated with Bitcoin, there is a big difference. Blockchain is the underlying technology that makes Bitcoin possible. So blockchain can be used without Bitcoin. And it often is.

Blockchains are being explored by thousands of companies around the world. For the right process, a blockchain can handle transactions faster, better, and cheaper than ever.

A blockchain works like this. Whenever anyone in the network wants to add to the blockchain, their computer sends that data to the entire network. Each computer validates that data and sends a confirmation back out to the network.

When enough computers "agree" that data is valid, it is added to the next block in the chain, and all the computers on the network update their copy of the database.[1]

For example, that block could contain all the metadata for a creative work, as shown in Figure 7. That metadata would be processed to make sure it could never be changed.

The blockchain itself could be available so that anyone with any reason to check any content's metadata could see it from another computer anywhere in the world. But no one else could ever cut, change, delete, edit, modify, or overwrite that metadata. Once a valid claim was written to the blockchain, it would be there for all to see, for all time.

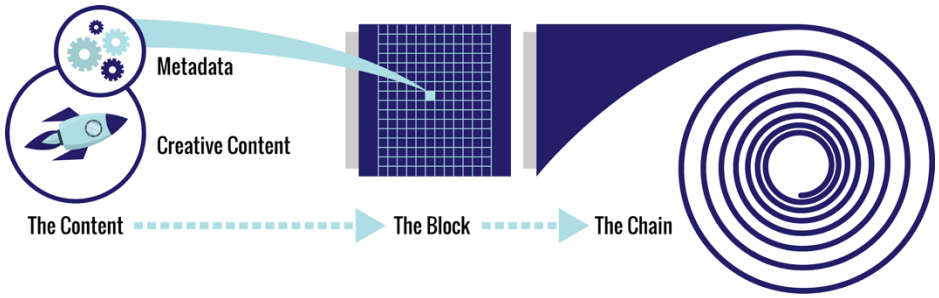


Figure 7: From Content to Blockchain

Why Use a Blockchain?

As *The Economist* aptly put it, a blockchain is "a machine for creating trust."[23] There is no better technology than blockchain to restore missing trust.

A blockchain enables people with no particular reason to trust one another to do business online. Even if they don't trust one another, they can trust the system and its code. They can be sure they will get what they paid for or get paid for what they sold.

Blockchain technology is a very promising technology to build the Attribution Ledger with, for all these reasons:

- People can trust that the blockchain data is valid and up-to-date
- People can trust that the data has never been changed or tampered with
- All partners and apps can access the same data in the same format
- Further software can be built on top of the blockchain to create a more robust and mature ecosystem

In all these ways, blockchain can restore trust in online content.

How blockchain can solve the attribution problem

One factor in particular can help blockchain to solve the attribution problem: The database is immutable. Once any data is verified and stored on the blockchain, it can never be changed.

A properly designed and built blockchain could serve as an effective platform for every sort of creative content, and provide the verified attribution, strict authentication, and time-saving automation that all stakeholders need.

These factors would benefit creators and rightsholders in the following ways:

Enforcing copyright through secure technology

Ownership of a creative work becomes indisputable once that claim is verified and entered on the Attribution Ledger blockchain. The theft and co-opting of works becomes more difficult. Any software that uses the Ledger for attribution verification will have access to validated and indisputable copyright information.

Returning ownership to creators and rightsholders

Blockchains use "smart contracts" to represent ownership of a creative work and the conditions set by the rightsholder. Once defined in the blockchain, that information is available to any app that uses the Ledger as its verification database. Ownership of the copyright is restored to creators and rightsholders, while consumers regain trust in online content.

Disseminating rights information automatically

Unlike the proprietary rights databases used by Spotify, YouTube, and others, the blockchain is a shared, secure ledger distributed among a network of computers. And a blockchain-powered Attribution Ledger could be integrated with other apps to increase the discoverability of creative works.

Eliminating data duplication and reducing fraud

Since all data is only entered once on the blockchain, this eliminates any duplicate information. All records are verified and stored in each copy of the blockchain so the information is available in real-time anywhere in the world. This will dramatically reduce fraud from imposters.

Storing more robust and complete rights information

Instead of just storing the basic rights information for a work, a blockchain-powered Attribution Ledger could store all ownership and usage information for the work. Usage conditions could be set by the rightsholder to outline how the work could be used.

More robust metadata stored on a blockchain could allow for more automation. Any integrated app could do more with that added information. For example, an app could prioritize requests for use, check and verify conditions for use, and take action with minimal human involvement. This would achieve more at less cost.

Facilitating real-time payments

Blockchain and cryptocurrency options make it easy for content users to pay for creative works. Instead of aggregating payments on a monthly basis, like Amazon or YouTube, smaller payments could be made to rightsholders instantly. And, income could be split more easily between all members of a creative team.

Fostering an industry-led technology ecosystem

A blockchain-powered Attribution Ledger could encourage the development of software apps and tools that use the Ledger for a variety of goals.

For example, a digital service provider could use the ledger to power their latest proprietary software app for a new industry vertical. Silicon Valley could even use it as a starting point for its next wave of disruption.

An individual rightsholder organization could create a tool to help local businesses support their content.

And rightsholders can use it to create apps more quickly, enabling the creative industry to keep up with the way consumers access and share content today and in the future.

Making the Attribution Ledger a Reality

As we work through the possibilities of a blockchain-powered Attribution Ledger, there are a number of things to be discussed and decided, especially:

- an effective organizational structure
- a clear dispute resolution process

An effective organizational structure

Through this purpose-driven initiative, the creative industries will partner with the technology sector to develop what's needed to make sure that creators have a viable future in the Web 3.0 economy.

As shown in Figure 8, we envision a diverse collection of industry stake–holders coming together to form the Attribution Ledger's governing body.

These stakeholders include creators and rightsholders, libraries, policy-makers, intellectual property offices, rights management organizations, digital service providers, technology firms, and others.

Members of this governing body will make key decisions about the management, technology, and long-term strategy of the Attribution Ledger.

Prescient is now calling for interested parties to step forward to join this project. We will work with the founding members to finalize the governance charter and then step back to become a member like any other.



Figure 8: Likely Stakeholders in the Governing Association

A clear dispute resolution process

One key to the effectiveness of any blockchain for rights management is to ensure that all the information stored on the blockchain is valid.

Otherwise, any new blockchain would be just another silo of questionable rights information. It would still rely on "blind trust" without any due diligence to confirm claims.

The Attribution Ledger requires a rigorous validation process. That means stakeholders must agree on who is involved in the authentication process and to what level.

While records on the blockchain cannot be modified, they can be linked to additional records that correct or change the information stored.

For example, if a work is disputed, a new record would be created on the blockchain linking back to the original work, so that any request for the original work would be flagged with an advisory.

And to ensure that the attribution metadata is authorized by all members, there must be a clear dispute resolution process.

The process for disputing a claim on the Attribution Ledger should be public, clear, and efficient. And for the process to work, members need to abide by the decisions of the dispute process.

Next Steps

All stakeholders must come together to design workable guidelines for a number of areas including membership, policies, and technology.

Membership questions

- The roles and responsibilities of members that participate in the consortium
- The roles and responsibilities of various players in the attribution process, such as claims registrants, attestation providers, content arbitrators, and corporate and individual users
- The vetting and approvals required to become an approved attestation provider
- The vetting and approvals required to become an approved claim arbitrator
- What further industry players could be involved in this project

Policy questions

- The attribution process for each type of content or media
- How to deal with varying requirements from different jurisdictions
- How to manage the intellectual property created: Should it be open source freely available, or a licensed product owned by the organization?
- The dispute resolution process for any content rights claims and counter-claims

Technology questions

- The platform and technologies required to build the ledger
- The rules and protocols for any third-party software vendors to integrate with the Attribution Ledger
- The rules and protocols for any third-party users of the ledger

As the world moves toward Web 3.0, the creative industry must stand up for itself. Creators must forge the missing link in the evolution of the Web. We need a secure, globally-shared repository of verified content rights. We need an Attribution Ledger.

We encourage anyone affected by today's changing rights environment to come together to develop a way forward that is creator-centric and rightsholder-driven.

About Prescient Innovations

Prescient Innovations is a creator-focused innovation lab dedicated to exploring the future of rights management and content monetization. The organization, which is a wholly-owned subsidiary of Access Copyright, is leveraging exponential technologies to build a dynamic, new ecosystem for creators, rightsholders and their audiences.

For more information, visit https://prescientinnovations.com/



About Access Copyright

Access Copyright is a collective voice of creators and publishers in Canada. A non-profit, national organization, we represent tens of thousands of Canadian writers, visual artists and publishers, and their works.

Through agreements with sister organizations around the world we also represent the works of hundreds of thousands of foreign creators and publishers. This rich repertoire of content is highly valued by educators, students, researchers, corporate employees and others who need to copy and share content.

For more information, visit www.accesscopyright.ca



Glossary

Attribution: The ability to connect a creative work to its lawful creator(s) and rightsholder(s) in a reliable and authoritative manner.

Bad actors: The imposters, pirates, and copyleftists who are gaming Web 2.0 to damage the income of creators and rightsholders.

Blind trust: Accepting a checkbox on an online form to prove that someone created a piece of content. Most digital service providers rely on blind trust for content uploaded to their sites.

Blockchain: A new type of database shared between many computers, all of which verify every entry to keep the data trustworthy and up-to-date.

Content: A creative work such as a book, painting, poem, photo, song, or video.

Creator: Any person or entity with a legitimate claim to a piece of content, either because they helped create or they licensed it to another entity.

Cryptocurrency: A digital currency that is not controlled by any government or bank.

Cryptography: The art and science of coding messages so that they are very difficult to decode.

Ecosystem: An interconnected system where different entities interact.

Hash: An algorithm that converts input into a string of numbers of a certain length.

Immutable: Something that can never be changed, deleted, or erased.

Ledger: A big book or set of records.

Metadata: Information about information. The metadata about a piece of content can include the author's name and many other interesting facts.

Trust: The unshakeable belief in the reliability or truthfulness of someone or something.

Web 1.0: The first generation of the Web, from about 1990 to 2005. Web 1.0 is often called the Web of information.

Web 2.0: The second generation of the Web, from about 2005 to the early 2020s. Web 2.0 is sometimes called the Web of interaction.

Web 3.0: The third or next generation of the Web, from the early 2020s into the future. Web 3.0 is sometimes called the Web of machine-to-machine interaction.

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