COALITION FOR INNOVATION

AI Blueprint for the Future

Coalition for Innovation, supported by LG NOVA

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Preamble

The Coalition for Innovation is an initiative hosted by LG NOVA that creates the opportunity for innovators, entrepreneurs, and business leaders across sectors to come together to collaborate on important topics in technology to drive impact. The end goal: together we can leverage our collective knowledge to advance important work that drives positive impact in our communities and the world. The simple vision is that we can be stronger together and increase our individual and collective impact on the world through collaboration.

This "Blueprint for the Future" document (henceforth: "Blueprint") defines a vision for the future through which technology innovation can improve the lives of people, their communities, and the planet. The goal is to lay out a vision and potentially provide the framework to start taking action in the areas of interest for the members of the Coalition. The chapters in this Blueprint are intended to be a "Big Tent" in which many diverse perspectives and interests and different approaches to impact can come together. Hence, the structure of the Blueprint is intended to be as inclusive as possible in which different chapters of the Blueprint focus on different topic areas, written by different authors with individual perspectives that may be less widely supported by the group.

Participation in the Coalition at large and authorship of the overall Blueprint document does not imply endorsement of the ideas of any specific chapter but rather acknowledges a contribution to the discussion and general engagement in the Coalition process that led to the publication of this Blueprint.

All contributors will be listed as "Authors" of the Blueprint in alphabetical order. The Co-Chairs for each Coalition will be listed as "Editors" also in alphabetical order. Authorship will include each individual author's name along with optional title and optional organization at the author's discretion.

Each chapter will list only the subset of participants that meaningfully contributed to that chapter. Authorship for chapters will be in rank order based on contribution: the first author(s) will have contributed the most, second author(s) second most, and so on. Equal contributions at each level will be listed as "Co-Authors"; if two or more authors contributed the most and contributed equally, they will be noted with an asterisk as "Co-First Authors". If two authors contributed second-most and equally, they will be listed as "Co-Second Authors" and so on.

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The Coalition is intended to be a community-driven activity and where possible governance will be by majority vote of each domain group. Specifically, each Coalition will decide which topics are included as chapters by majority vote of the group. The approach is intended to be inclusive so we will ask that topics be included unless they are considered by the majority to be significantly out of scope.

We intend for the document to reach a broad, international audience, including:

- People involved in the three technology domains: CleanTech, AI, and HealthTech
- Researchers from academic and private institutions
- Investors
- Students
- Policy creators at the corporate level and all levels of government

Chapter 4:
The Silent Pixel Code: A Proposal to Protect Content for Media Creators

Author: Johny Aguirre

Overview

The process of training large language models (LLMs) often involves the use of vast amounts of text and code, much of which is protected by intellectual property rights including copyright. This raises significant questions and concerns regarding the legality and ethical implications of using copyrighted material for LLM training purposes. Due to these concerns regarding IP and copyright, we have developed an innovative idea called "**Silent Pixel Code"**: a steganography system that helps authors control their artworks. This system can be incorporated at the moment of media creation in cameras, AI, or editing software. The idea goes beyond creators, with ambitions to generate law enforcement forensic tools and general public AI detection apps. Currently, this technology is still in development, and its adoption is voluntary.

The figure illustrates the concept of "Silent Pixel Code," a steganography-based system designed to address intellectual property concerns in AI training. It depicts how the technology can be integrated into media creation tools, offering creators control over their work. Furthermore, it highlights the potential for developing forensic tools for law enforcement and detection apps for public use, all stemming from this innovative approach to embedding invisible control signals within digital media.

Specifically, key issues revolve around:

Copyright Infringement: Does the act of copying and using copyrighted material as training data constitute copyright infringement? Legal

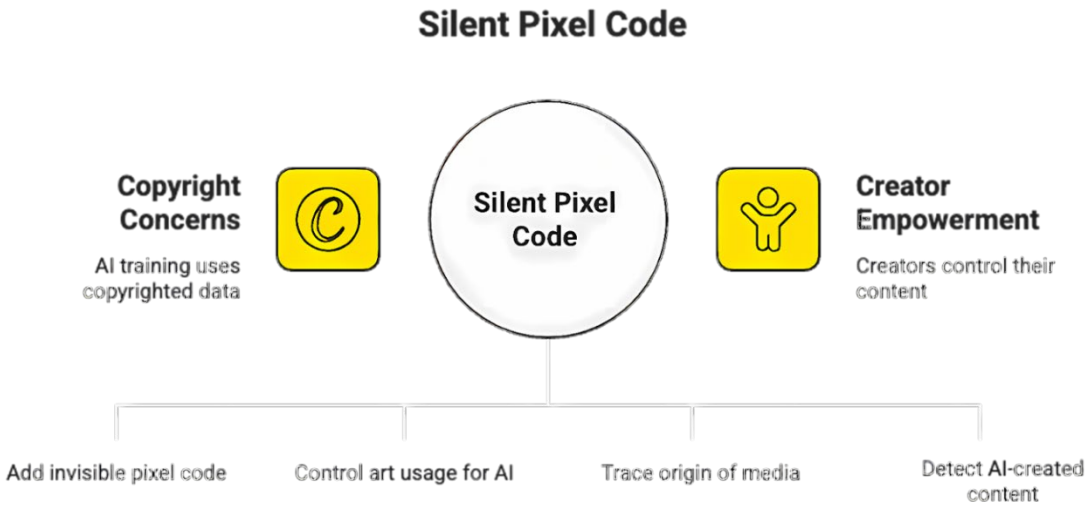


Figure 1: Overview of the "Silent Pixel Code" system for copyright protection and AI content detection.

frameworks differ across jurisdictions, and the application of traditional copyright exceptions such as "fair use" or "fair dealing" to LLM training is still being actively debated and litigated.

Derivative Works: Could the output generated by an LLM be considered a derivative work of the copyrighted material it was trained on? If so, who holds the rights to this output: the model developer, the user, or the original copyright holder?

Attribution and Licensing: What are the obligations, if any, to attribute the sources of the training data? How do existing licenses of the training data interact with the use in LLMs and the generated output?

Transparency and Documentation: How transparent should the training data used for LLMs be? What level of documentation is necessary to understand potential intellectual property (IP) risks and comply with legal requirements?

Addressing these complexities is crucial for fostering innovation in the field of AI while respecting the rights of creators. Clear legal frameworks, industry best practices, and technological solutions, such as the Silent Pixel Code, are needed to navigate these uncharted waters and ensure the responsible development and deployment of LLMs.

Stakeholders in the IP and Copyright Issues of LLM Training Data:

Primary Stakeholders:

These stakeholders are most directly and significantly impacted by the issues and are crucial for the development and adoption of any solutions.

Creators & Rights Holders:

- Writers
- Artists
- Publishers
- Film and Television Producers
- Musicians

Legal & Regulatory Bodies:

- Copyright Offices
- Legislators and Policymakers
- Courts and Legal Systems

Secondary Stakeholders:

These stakeholders have a significant interest in the issues and can play a vital role in shaping the landscape.

Technology & Infrastructure Providers:

1. Dataset Providers and Aggregators
2. Video / Phone Camera Manufacturers
3. AI Video Companies
4. Editing Software Companies

User Groups & Public Interest:

- General Public
- Researchers and Academics (Using LLMs)
- Businesses Utilizing LLMs
- Civil Liberties and Digital Rights Organizations

Other Potentially Affected Parties:

These stakeholders may be affected by the issues or involved in related services.

- Content Licensing Platforms
- Intellectual Property Lawyers and Consultants
- Insurance Companies

Challenges and Gaps in Addressing IP and AI-Generated Content

To establish a solution to this problem, a system like the Silent Pixel Code must overcome a range of obstacles and bottlenecks.

General Challenges

Big Tech Opposition: To mitigate opposition, emphasize the system's benefits in fostering trust, transparency, and a fair ecosystem for AI development. Highlight how it can reduce legal uncertainty and encourage content creation. Advocate for industry standards and collaborative development with key players, including technology companies, to ensure wider adoption.

Specific Obstacles and Solutions for Silent Pixel Code

- **Solving the Technology Gap (Lack of Creator-Centric IP Control Technology):** The Silent Pixel Code directly addresses this gap by offering a technology for creators to embed and manage IP consent. Focus on user-friendly design and accessibility to ensure creators of all technical skill levels can utilize the system.
- **Enhancing Public Identification of AI-Generated Content (Limited Public Capacity to Identify AI-Generated Material):** The App Visual Verification tool directly tackles this by providing an easy way for the public to identify AI-generated content. Educational initiatives can further enhance public awareness and understanding of the system.
- **Empowering and Incentivizing Creators:** The Silent Pixel Code empowers creators by providing a direct technological tool for IP control and management. The system is designed to seamlessly integrate with micro-payment systems or licensing platforms, ensuring fair compensation for the use of content in AI training.

To enable widespread implementation, the initiative will support the development of open-source libraries and affordable software tools. Furthermore, it will foster the formation of creator alliances and organizations to advocate for the adoption of these technologies and fair IP practices within the industry.

Summary of the Silent Pixel Code Approach

The Silent Pixel Code offers a targeted solution to these complex challenges. By providing a creator-centric technology, enhancing public awareness, and empowering creators to control and monetize their IP, the system lays the groundwork for a more ethical and sustainable future for AI and creative content.

Our New Vision

The core issue is that current metadata practices (such as copyright notices) are often overridden by a platform’s terms of service, leading to ambiguity about the proper use and licensing of media used to train AI models.

To address this, we propose a new approach centered on a Silent Pixel Code system for AI media source verification. This system aims to embed IP information and licensing details directly into media files in a way that is persistent and verifiable

Key Components:

Silent Pixel Code Definition: "Silent Pixel Code" refers to a method of embedding IP information and license types (allowing or disallowing AI use, specifying usage terms) directly within the media data itself, potentially using steganography or advanced video/image compression techniques. This goes beyond traditional metadata, aiming for a more robust and tamper-proof solution.

Implementation Areas:

- **Software Embedding:** End-user software will allow creators to generate and embed

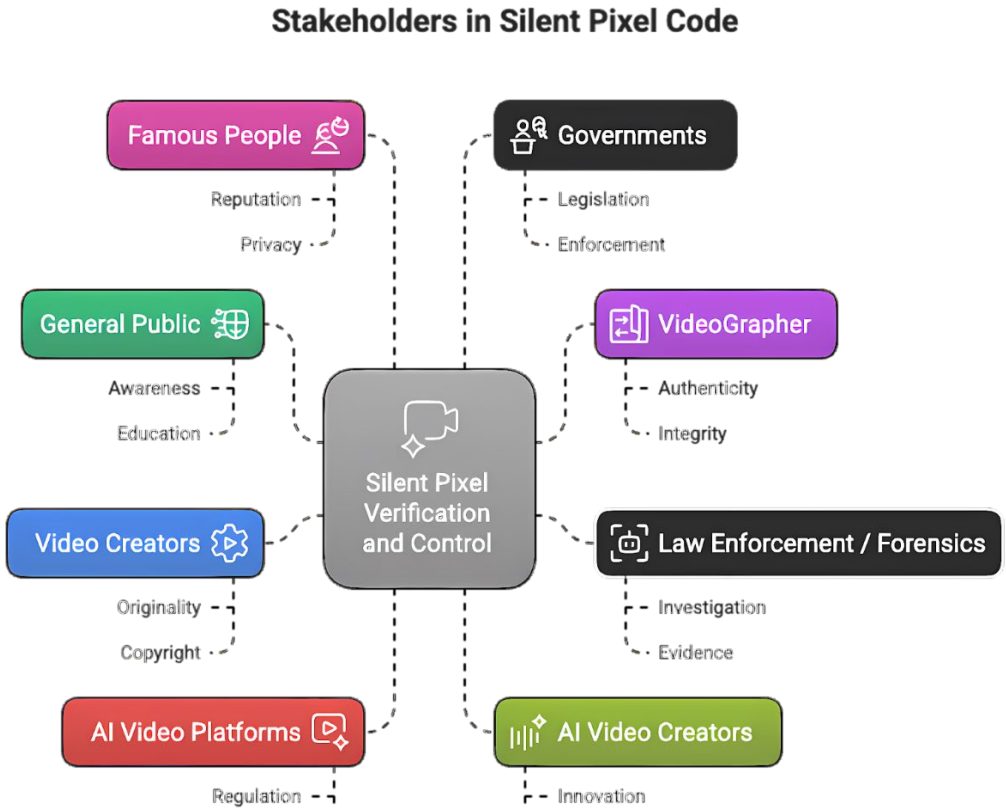


Figure 2: Silent Pixel Code Implementation Ecosystem

- **AI-Generated Media:** All media generated by LLMs will automatically include the "Silent Pixel Code" containing information about its AI origin and any relevant usage restrictions. This allows for easy identification and tracking of AI-created content.
- **Camera Integration (Mobile and Dedicated):** During the image or video capture and compression process within cameras, the "Silent Pixel Code" will be embedded. This ensures that original source material has IP and usage information from the point of creation.

This diagram illustrates the comprehensive ecosystem for embedding and tracking the Silent Pixel Code. It shows how the code is integrated at different stages of media creation—from AI generation and camera capture to creator-driven software embedding. The central IP Silent Pixel Code Generator acts as the secure backbone for authentication and managing licensing data.

the "Silent Pixel Code" into their existing media files. This provides a tool for creators to protect their work regardless of the creation method.

- **IP Silent Pixel Code Generator (Key Server):** A centralized server will act as an "IP Silent Pixel Code Generator," potentially managing encryption keys and authentication processes related to the "Silent Pixel Codes," especially in cases requiring secure licensing or usage control.

Verification Mechanisms:

Forensic Software: Specialized forensic software will be available for law enforcement and legal professionals to retrieve more detailed data from the "Silent Pixel Code," potentially including creation history, ownership chains, and licensing agreements.

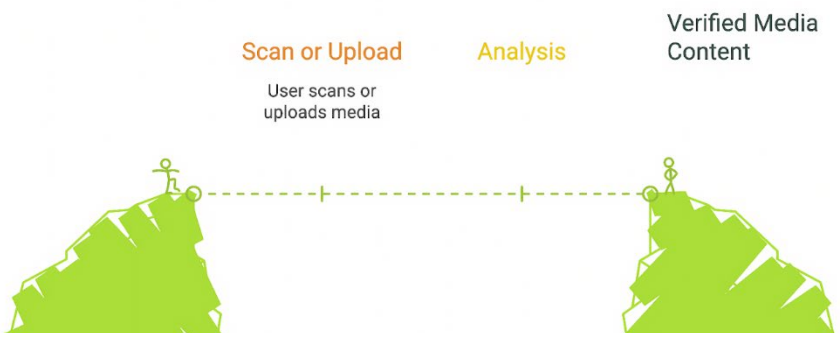
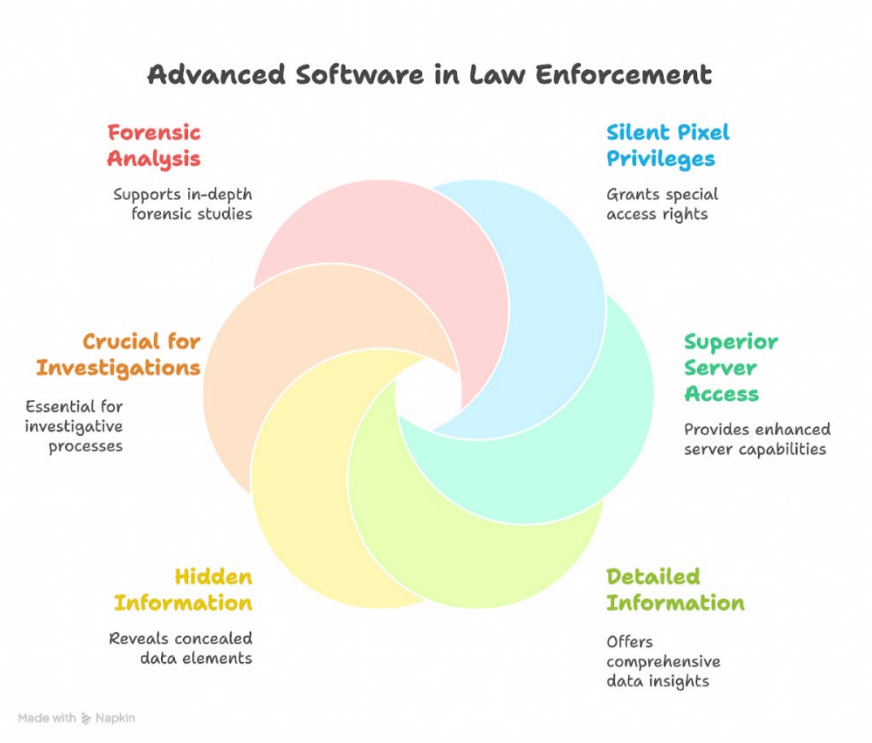


Figure 3: User can use your phone to scan a video or upload to the website for verification.

App or Software Verification: A user-facing mobile application will allow individuals to scan or analyze media to visually verify the "Silent Pixel Code" information, revealing details about the source, IP rights, and allowed usage. Also, an upload option for web based will be available. This empowers the general public to identify AI-generated content and understand usage rights.



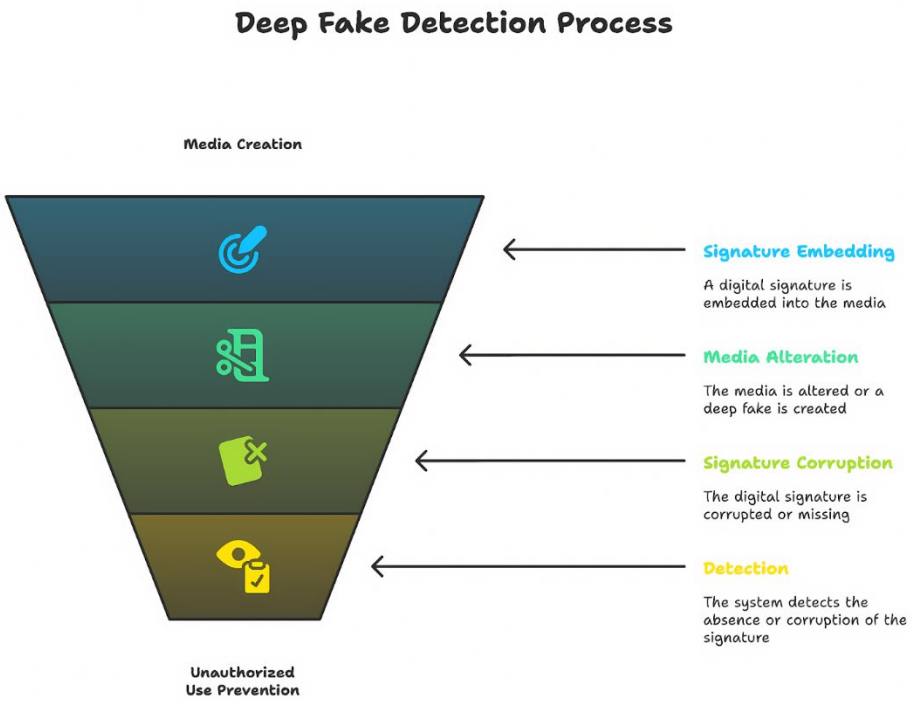


Figure 4: The S

Figure 5: Silent Pixel for Fake news and Deep Fake Detection

Examples

1. Deep Fake Detection & Prevention

This feature focuses on combating the misuse of AI-generated media. Our system would embed a hidden digital signature or watermark into videos and images at the time of creation. This signature is invisible to the human eye but detectable to the system. If the media is altered to create fake news, the signature will be corrupted or missing.

2. IP Control on Streaming Platforms

This feature provides a robust method for content creators and platforms to manage and protect intellectual property. The system embeds metadata — such as creator identity and rights information — directly into the media file using steganography.

This feature addresses the need for transparency and accountability in the creation of AI-generated content. Your system would embed a unique identifier into every video created by AI tools. This identifier would link the content back to the specific AI model or software used to create it.

Potential benefits of Silent Pixel Code

Enhanced IP Control for Creators:

Creators gain granular control over their intellectual property in the AI era. The 'Silent Pixel Code' system empowers them to:

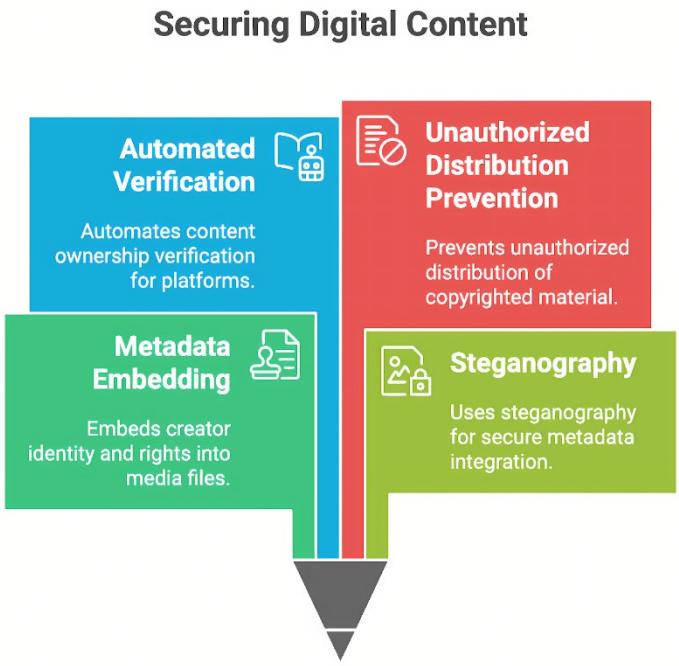


Figure 6: A system capable of giving the creator the ability to control the use and distribution of the media.

- Explicitly define usage rights for their content, including whether or not it can be used for AI training,
- Embed licensing information directly into their creations, ensuring clarity and preventing unauthorized use,
- Track the potential usage of their content through verification tools and forensic analysis, and
- Potentially participate in new economic models that compensate them for the use of their content in AI development.

Increased Trust and Confidence:

Large Language Model (LLM) developers can foster greater trust and confidence among both the public and content creators by adopting the Silent Pixel Code system. This leads to:

- Increased transparency about the data used to train AI models, addressing concerns about unauthorized usage and copyright infringement,
- Demonstrated commitment to respecting creators' rights, can improve public perception of AI technology,
- Stronger relationships with creators, potentially leading to collaborations and access to higher-quality training data, and
- Reduced legal uncertainty and the risk of costly litigation related to IP disputes.

Improved Traceability and Provenance:

Integrating the Silent Pixel Code system into cameras (both mobile phone and dedicated) provides enhanced traceability and provenance for media content from the point of creation. The technology can:

- Enable the establishment of a clear chain of origin for images and videos, making it easier to verify authenticity and ownership,

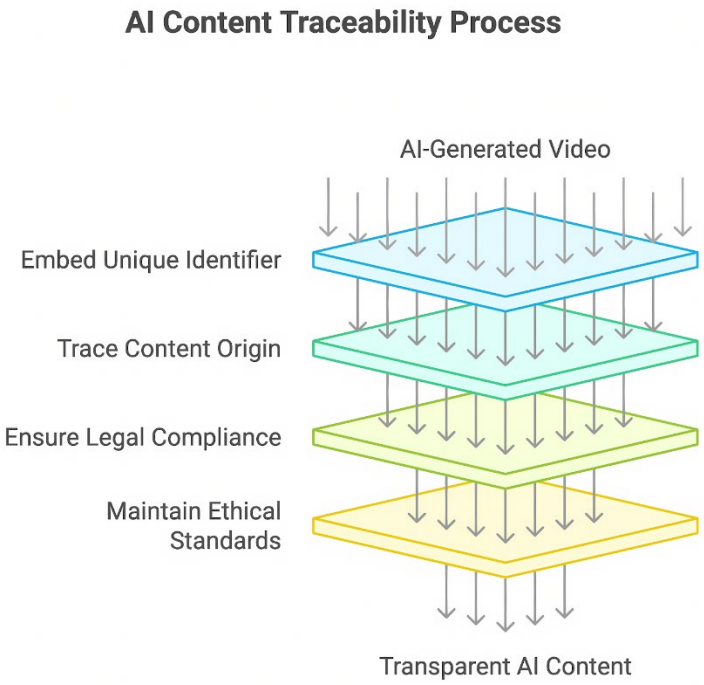


Figure 7: Origin Identifier system integrated to ai video generators.

- Deter the misuse of media, as the origin can be traced, which is particularly important for combating the spread of misinformation and deepfakes,
- Provide valuable information for law enforcement in investigations involving the use of media as evidence, and
- Create opportunities for new features and services related to media rights management and licensing directly within camera devices.

Potential Risks and Mitigations:

Risk: Technical Vulnerabilities and Circumvention:

Description: The Silent Pixel Code, whether embedded through steganography or compression techniques, might be vulnerable to sophisticated methods of detection and removal or alteration. Malicious actors could develop tools to strip the code, rendering it ineffective.

Mitigation:

- **Robust Encoding:** Employ strong and constantly evolving encoding methods (steganographic algorithms, advanced compression watermarking) that are difficult to detect and remove without significantly degrading the media quality.
- **Multi-Layered Embedding:** Consider embedding the Silent Pixel Code in multiple layers or using redundant encoding techniques to increase resilience against removal attempts.
- **Regular Updates and Security Audits:** Continuously update the encoding algorithms and conduct regular security

audits to identify and address potential vulnerabilities.
- **Key Management Security:** If encryption keys are used for authentication, ensure robust security measures for their generation, storage, and management within the "IP Silent Pixel Code Generator".

Risk: Adoption Barriers and Lack of Universal Implementation:

Description: The effectiveness of the system relies on widespread adoption by creators, technology platforms (LLM companies, social media), operating systems, and camera and phone manufacturers. Lack of universal implementation would limit its utility.

Mitigation:

- **Industry Standards Advocacy:** Actively work with industry bodies and standardization organizations to promote the Silent Pixel Code as an open standard.
- **Incentivize Adoption:** Offer incentives (e.g., certifications, preferential treatment on platforms) for creators and companies to adopt the system.
- **Ease of Integration:** Design the system with easy-to-use tools and APIs for seamless integration into existing software, operating systems, and hardware.
- **Public Awareness and Education:** Educate creators and the public about the benefits of the Silent Pixel Code to drive demand and encourage adoption.

Risk: Performance Overhead and File Size Issues:

Description: Embedding the Silent Pixel Code, especially using complex techniques, could potentially increase file sizes or introduce performance overhead during media processing (encoding, decoding, playback).

Mitigation:

- **Efficient Algorithms:** Develop highly efficient encoding and decoding algorithms that minimize file size increases and performance impact.
- **Adjustable Embedding Levels:** Allow creators to choose different levels of robustness for the Silent Pixel Code, potentially trading off some resilience for smaller file sizes or lower overhead.
- **Hardware Acceleration:** Explore hardware-level integration in cameras and other devices to offload the processing of the Silent Pixel Code and minimize performance impact.

Risk: Privacy Concerns:

Description: Embedding information within media files could raise privacy concerns if the Silent Pixel Code contains personally identifiable information (PII) or tracking data beyond IP and licensing.

Mitigation:

- **Privacy-Centric Design:** Ensure the Silent Pixel Code primarily focuses on IP and licensing information and avoids embedding unnecessary PII.
- **Transparency and Control:** Provide creators with clear information about what data is embedded and give them control over this information.
- **Data Minimization:** Only embed the minimum amount of data necessary for IP protection and verification.
- **Compliance with Privacy Regulations:** Adhere to relevant data privacy regulations (e.g., GDPR, CCPA) in the design and implementation of the system.

Risk: Legal and Interpretational Challenges:

Description: The legal implications of the Silent Pixel Code, such as its legal standing in

copyright disputes or its enforceability across different jurisdictions, might be unclear initially.

Mitigation:

- **Legal Consultation and Framework Development:** Engage with legal experts early in the development process to establish a clear legal framework and address potential interpretational challenges.
- **International Standardization Efforts:** Work towards international recognition and standardization of the Silent Pixel Code to ensure its legal validity across borders.
- **Clear Licensing Language:** Provide clear and standardized language for the licensing information embedded in the Silent Pixel Code.

Risk: Evolving AI Technology:

Description: As AI technology advances, new methods for generating and manipulating media might emerge that could challenge the effectiveness of the Silent Pixel Code.

Mitigation:

- **Continuous Research and Development:** Invest in ongoing research to adapt the Silent Pixel Code system to new AI advancements and develop more resilient embedding and detection techniques.
- **Collaboration with AI Research Community:** Engage with the AI research community to stay informed about emerging threats and potential solutions.

Next Steps

Stakeholder Engagement and Buy-In: Present the Silent Pixel Code to creators, LLM companies, tech manufacturers, and legal experts to gather feedback and build support.

Technical Development: Conduct feasibility studies, refine algorithms, and begin prototyping software and hardware components of the system.

Legal and Standardization: Analyze legal implications, explore frameworks, and initiate discussions with standardization bodies to establish a strong foundation.

Pilot Programs: Conduct controlled tests and beta programs with creators and users to evaluate effectiveness and gather real-world feedback.

Secure Resources: Pursue funding and partnerships to support the development, implementation, and wider adoption of the "Silent Pixel Code".

Author (In order of contribution)

Johnny Aguirre, Ekrome Founder
Johnny is an experienced professional across various industries and technologies, currently focused on building a startup that provides AI solutions for small businesses.

For more information about the Coalition for Innovation, including how you can get involved, please visit coalitionforinnovation.com.

View the Next Chapter