



5th JPEG NFT and Fake Media Workshop

JPEG June 30th 2022

- **14:00 Welcome & Introduction**
Sabrina Caldwell, Australian National University
- **14:10 Decentralized Content Identification**
Titusz Pan, Craft
- **14:30 eID solutions in Self-Sovereign Identity (SSI) ecosystems**
Catherine Fankhauser, SICPA
- **14:50 The European Regulation on eID and trust services move toward self-sovereign use of identities**
Sylvie Lacroix, SEALED
- **15:10 Panel discussion**
Moderator: Touradj Ebrahimi, EPFL



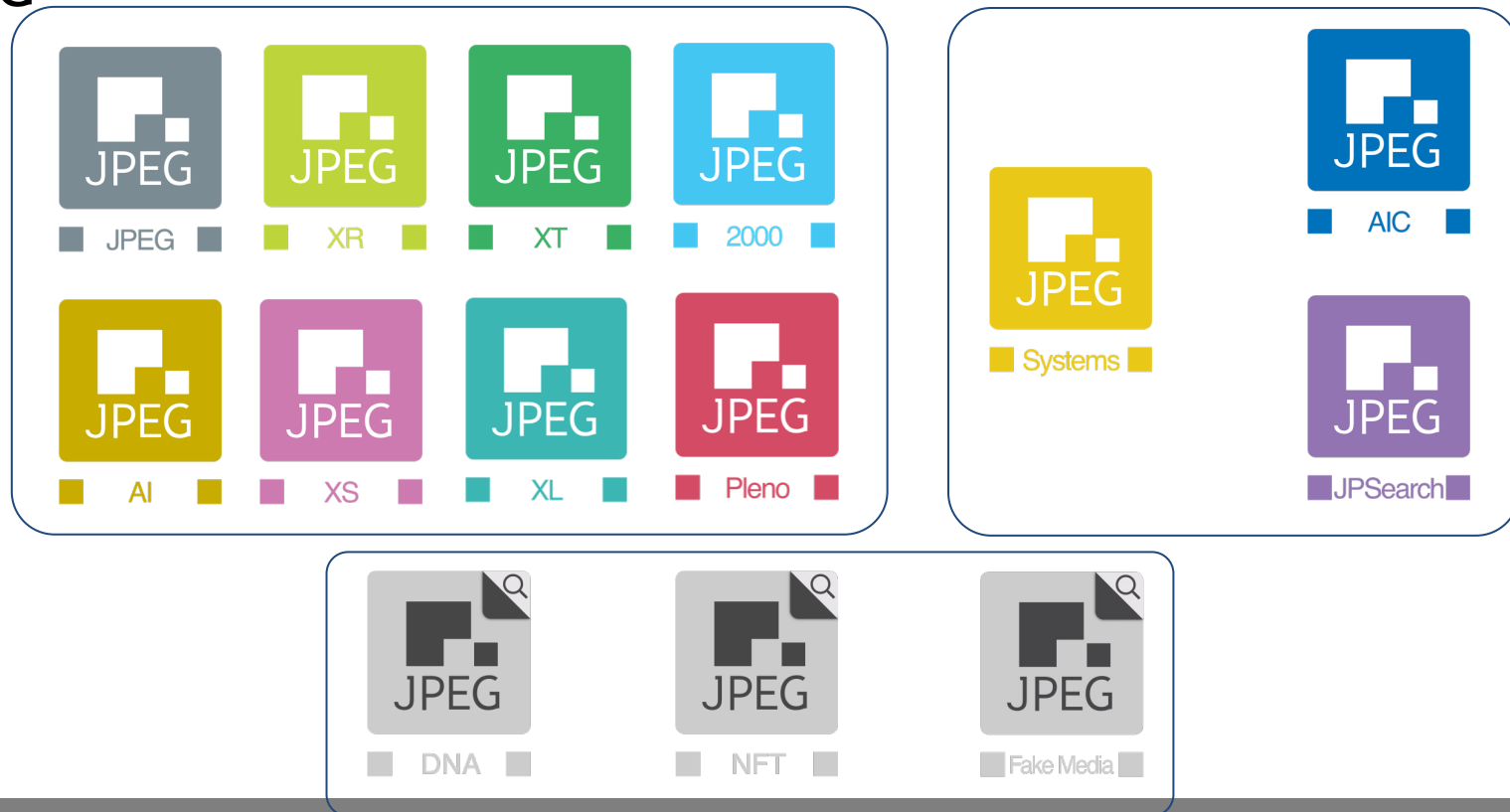
JPEG activities in Fake Media and NFTs with common challenges and issues

5th JPEG NFT and Fake Media Workshop
30th of June 2022

Sabrina Caldwell
Frederik Temmermans, Fernando Pereira, Touradj Ebrahimi



The JPEG Family of Standards





Standardization Roadmap

Inform and engage
stakeholders

Collect relevant use
cases

Assess and organize
use cases

Define and cluster
requirements from
use cases

Define appropriate
performance
assessment processes
and metrics



**Issue a Call for
Proposals**



Standardization Roadmap

Inform and engage
stakeholders

Collect relevant use
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■ NFT ■

Assess and organize
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■ Fake Media ■

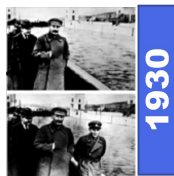
**Issue a Call for
Proposals**

History of media manipulation



Abraham Lincoln

Lincoln's head was added on top of southern politician John Calhoun's portrait.



Joseph Stalin

Leaders remove people (from the images) whom they no longer wanted to associated.



Canadian PM

William Lyon Mackenzie King removes King George VI from a photo with Queen Elizabeth to portray himself more powerful.



Soviet Soldiers

Russian magazine removes the watches from soldiers' wrists to ensure that their readers don't think the soldiers were looting.



Oprah Winfrey

TV guide edited the cover image where they used Oprah's head on the body of Ann-Margaret.



OJ Simpson

Time magazine edited OJ Simpson's image after his arrest and made it darker and more sinister. Actual one was displayed in News Week.



Iranian Missiles

The doctored image was released by the Iranian Government to show successful launch of four missiles when only three were successful.



Deepfake Tom Cruise

Near realistic deepfake of Tom Cruise indicates the potential of AI based media manipulation. Image courtesy: Belgium VFX specialist Chris Ume.

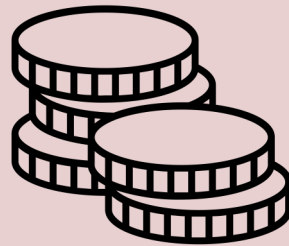
The impact of media manipulation



Political



Social



Economic



Media modifications for creative applications





JPEG Fake Media Scope



Fake Media

- The scope of JPEG Fake Media is the **creation of a standard** that can facilitate the **secure and reliable annotation** of media asset **creation** and **modifications**.
- The standard shall support usage scenarios that are in **good faith** as well as those with **malicious intent**.

Modified Media

*Nothing to hide, transparency
'Good' purpose/intention*



Modified Media

*Hiding is essential !
'Bad' purpose/intention*

JPEG Fake Media Use cases

Misinformation and disinformation	Forgery/Media forensics	Media creation	Media modification
<ul style="list-style-type: none"> • Media usage in breaking news • Deepfake detection • Content authenticity checking • Content usage tracing • Fraud in academic research • Photographic framing 	<ul style="list-style-type: none"> • Insurance fraud • Mileage reporting photo • Photo for cost charge • Evidence of trial • Media sharing on social media • Credibility of AI training image data sets 	<ul style="list-style-type: none"> • Movie special effects • Media transcoding • Chroma keying or silhouette extraction 	<ul style="list-style-type: none"> • Image colorization and restoration • Photo editing



JPEG Fake Media Requirements



Fake Media



Media creation and modification descriptions



Metadata embedding and referencing



Authenticity, integrity, and trust model



NFT in a nutshell

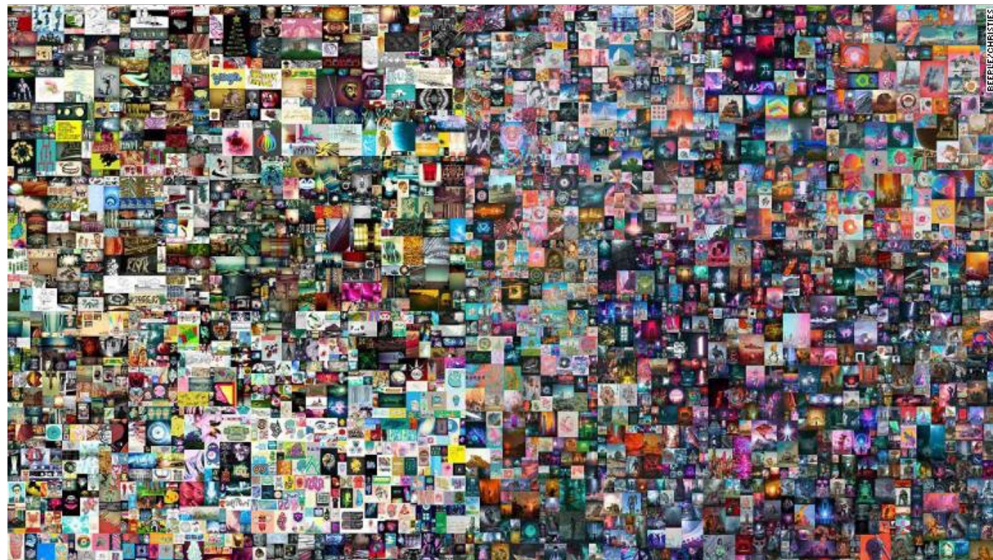
- **Non-Fungible Token**
 - Fungible: mutually interchangeable
e.g. currency
 - Non-Fungible: not interchangeable
e.g. a painting
- Brings the notion of non-fungible physical assets into digital world
- Use of decentralized architectures enables zero trust digital assets transactions
- Use of smart contracts opens new dimensions in digital assets transactions





Use cases

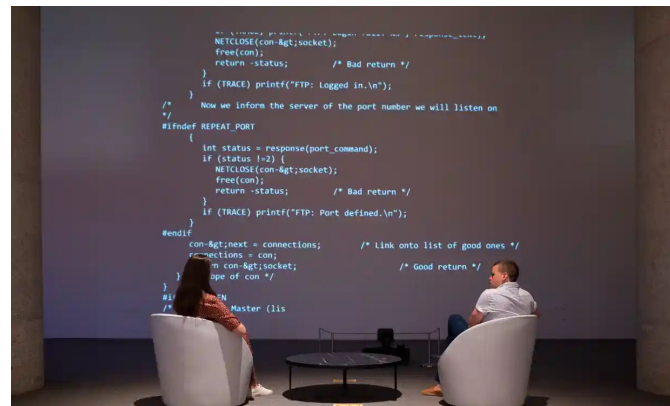
NFT sales hit \$2 billion in first quarter 2021¹



Beeple's "The First 5000 days" sold for \$69m



10y old "Nyan Cat" meme sold for \$590k



Berners-Lee's www source code sold for \$5.4m

1. <https://www.cnbc.com/2021/04/13/nft-sales-top-2-billion-in-first-quarter-with-interest-from-newcomers.html>



Use cases

- Digital twins or replica of physical assets



Burned Banksy original art



The ABBA chair Andrés Reisinger



Use cases

- Virtual object for VR/AR/XR



Mars House Kista Kim or Mateo Sanz Pedemonte



Atari 3D Sneaker NFT



Challenges in NFTs

- **Lack of interoperability** between solutions offered between NFT services
- **Long-term viability and reliability** of NFTs
- **Lack of security** in NFT certificate binding to digital assets
- **Best practices** for digital assets
- **Trustable and decentralized storage** of digital assets
- **Legal framework**





Fake Media and NFT Synergies

- Investors in NFTs are surely interested in the **trustworthiness** of the media they invest in
- NFTs provide an immutable record of a media transaction and hence also an **immutable record** in the **media provenance** chain
- **Interoperable metadata:**
 - Embedding and referencing
 - Secure and bilateral linkage between metadata and media content
- **Identification of assets and actors**
 - Perceptual hashes and visual media descriptors provide a solution to challenges in both NFT and Fake Media



Thank you!

- **Key contacts**

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- Sabrina Caldwell, sabrina.caldwell@anu.edu.au
- Fernando Pereira, fp@lx.it.pt
- Touradj Ebrahimi, Touradj.Ebrahimi@epfl.ch

- **JPEG Fake Media and JPEG NFT information and documentation**

- <https://jpeg.org>