UNDERSTANDING NON-FUNGIBLE TOKENS AND THE INCOME TAX CONSEQUENCES

Elizabeth F. Morton[1]*, Michael F. Curran*[2]

Abstract[3]

The explosion of non-fungible token activity in 2021 highlighted a growing prevalence of a form of cryptoasset with functionality distinct from cryptocurrencies such as Bitcoin. Rather than being limited to a means of payment or investment, non-fungible tokens (NFTs) offer a broad variety of use cases which, in turn, requires further understanding of the principles of Australian taxation law. This paper examines a multitude of income tax issues that can arise in respect of NFTs, both on capital and revenue account. It examines the characterisation of NFTs pursuant to the capital gains tax regime for both business and non-business taxpayers, with particular focus on the applicability of the regime's "collectables" and "personal use assets" categories. The paper then raises a number of issues specific to business taxpayers and the issues therein.

Keywords: Cryptoassets, Non-Fungible Tokens, Capital Gains Tax, Collectables, Personal Use, Trading Stock, Depreciation, Royalties.

1. INTRODUCTION

Increasingly, we are seeing hype cycles of newly minted NFTs. In the first half of 2021, for example, we saw Jack Dorsey, founder of Twitter, turning his first message from March 2006 into an NFT (Reichert, 2021); we saw numerous pieces of artwork sell via Christie's, as well as artists selling albums as NFTs (Reichert, 2021), and then, "Charlie's last bite", a viral YouTube video, was removed from YouTube and sold as an NFT for US$760,999 in May 2021 (Telford, 2021). However, NFTs have been in existence since 2017 with, for example, CryptoPunks (Larva Labs, n.d.)[4] and CryptoKitties (CryptoKitties, n.d.-a) yielding substantial media attention and trading activity. Khezr and Mohan (2021) define NFTs as "units of data stored on a blockchain to certify the originality of various digital properties, such as music, digital art and video" (p. 2). More simply, they can be described as data that is stored on a digital ledger (Australian Taxation Office [ATO], n.d.-e), is unique, and lacks interchangeability when compared to Bitcoin and other altcoins. Khezr and Mohan (2021) describe NFTs as enabling "new versions of traditional market institutions" (p. 2). NFTs are a form of virtual property.

With the growing interest in and use of blockchain tokens beyond cryptocurrencies, there is a need to clarify the tax treatment in terms of their characterisation, not merely as a digital means

[1] Senior Lecturer (School of Accounting, Information Systems and Supply Chain) and Research Fellow (RMIT Blockchain Innovation Hub), RMIT University, Melbourne, Australia. Email: elizabeth.morton@rmit.edu.au
[2] Lawyer, Barrister, Victorian Bar, Australia. Email: Michael.Curran45@gmail.com
[3] The initial analysis was conducted in 2021 for an earlier draft of this paper. The paper was accepted by the Journal of Tax Administration in March 2023.
[4] In August 2021, the media reported that Visa purchased a CryptoPunk as part of their collection of commerce artefacts (Chipolina, 2021).

of payment or investment, but as something that carries intrinsic meaning and utility. Until a couple of years ago, Australian taxation guidance has been silent about NFTs (ATO, n.d.-d). This paper explores the Australian income tax consequences arising from NFTs, particularly in terms of the distinction between Capital Gains Tax (CGT) assets that fit the definitions of "collectable" and "personal use asset" found in the Income Tax Assessment Act 1997 (Cth) (hereafter "ITAA97"), as well as a number of issues pertaining to business taxpayers. To do so, however, requires an appreciation of *what* NFTs represent and to *whom*.

The relevance of examining NFTs is threefold. Firstly, substantial focus has been given to cryptocurrencies such as Bitcoin. This can be contrasted with NFTs, which can capture anything from comparable investments to gaming and artwork. Without considering blockchain technology specifically, the ATO has already been concerned with whether CGT consequences for collectables and artwork are being captured correctly.[5] Moreover, there has been substantial growth in crypto-related activities by Australian taxpayers. In 2019, the ATO estimated that between 500,000 and one million Australians were investing in cryptoassets (ATO, 2019) and, in 2021, in what is known as the Bragg Report, the Select Committee on Australia as a Technology and Financial Centre noted that as many as 25 per cent of Australians may have held or be holding cryptoassets (Commonwealth of Australia, 2021). According to the Bragg Report, these figures make Australia one of the biggest crypto adopters per capita (Commonwealth of Australia, 2021). Regardless of the specific number of crypto adopters in the nation, the government has crypto-related activities on its radar as an area of concern and has questioned whether taxpayers are meeting their tax compliance requirements (ATO, 2019; see, for example, ATO, n.d.-c).

There is an increasingly broader—or infinite—treatment and series of use cases for NFTs. Virtual worlds offer alternative realities where NFTs can be utilised in a range of ways, whether for displaying artwork in digital galleries, in gaming (such as via "Axie Infinity" creatures), or through trading (for example, "NBA Top Shots"), to name a few. With this ability to offer a unique, potentially valuable digital asset, we need to appreciate more specifically the activity and treatment of NFTs, as well as the consequential variation in income taxing implications. As such, this examination explores the shift towards digitally native assets.

Such an exploration will offer insight into policy directions in terms of taxing regimes, with a particular focus on Australia. This approach is in line with Cooper's (2015) caution about adding to an already complex "jigsaw" of tax regimes that may already be unnecessarily over-engineered.[6] Reflecting on Cooper's (2015) work, this paper contemplates the balance between existing provisions adequately capturing the tax consequences of novel digital assets, i.e. being fit for purpose, and whether there are points of difficulty that can be resolved through targeted reform. This reflects Cooper's (2015) position comparing broad overlapping regimes with focussed rules that resolve gaps or absences in the law, or that reverse or supplant existing law, that may be considered inappropriate.[7] In doing so, this paper aims to appreciate differences, exemptions, and priorities.[8] This reflects the Bragg Report, which recommends that "the Capital Gains Tax (CGT) regime be amended so that digital asset transactions only create a

[5] See, for example, ATO (n.d.-d); Commissioner of Taxation, Australian Tax Office (2016); C. Evans et al. (2018).
[6] See Cooper (2015), at pp. 783 and 786. He outlines six structural "flaws" in tax reform, particularly with respect to regimes such as CGT and fringe benefits tax (FBT) and the potential overlapping and excessively broad approach (p. 788).
[7] See Cooper (2015), pp. 789–90.
[8] See Cooper (2015), p. 799.

CGT event when they genuinely result in a clearly definable capital gain or loss" (Commonwealth of Australia, 2021, vii). This could be via a new category of CGT asset or new CGT event. To do so requires an understanding of the variety of *what* NFTs are, how they may be constructed, and to *whom* they belong.[9]

This paper is structured as follows. In section 2, the context in which NFTs operate is outlined. This includes key attributes of NFTs as distinct to other cryptoassets, with particular focus on the NFT standards and metadata. In section 3, the Australian income tax issues for NFTs are detailed. Firstly, an overview of the levels of complexity experienced by taxpayers is provided, then the ATO guidance is detailed. The paper then goes on to examine income tax issues with respect to those taxpayers who would characterise their holdings as being on capital account and those who would characterise their activities as business activities. The analysis is brought to a close with final considerations in section 4.

2. NFTS CREATE UNIQUENESS AND SCARCITY THROUGH BLOCKCHAIN TECHNOLOGY

NFTs, unlike traditional cryptocurrencies, are not simply seeking to operate as a form of digital, programmable "money" or "currency". They enable a broad range of pursuits and activities, whether for speculation or investment, or for hobby, artistic, recreational, or gaming pursuits. This is because they are cryptographic tokens which represent something unique rather than being homogenous (i.e. fungible) like the more traditional forms of cryptocurrency.

The Ethereum blockchain was the first blockchain to create the ability for NFTs to be issued through the introduction of smart contracts (Chevet, 2018; Srinivasan, 2017). NFTs such as CryptoKitties gamify some of the key features of blockchain (i.e. decentralisation, transparency, and immutability) and the use of smart contracts to keep track of the mechanics of a game, program, or campaign to create a safe digital display case for "collectibles". Moreover, NFTs enable fractional ownership of assets, therefore broadening the scope of ownership of art and collectables.[10]

In the following subsections, we explore the characteristics underpinning NFTs that are necessary to understand and interpret the income tax implications. In particular, we outline what NFTs represent, their dynamic and unique nature, the ways in which metadata storage can operate, and how NFTs can break down the traditional walls of virtual reality and gaming. These factors impact the way in which we characterise NFTs on capital account (i.e. CGT assets and CGT events) and on revenue account.

2.1. Provenance and Protection

Blockchain technology enables the provenance, scarcity, and protection of digital assets. Traditionally, digital goods have suffered from lack of scarcity due to copy and paste, and P2P capabilities, resulting in pervasive copyright infringements (T. M. Evans, 2019). T. M. Evans

[9] We largely restrict our examination to income tax consequences rather than those issues that arise beyond, such as goods and services tax (GST) issues, the interpretation of money and currency, sales to offshore consumers, electronic distribution platforms, and so forth. A multitude of such taxing implications have been examined. See, for example, Cameron (2020); de Zilva (2018); Emery (2016); Morton and Curran (2022a); Ram (2018); Richter et al. (2015).

[10] See, for example, Xie (2021).

(2019), for example, notes the ability of blockchain technology to enable "new ways to create, adapt, distribute, display, and perform literary and artistic works" (p. 230). Additionally, the second-hand market bolsters the adoption and retention of value of NFTs (Chevet, 2018).[11] The original NFT creator receives a return on the secondary market.[12]

This highlights the core benefit frequently associated with blockchain technology: provenance. NFTs create the ability to ensure the origins behind digital art, for example, thereby building credibility—or community.[13] Note, however, that this does not entirely prevent fraudulent versions being minted on blockchain nor illegitimate copies being spread across the internet (for example, someone may obtain a screenshot of an NFT or may possess a JPEG of a piece of artwork off-chain). What blockchain does enable, however, is the establishment of a certified original version of an artwork within a community (Khezr & Mohan, 2021). Khezr and Mohan (2021) summarise the value of NFTs as continuing:

> the time-honoured tradition of attributing value to artwork through the involvement of the artist, and an acknowledgement of the artist's creativity, rather than in the mechanical reproduction of the end product. The artist's cryptographic digital signature then replaces the traditional pencil or ink signature as the certifier of an original print. (p. 9)

However, as detailed further in subsection 2.4 of this paper, there is a need to appreciate what a purchaser acquires when buying an NFT, including the location of the metadata and control of access to that data (Khezr & Mohan, 2021). For example, at the time of analysis, Rarible (2020) stated within its terms and conditions that it retained the right to terminate access or use for any reason and did not commit to the endorsement of the quality or legitimacy of the work minted,[14] including its uniqueness and authenticity.[15]

As such, there is concern not only over the quality of the data itself, but also about the reliance of the provider managing the NFT, which is subject to alterations in both its offerings and the software that it deploys (Rarible, 2020).[16] It is necessary to understand not only the terms and conditions underpinning each unique NFT but also the community in which the NFT operates and the interoperability between communities.[17]

[11] At the time of analysis, OpenSea was the largest marketplace through which to buy and sell NFTs. Other platforms include Rarible, SuperRare, and Nifty Gateway.

[12] For example, at the time of analysis, in the Rarible marketplace, the creator could set the royalty percentage for secondary sales (Rarible, 2020). Please note that terms and conditions are subject to change. Royalties are discussed in subsection 3.4 of this paper.

[13] Marketplaces can also rely on verified badges to add a layer of authenticity to creators. See, for example, Rarible (n.d.).

[14] See, for example, Condition 3.5 (Rarible, 2020). Please note that terms and conditions are subject to change.

[15] See also Condition 2.3 and Condition 9.4 (Rarible, 2020). Please note that terms and conditions are subject to change. See also ATO (2019); Commonwealth of Australia, (2021).

[16] According to Rarible's (2020) terms and conditions, alterations to the DEX system, which is the software that it deploys on Ethereum, are subject to change (Rarible, 2020). However, it did indicate that it would respond to notices of alleged copyright infringement in accordance with the United States' Digital Millennium Copyright Act (1998)*:* see paragraph 4. It also outlined that the creation, selling, buying, or use of a "Collectible" that infringes on copyright, trademark, patent, trade secret, or other intellectual property rights is a prohibited use: paragraph 7.

[17] For example, NFTs created on Rarible can be viewed and managed on Opensea.io.

2.2. Non-Fungibility

Fungibility relates to interchangeability: one coin is equivalent to another (Shorish et al., 2021). Each NFT offers intrinsic and extrinsic value that is unique.[18] Of particular relevance to this paper are those akin to artwork or collectables, including those used within gaming contexts. An NFT can represent a unique still, moving, programmable,[19] or audio asset—often within a particular "universe"[20]—with a particular set of *attributes*. These have varying degrees of rarity and utility. Often, the universe or collection can make use of fungible tokens (i.e. cryptocurrencies), for example, to purchase add-ons to the particular NFT or to trade. Whilst being cryptographically secure,[21] the non-fungible nature—*uniqueness*, *scarcity*, and *demand*—drives value.[22]

For example, Hashmasks are a collection of 16,384 unique digital portraits (NFTs) on the Ethereum blockchain that went on sale at the beginning of 2021.[23] More than 70 artists globally were involved in their creation.[24] The portraits are of masked figures randomly distributed[25] to purchasers with five basic *explicit* characteristics varying in rarity (character, eye colour, item, mask, and skin colour) and *implicit* rarity (easter eggs, e.g. backgrounds, shirts, hairstyles, colours).[26] In addition, Hashmasks have an additional layer of uniqueness in the form of each portrait's name. The portraits are initially acquired unnamed (unless via a secondary market). Owners can name their portrait using a *name changing token* (NCT).[27] Hashmasks were one of the biggest contributors to NFT growth in January 2021, topping the list of collectables when they were launched (DappRadar, 2021).

In contrast, CryptoKitties is a blockchain-based game which was launched on the Ethereum blockchain platform in 2017. At launch, 50,000 "cats" were stored on the Ethereum blockchain—"Gen 0" or "Clock Cats" (The CryptoKitties Team, n.d.). Additionally, special ranges of CryptoKitties are available. For example, "Fancy Cats" allow for collaboration with influencers in order to create CryptoKitties incorporating custom art (The CryptoKitties Team,

[18] See, for example, Finzer (2020).
[19] Whereby the piece of artwork incorporates on-chain data that is programmable, thereby changing colours or other features: see Xie (2021).
[20] Such as the CryptoKitty universe, the "KittyVerse" (CryptoKitties, n.d.-c).
[21] CryptoKitties are a new category of intellectual property (IP), since they cannot be copied and therefore reduce the need for the courts of law. See Berg et al. (2018); Berg et al. (2019).
[22] See T. M. Evans (2019) on p. 219.
[23] All Hashmasks were sold within four days, making more than 7,600 in ether (approximately $10M). See Avan-Nomayo (2021); SaladChefs (2021).
[24] All identities are unknown (Hashmasks, n.d.-c).
[25] Owners only knew what they had received after the sale via a random mechanism on-chain (Hashmasks, n.d.-a).
[26] For example, Sanskrit, Moby Dick, and pieces of a jigsaw puzzle. See Hashmasks (n.d.-e); Malwa (2021). See also Twitter discussion feeds such as Nerd (2021) and spencecoin.eth (2021).
[27] An ERC20 token. When the portrait is initially purchased, 1,830 NCTs are received for a name change, but secondary market buyers rely on NCTs accumulating. The rate at which this occurs is 10 NCT per day, which can be saved and then spent on renaming the portrait (1,830 NCT per name change), i.e. half a year. See Hashmasks (n.d.-d). Some examples include "Satoshi Nakamoto", "Vitalik Buterin", "CSW is not Satoshi", "Eleven", "Blur", "COVID Economy", "XAEAXii", and "Mbappe": see 'Hashmasks (n.d.-b). The distribution of NCTs ends after approximately ten years, after which NCTs can only be burnt. Once there are no NCTs left, the artwork is considered "complete".

n.d.). There are now in excess of 15,000,000 CryptoKitties (The CryptoKitties Team, n.d.).[28] Each digital cat has a unique combination of common and rare attributes (Berg et al., 2018). Purchases and sales occur via smart contracts using ether and, once acquired, new cats can be bred "with exciting traits and varying levels of cuteness" (The CryptoKitties Team, n.d., p. 6). Each time a cat breeds, it takes longer for it to rest before it can do so again, therefore reducing the utility of that particular cat over time (The CryptoKitties Team, n.d.).[29] Once users have CryptoKitties, they can utilise extensions to add accessories or engage in the "KittyVerse" where community members have built a range of experiences (CryptoKitties, n.d.-c).

CryptoKitties is described as a self-sustaining community with scarcity and utility. By December 2017, sales had exceeded US$12 million (Young, 2017). Numerous high value trades were reported, some in excess of US$100,000 (CryptoKitties, 2018), and there were anecdotes of substantial amounts of money being made.[30] Furthermore, in the months after its release, CryptoKitties was reported to have slowed down trading on Ethereum ("CryptoKitties craze slows down transactions on Ethereum", 2017). However, this level of activity was short-lived and, throughout 2018 and 2019, usage dropped significantly.

From an income tax perspective, the ability of NFTs to offer unique, potentially valuable (and volatile) digital assets raises significant implications that are distinct from those raised by the more traditional cryptocurrencies, such as Bitcoin. Although traversing both capital and revenue considerations, we see it as pertinent to consider thoroughly the appropriate capital characterisation of NFTs as either CGT assets, collectables, or personal use assets. This could be from taxpayer activities relating to artistic interests or gaming interests, and could relate to young people. For the latter, this could be inadvertent because they do not understand that CGT assets are being acquired and disposed of, and therefore could cause tax compliance (and associated liability) issues for them. In this regard, there are core consequences for both the taxpayer and the revenue raising objectives of the government, such as exemptions and special rules with respect to cost base elements and losses.

2.3. Blockchain Standards for NFTs, Crypto Composables, and Dynamic Smart Contracts

NFTs can be viewed across different wallets due to their interoperability (Finzer, 2020). NFTs rely on unified standards relating to ownership, transfer, and access. Additional layers can then be added to this basic position (Finzer, 2020). This means that the basic operation of NFTs will

[28] The creators earn a percentage from each transaction conducted in the marketplace (3.75%) and, as a user, revenue from their own cat sales (The CryptoKitties Team, n.d.). It is estimated that Clock Cats are released every 15 minutes via CryptoKitty smart contracts (The CryptoKitties Team, n.d.).

[29] However, breeding is not free. According to CryptoKitties, breeding "two of your own cats together costs a flat rate of 0.04 ETH plus the transaction fee. Breeding with another player's Kitty costs the siring price set by that player, plus the 0.04 ETH breeding charge and the transaction fee" (CryptoKitties, n.d.-b). Such fees are subject to change. A transaction fee (or "gas") reflects payments made to miners on the Ethereum network to verify the transaction. The higher the price a user is willing to pay, the quicker the processing takes place.

[30] For example, see Liao (2017), where it states that one user acquired a CryptoKitty for 12 Ether (approximately US$4,800).

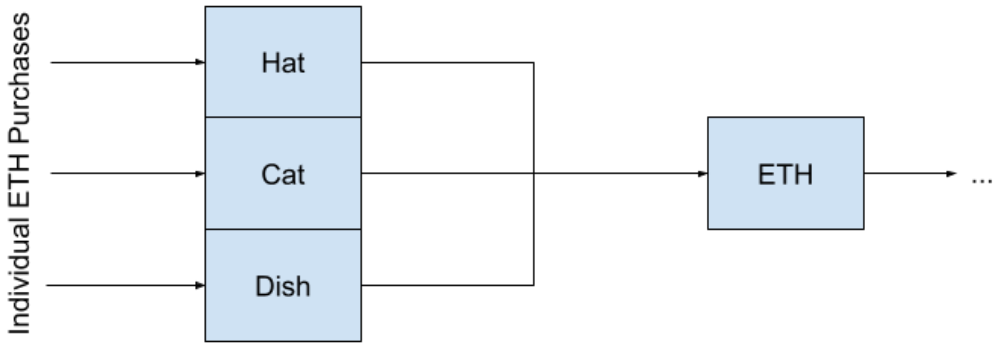
be consistent. The core standards for NFTs on the Ethereum blockchain include ERC721, ERC1155, and ERC998.[31]

ERC721 is the first NFT standard and the one on which CryptoKitties operates. It provides, among other things, a way in which to check who owns the NFT and a way to transfer that ownership (Finzer, 2020). For other pieces of digital art, NFTs are minted[32] through the unique pieces or series being uploaded onto platforms such as OpenSea or Nifty Gateway. Once "minted", the data is immutable through the entry onto the blockchain. ERC1155 enables semi-fungible tokens via classes of assets—for example, when there are 100 copies of a particular print available, each numbered 1/100, 2/100, 3/100 etc. (Finzer, 2020).[33]

The ERC998 standard enables NFTs to own their own cryptoassets (whether NFTs or fungible tokens), known as crypto composables (Chevet, 2018). This can be exemplified by CryptoKitties. NFTs can not only create child assets (breed new CryptoKitties), but can also be composed into complex sets and traded in a single transfer: "For example, a cryptokitty may own a scratching post and a feeding dish; the dish may contain some amount of fungible "chow" tokens" (Lockyer, 2018c).[34]

This adds a layer of complexity in terms of transacting (see Figure 1). The creators of CryptoKitties are powerless to prevent independent developments offering composables from being associated with their particular NFTs (Leland, 2018).

Figure 1: Crypto Composable Transactions



Source: Authors' depiction

The user must firstly acquire cryptocurrency to purchase NFTs (for example, as depicted in Figure 1, Ether is required in order to purchase CryptoKitties and their composables). Although these are separate tokens, the CryptoKitty represents the parent token, which has subsequently

[31] Note that NFTs are also emerging outside of the Ethereum blockchain. To add complexity and highlight the unique environment of blockchain, NFTS such as CryptoKitties can be turned into cryptocurrencies (i.e. fungible cryptoassets) as well. For example, Wrapped Kitties (WCKs) are "ERC20 tokens backed 1:1 by an ERC721 CryptoKitty" (Wrapped Kitties, n.d.). See also CoinGecko (n.d). Note: the ERC20 token standard is the Ethereum standard for fungible tokens (Smith et al., n.d.).

[32] Minting refers to tokenisation of the piece of work, i.e. creating the NFT on the blockchain. This is not, in itself, a sale but it is a creation. In contrast, the destruction of tokens is coined "burning".

[33] On pp. 9–10 of their paper, Khezr and Mohan (2021) discuss the superstition related to the ordering of editions, e.g. whether or not one of 50 is more valuable that two of 50. Note that ERC721 NFTs can be built with the ERC1155 standard (Finzer, 2020).

[34] At the time of analysis, composables could be purchased from, for example, *KittyHats*, which offered hats, apparel and accessories for CryptoKitties. As these are separate community developments, they are not necessarily lasting in line with the core CryptoKitty offerings.

obtained child tokens (a hat or dish). These three tokens now represent a set that can be transferred (or sold) in a single transaction: "You sell someone the cat? They also get the hat. Because the cat owns the hat. There's probably a Dr. Seuss poem in there somewhere" (MH10K, 2018).

This ultimately provides the ability for decentralised gaming (Lockyer, 2018b), although gaming on blockchain is generally seen as limited for the most popular game genres because of the relatively slow verification process (Sihvonen et al., 2019).

Other examples include "Loot", which is a series of 8,000 NFTs that are each made up of a number of items that a player may need in a game that does not yet exist. The "loot" simply lists random items, such as "Silk Hood" or "Shoes", without images or statistics (Russell, 2021). Subsequent to Loot's release, other developers have created visualisation tools, price monitoring tools, and "Realms" for the loot (Russell, 2021).

The programmability of blockchain smart contracts further enables NFTs to change. These are described as "dynamic" NFTs (Khezr & Mohan, 2021). Khezr and Mohan (2021) describe, for example, the artwork "Crossroad" that was sold on Nifty Gateway prior to the U.S. election, with its ultimate irrevocable depiction that would depend on the outcome of the election. The dynamic nature of this NFT was a function of the NFT code written into its smart contract (Khezr & Mohan, 2021).

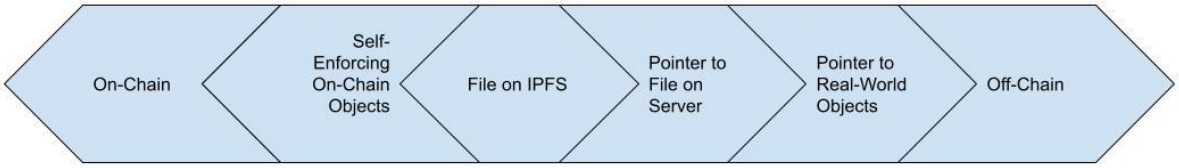
The programmability and composability of NFTs further highlight the need to understand both *what* NFTs represent and to *whom*. There is a broadening use case for NFTs. With this ability to offer a unique, potentially valuable, digital asset, the question arises as to whether the existing tax provisions are able to adequately capture the tax consequences of novel digital assets or whether there are points of difficulty that can be resolved through targeted reform, such as those recommended by the Bragg Report (Commonwealth of Australia, 2021). The report indicated that reform could be by way of a new category of CGT asset or new CGT event. However, we take heed of Cooper's (2015) caution about adding to an already complex "jigsaw" tax regime that may be overengineered.[35] Could the appropriate characterisation of NFTs as personal use assets and collectables, and the consequential application of their special rules, resolve some of the complexities of blockchain technology-related tax compliance?

2.4. NFTs and Associated Metadata

It is important to note what is being acquired when NFTs are traded. The NFT itself offers the certificate of authenticity that is permanently attached or associated with the digital artwork or other creation (Khezr & Mohan, 2021). However, beyond authenticity and unlike traditional cryptocurrencies, the value (and uniqueness) may not simply be the quantity held in the blockchain ledger entry itself. A consideration of the metadata, which can be on-chain or off-chain, is required: (see Figure 2).

[35] Cooper (2015) outlines six structural "flaws" in tax reform, particularly with respect to regimes such as CGT and FBT and the potential overlapping and excessively broad approach (p. 788).

Figure 2: Metadata Location Continuum



Source: Authors' depiction

According to Finzer (2020):

> Metadata provides descriptive information for a specific token ID. In the case of the CryptoKittty, the metadata is the name of the cat, the picture of the cat, a description, and any additional traits (called "cattributes", in the case of CryptoKitties).

To be on-chain, the metadata needs to be built directly into the smart contract: the metadata is within the token itself. As such, the metadata is permanently recorded in the NFT and is, therefore, not reliant on any other application (Finzer, 2020). Thus, in theory, by virtue of its on-chain location, it offers a long-lasting existence and enables the NFT to change as per the logic of smart contracts—such as breeding rates for CryptoKitties being dependent on their generation (Finzer, 2020). "Avastars" and "BlockHorses" store their metadata on-chain.[36] As such, the artwork does not depend on a private server to exist; however, it requires a more complex smart contract in order to run and is, therefore, more expensive to establish. Moreover, on-chain storage requirements create limitations in terms of storage capacity (Finzer, 2020).

Despite the benefits offered by on-chain storage, it is common to store metadata off-chain, with on-chain data limited to proof of ownership (Chevet, 2018). The ERC721 standard achieves this through including a tokenURI (a public URL), which is an address that directs the owner to the metadata's location (Finzer, 2020). For example, the on-chain metadata for each CryptoKitty includes a unique number (the cat's "DNA") which needs to be read by the CryptoKitties' private (and centralised) servers for the appearance of the cat to be established and the image to be displayed (Chevet, 2018; Sedgwick, 2018). Extensions to the ERC721 allow developers to display metadata in the marketplace, such as via OpenSea—e.g. traits, animations, and colours (Finzer, 2020).

It is the private server that holds the value—the rarity of the CryptoKitty. This means that if the CryptoKitty universe (private server) no longer exists, the cat's image would no longer exist (Sedgwick, 2018). As such, without that image—without the private server—the unique token owned (NFT) on the blockchain becomes valueless (Sedwick, 2018). Similarly, the metadata is not safe from changes being made by those in control of the server.[37]

An alternative for centralised, private servers is Amazon Web Services and the InterPlanetary File System (IPFS). The IPFS enables permanent links to be used as it "eliminates the need for websites to have a central origin server, making it perhaps our best chance to entirely re-

[36] See, for example, the following: NFT42 (https://www.nft42.com); Avastars (https://avastars.io/); and BlockHorses (OpenSea, n.d.-a).
[37] OpenSea mitigates this via a cache of the metadata on its servers (Finzer, 2020).

architect the Internet—before its own internal contradictions unravel it from within" (Case, 2015).

The IPFS is growing in popularity. Like blockchain itself, the IPFS is a peer-to-peer storage system that enables metadata to be immutable and persistent over time (Finzer, 2020). Hashmasks, for example, rely on IPFS URLs.[38] However, the IPFS is still dependent on the nodes that host the files staying online (Hashmasks, 2021; Kahan, 2021). There are further decentralised storage solutions that work with IPFS, such as Airweave, Filecoin, and Pinata (Hashmasks, 2021; Kahan, 2021).

At the time of analysis, when a "Collectible" was created through the Rarible application, for example, the metadata was generally stored on the IPFS, for which the Rarible Company operated an IPFS node (Rarible, 2020).[39] However, it did not commit to the guaranteed persistence and integrity of IPFS data (Rarible, 2020). At the time of analysis, in its terms and conditions, Rarible (2020) stated that it had complete discretion to, from time to time, remove or restrict the creation of "Collectibles". Similarly, it confirmed that it would not be liable for a lack of support for trading via its application (Rarible, 2020).

As such, whether or not the IPFS is utilised, there are inherent risks as to the continued availability of metadata associated with NFTs. The metadata file could be stored on the IPFS but may similarly point to a file stored elsewhere. Aspects of the metadata could be stored on-chain whilst other elements are stored off-chain. Within a single marketplace, a multitude of approaches will be taken by creators when creating and managing the metadata. This raises the question of whether the purchaser is truly acquiring anything beyond the NFT itself. Even if they are, the purchaser is still dependent on applications continuing to provide services. This has clear implications from a tax perspective, particularly with reference to *what* the assets are, *when* the assets are, and the potential for those assets to come to an end if the underlying metadata is impacted. Critically, not all NFTs are equal with regard to the associated metadata.

2.5. Virtual Worlds and Gaming

NFTs enable ownership of digital property within the metaverse. Virtual realities can be anything from digital galleries to avatars and virtual realities. Although blockchain technology is driving this activity, virtual reality and virtual property have been around for a long time, particularly in the gaming community. Virtual property can be defined as "persistent computer code stored on a remote source system, where one or more persons are granted certain powers to control computer code, to the exclusion of all other people" (Blazar, 2006, as cited in Macrae, 2008, p. 324). This includes game characters and digital commodities (Macrae, 2008).[40]

NFTs are creating increasingly interoperable communities and economies. For example, *F1® Delta Time* was one of the first NFT play-to-earn car games (Lane, 2022).[41] Its in-game assets

[38] Hashmasks are now on-chain, so do not rely on their website for the images, but still rely on the Hashmask node (Hashmasks, 2021). See also Kahan (2021).

[39] However, the metadata can be stored elsewhere, depending on how the collectible is created (Hashmasks, 2021; Kahan, 2021).

[40] He notes that a "single copy of the code defining these details is maintained and the database links to this code whenever the player uses that item. Significantly, the transfer of virtual property is undertaken in a manner akin to the transfer of funds between bank accounts, in that it involves the modification of each player's database listing" (Macrae, 2008, p. 325).

[41] In 2022, the offering shut down. The website is no longer active.

were ERC-721 NFTs (Animoca Brands Corporation Limited, 2019). They reflected primary NFTs (cars and drivers), component tokens (parts and gears) that could attach to primary tokens, as well as stand-alone tokens that operated independently and which were not subject to composition logic (e.g. tacks and trophies) (Animoca Brands Corporation Limited, 2019).[42] Depending on the NFT and its attributes, it could impact performance or reflect more cosmetic elements in the platform. Metadata could relate to visual elements (2D thumbnail/images, 3D models) and non-visual elements, (such as name, description, team, track, rarity, collection, or racing stats) (Animoca Brands Corporation Limited, 2019).

Macrae (2008) notes that, in off-chain gaming, licence agreements curtail intellectual property rights and the property interests of players; however, blockchain offers decentralisation and markets beyond game play. These are perhaps more akin to the unscripted worlds off-chain that are more heavily reliant on player-created content and therefore allow significant property rights over the virtual property created (Macrae, 2008). With respect to *F1® Delta Time* described above, for example, players could use, trade, or sell the NFTs, and it used a fungible token as its in game primary currency—"REV"—which was an ERC-20 token. REVs are used for trading/purchasing the NFTs, as well as rewards for achievements and for completing actions, fees to compete in races, and rewards for racing (Animoca Brands Corporation Limited, 2019). NFTs for the game could also be traded on secondary markets, such as OpenSea. As such, they could be used for gaming on the platform, earning ERC-20 tokens, and purchasing NFTs that can then be traded openly. However, following the shutdown of the project, the NFTs were impacted, raising fundamental questions about their underlying property rights and the true nature of such endeavours breaking down the walls of a traditional gaming platform (see, for example. Lane, 2022).

2.6. Summary

Explicit examination of the underlying characteristics of NFTs is warranted in order to appropriately determine the Australian income taxation consequences. This includes appreciating the construction of the NFT, including the nature of any crypto composables, any dynamic coding involved, and the location of the metadata. As with most taxation issues, it is necessary to extend this examination to include the relevant taxpayers' facts and circumstances. The unique and bespoke nature of NFTs means that they can be anything from recreational collectables, artwork, or gaming assets to assets held for business or speculative purposes. Moreover, the connection with the greater crypto community is equally relevant. Virtual worlds offer alternative realities where NFTs can be utilised and traded, whether for displaying artwork in digital galleries or for gaming (such as via Axie Infinity creatures or through trading NBA Top Shots). The authors now turn to the established rules of statutory interpretation in order to consider the way in which an NFT can be characterised for tax purposes.

3. TAXING NFTS

We summarise that there are three core levels of complexity required or anticipated in transacting with NFTs:[43]

[42] The concept of crypto composables is explained in more detail in subsection 2.3 of this paper.
[43] Ignoring further complexities, such as when decentralised finance (DeFi) protocols are involved.

1. Transactions between fiat currency ($) and ether (ETH) (Level 1).
2. Transactions between Ether (ETH) and crypto-collectables (NFTs) (Level 2).
3. Transactions between NFTs (Level 3).

Level 1 simply reflects the transition from fiat currency (i.e. the Australian dollar) and the fungible cryptocurrency (e.g. ETH). From here, taxpayers are not dealing with the Australian dollar. Level 2 and 3 transactions are not associated with fiat money and should therefore be considered in terms of the market value of the property. Level 2 creates dual CGT events (the disposal of ETH and the acquisition of NFT or vice versa).[44] Table 1 presents a selection of examples using CryptoKitties' Kittyverse transactions.

The tax treatment of the transactions will be dependent on the particular facts and circumstances. Core issues are considered in the following subsections, based on whether the taxpayer is a non-business or business taxpayer.

Table 1: Example Transactions within the Kittyverse (CryptoKitties)

Level		Item	Event	Transaction Flow	Inflows	Outflows
Level 1		1	Acquisition of ETH	$ → ETH	ETH	Fiat $ Transaction fee (*gas*)
Level 2	Level 3	2	Acquisition of NFT	ETH → NFT_t	NFT	ETH (to seller, 3.75% to creator)* Transaction fee (*gas*)*
		3	Acquisition of composable NFT	ETH → $NFT_{composable}$	NFT_c	ETH (to seller/creator)* Transaction fee (*gas*)*
		4	Breeding of NFT	NFT_{parent} → NFT_{child}	NFT	Birthing fee (ETH) Transaction fee (*gas*)*
		5	Acquisition of NFT via activity	Gift/Services → NFT_t	NFT	Nil (Transaction fee imposed on transferor)
		6	Disposal of NFT	NFT_t → ETH	ETH ↓ Inflows represents new acquisition of ETH	NFT ETH (3.75% to creator)* Transaction fee (*gas*)*
		7	Disposal of NFT set	$NFT_{1,2...t}$ → ETH	ETH ↓ Inflows represents new acquisition of ETH	NFT ETH (3.75% to creator)* Transaction fee (*gas*)*
		8	Disposal of NFT via gifting to user	NFT_t → Gift	-	NFT ETH (3.75% to creator)* Transaction fee (*gas*)*
		9	Loss of NFT via loss of private server	Nil (NFT_t still held)	-	-
Level 1		10	Disposal of ETH	ETH → $	Fiat $	ETH Transaction fee (*gas*)*

* Outflows represents partial disposal of ETH (parcel selection options).

Source: Authors' depiction using data from CryptoKitties (n.d.).

[44] Focussing on the non-business taxpayer. Whether they fall within the scope of the CGT provisions or the trading stock provisions is dependent on factors such as intention and business characteristics.

3.1. The Australian Taxation Regulatory Context

Australia operates under a common law system, where law is derived from the legislature (the parliament) and the judiciary's (court's) application of the doctrine of precedent for decision making (Heydon, 2015). This common law system lives and breathes as society evolves over time—it is dynamic, not static.[45] According to Morton et al. (2021):

> [T]he complexity that arises through the diversity in circumstances to which law must be applied. This includes changing factors and/or circumstances over time, as well as the way in which community standards influence law. The judiciary fulfils an important role in addressing the boundless circumstances that may arise that cannot be captured by legislation, responding to novel circumstances, extending existing rules as necessary, and establishing the limits or validity of legislation. (p. 85)

While common law can provide stability, predictability, and flexibility,[46] tax compliance yields a particular administrative focus and has the ATO at its centre. Irrespective of uncertainty and consultation processes underway that contemplate the need for law reform, tax practitioners and taxpayers must continue to meet their tax obligations. As such, the role of the ATO in providing sufficient guidance on the crypto economy has become particularly critical.

Australia was one of the earliest jurisdictions to introduce formal tax guidance for the emerging crypto economy (PwC, 2021). In 2023, the Treasury of the Australian Government (hereafter "Treasury") reported that more than one million taxpayers in Australia were expected to lodge a 2022 tax return that included crypto activities (Australian Government, The Treasury, 2023). This follows previous campaigns concerned with compliance and the disclosure of crypto activities, including writing to 100,000 taxpayers with regard to potential activities in 2019 as part of their data-matching programme (ATO, n.d.-c; 2019).

Despite this, there are many areas of the crypto economy in which there is not yet formal tax guidance or in which, at least, the tax guidance is not yet robust. Formal tax guidance is enshrined in a series of tax determinations released in 2014, for which the Commissioner of Taxation is legally bound:

> • "Income tax: is bitcoin a 'foreign currency' for the purposes of Division 775 of the Income Tax Assessment Act 1997?"—TD 2014/25 (ATO, n.d.-f).
> • "Income tax: is bitcoin a CGT asset for the purposes of subsection 108-5(1) of the Income Tax Assessment Act 1997?"—TD 2014/26 (ATO, n.d.-f).
> • "Income tax: is bitcoin trading stock for the purposes of subsection 70-10(1) of the Income Tax Assessment Act 1997?"—TD 2014/27 (ATO, n.d.-f).
> • "Fringe benefits tax: is the provision of bitcoin by an employer to an employee in respect of their employment a property fringe benefit for the purposes of subsection 136(1) of the Fringe Benefits Tax Assessment Act 1986"—TD 2014/28 (ATO, n.d.-f).

Public rulings such as these express the Commissioner of Taxation's interpretation of how the law (legislation and judiciary outcomes, i.e. case law) applies generally. Such rulings can be

[45] See Morton et al. (2021) at pp. 81 and 84.
[46] See Kirby (2005) at pp. 1 and 16. See also Morton et al. (2021) at p. 84.

relied on by relevant taxpayers and the Commissioner of Taxation must also apply the law set out in the ruling (unless they are satisfied that the ruling is incorrect and that it disadvantages the taxpayer). The rulings and reliance thereon protect taxpayers from underpaid tax, penalties, and interest if, ultimately, the ruling is incorrect—for example, following a subsequent judiciary outcome (ATO, n.d.-f).

Legally binding ATO guidance is generally limited to that relating to Bitcoin or similar traditional cryptocurrencies (ATO, n.d.-f). Since the release of the tax determination series in 2014, the ATO has regularly updated its website with more bespoke guidance—web guidance (ATO, n.d.-a), which does not yield the same level of protection and, therefore, relies more generally on trust in the ATO (see ATO, 2022a; Morton et al., 2024).

Despite the continuing development of web guidance, the ATO's overarching position on crypto activities remains relatively unchanged. A significant amount of web guidance is directed towards activities that are characterised as being on capital account and for "cryptocurrencies", with more recent guidance expanding the terminology used from "cryptocurrency" to "crypto asset" (ATO, n.d.-a). Whilst the former Australian Government set in place numerous reviews with regard to policy frameworks on licensing and custody, decentralised autonomous organisations (DAOs), taxation, token mapping, and central bank digital currency (CBDC) viability, there has been a slight shift in focus and the prioritisation of, in particular, investor protection since mid-2022, when a new government was elected.[47] This has similarly resulted in the delay of some planned consultations. The current government, however, has continued with planned consultations around token mapping, and the taxation of digital assets and transactions. There has been a focus on token mapping and the development of a licensing framework during 2022 and 2023.

With respect to tax specifically, despite the Bragg Report's recommendation to amend the CGT provisions within the income tax legislation in order to ensure that CGT events are only triggered once they "genuinely result in a clearly definable capital gain or loss" (Commonwealth of Australia, 2021, p. vii), the former government merely noted this, and instigated a formal and broader review of the taxation of digital asset and transactions in Australia by the Board of Taxation [BoT] (Australian Government, 2021).

This was due to be released at the end of 2022, but delays were again observed following the change of government. The BoT consultation began in September 2022 with the due date for the final report revised to September 2023, then again to February 2024 (BOT, n.d.).

At the time of writing, there is no bespoke taxing regime for the crypto economy. Whilst there have been amendments, for example, to the goods and services regime in order to prevent double taxation when the crypto economy is used to buy and sell goods, it is expected that taxpayers will interpret how the existing principles of tax law apply to their activities themselves. The tax determinations and web guidance outlined above assist in that process. They are not, in themselves, a regulatory framework for the crypto economy. Similarly, the definition of foreign currency was revised to ensure that cryptoassets such as Bitcoin will not fall within the scope of the foreign currency regime despite the fact that they are recognised as legal tender in foreign jurisdictions such as El Salvador (Morton & Curran, 2022b). The Australian government has been clear about its intention to amend the law: it will seek to retain the status quo as set out in TD 2014/25 (Chalmers & Jones, 2022). However, the proposed

[47] See the summary on p. 25 of PwC (2021). See also the Bragg Report (Commonwealth of Australia, 2021).

amendment carves out CBDCs from the exclusions, thereby implicitly acknowledging the place for CBDCs and, therefore, the technology (Treasury Laws Amendment [Measures for Consultation] Bill 2022; see also Morton & Curran, 2022a).

One of the key elements of complexity that the crypto economy brings is the move away from fiat currency. This requires principles of bartering to be enacted: see ATO (1992b).[48] This has also led to questions being raised with respect to employee remuneration, in that, depending on whether or not the employee has a valid sacrifice arrangement in place, crypto remuneration may be treated either as ordinary income or as a fringe benefit. If it is treated as the latter, this triggers the application of the fringe benefits regime rather than the income tax regime. This, in turn, has implications in terms of whether or not superannuation obligations are impacted (Bevacqua et al., 2022; Cameron, 2020).

More broadly, the characterisation of DAOs raises significant issues, not only for taxation regimes but, more broadly, for the legal and moral obligations that can arise for participants (see, for example, Pirovich, 2021; Tse, 2020). The current position of DAOs in Australia has been compared to the status of corporations prior to the introduction of limited liability companies:

> Prior to limited liability companies, it was untenable for individual shareholders to have 'moral culpability' for the actions of corporations, as they lacked the power and control mechanisms to discipline errant management.
>
> It is equally untenable for individual stakeholders of decentralised systems, such as decentralised financial applications, to have moral culpability for the actions of those decentralised systems, because the individuals lack the power and control mechanisms to discipline errant decision-making. (Commonwealth of Australia, 2021, p. 76)

The Australian tax law definition of a company excludes partnerships but includes unincorporated associations (ITAA97, section 995.1). The Bragg Report recommended the establishment of a new legal entity for DAOs (Commonwealth of Australia, 2021). However, no major developments have yet to occur.

3.2. ATO on Cryptoassets

As per TD 2014/25 (ATO, n.d.-f) and TD 2014/26 (ATO, n.d.-f), the ATO takes the stance that Bitcoin is a CGT asset (ITAA97, section 108.5[1])—where the taxpayer is not carrying on a business of cryptocurrency trading—rather than money or foreign currency.[49] A CGT asset is defined as "(a) any kind of property; or (b) a legal or equitable right that is not property" (ITAA97, section 108.5(1)). More specifically, CGT assets fall within the notion of property pursuant to the following:

[48] In some instances, non-cash transactions may lead to the application of section 21A of the Income Tax Assessment Act 1936 (hereafter "ITAA36"), which deems non-cash benefits to be treated as if they were convertible to cash.

[49] TD 2014/25 (ATO, n.d.-f). See also *Seribu Pty Ltd and Commissioner of Taxation (Taxation)* [2020] AATA 1840 (16 June 2020) and, more generally, a consideration of the Commissioner of Taxation's position in, for example, de Zilva (2018) on pp. 372–374.

(1) A CGT asset is:
  (a) any kind of property; or
  (b) a legal or equitable right that is not property.
(2) To avoid doubt, these are CGT assets:
  (a) part of, or an interest in, an asset referred to in subsection (1);
  (b) goodwill or an interest in it;
  (c) an interest in an asset of a partnership;
  (d) an interest in a partnership that is not covered by paragraph (c). (ITAA97, section 108.5[1][1])

This means that transacting with traditional cryptocurrencies will likely result in specific tax consequences, depending on the taxpayer's intentions and activities (for example, if the cryptocurrency is held for investment or business use). In terms of investing and/or transacting other property, using cryptocurrency will result in the standard CGT consequences, exemptions, and reductions (CGT events, personal use $10,000, 50% discount, etc.). As with physical assets and shares, a CGT event occurs when cryptocurrency is disposed of, i.e. when it has been sold, gifted, traded, exchanged, converted to fiat currency, or used to acquire goods or services (ATO n.d.-b). This can be compared with that of a trader or speculative investor, where transactions will be on revenue account and be subject to the trading stock provisions (ITAA97, division 70).

The Commissioner of Taxation is of the opinion that guidance on Bitcoin and similar cryptocurrencies is also applicable to NFTs (ATO, n.d.-e; see also ATO, 2020). The ATO extends the established guidance to NFTs, with the particular tax treatment dependent on the use and reasons for holding and/or transacting with them (ATO, n.d.-e). The ATO summarises, in the guidance that it provides, that income tax may be due on an NFT:

- as a CGT asset under the capital gains tax (CGT) regime
- on revenue account as trading stock
- as part of a business

as a profit-making scheme (ATO, n.d.-e).

The ATO provides several examples to explore the consequences of NFTs (ATO, n.d.-e).

3.3. Capital Account: Personal Use Assets and Collectables

Outside of the tax system, we speak of collectables as including anything from basketball or baseball cards, Pokémon, or Beanie Kids. However, the principles of statutory interpretation require us to look at the language within the context of legislation as a whole (James et al., 2019). For both collectables and personal use assets, this begins with the definition of those terms proffered by ITAA97, division 108, thereby considering a meaning that may not necessarily equate with the ordinary meaning of either term.

In particular, ITAA97, subsections 108.10(2) and (3) state that:

> (2) A collectable is:
>
> *(a) artwork, jewellery, an antique, or a coin or medallion; or* [emphasis added]
>
> (b) a rare folio, manuscript or book; or
>
> (c) a postage stamp or first day cover;
>
> *that is used or kept mainly for your (or your associate's) personal use or enjoyment* [emphasis added].
>
> (3) These are also collectables:
>
> (a) an interest in any of the things covered by subsection (2); or
>
> (b) a debt that arises from any of those things; or
>
> (c) an option or right to acquire any of those things.

Of particular relevance to NFTs is paragraph (a), which covers "artwork" and includes the requirement that the item "is used or kept mainly" for "personal use or enjoyment" (ITAA97, section 108.10[2]). Artwork is defined in ITAA97 as: "(a) a painting, sculpture, drawing, engraving or photograph; or (b) a reproduction of such a thing; or (c) property of a similar description or use" (section 995.1).

The authors argue that the digital nature of NFTs is not an issue here either in terms of them being interpreted as *property* in line with guidance on traditional cryptocurrencies[50] or in terms of the artwork's ability to be digitally native (or to be a digital reproduction of a physical piece of art). It therefore does not matter whether the "art" packaged within an NFT is original or a reproduction. Although the NFT offers an ability to certify that a piece of artwork is original, it can equally certify reproductions as being one of a series (semi-fungible).

In relation to the latter, the authors argue that a *digitally constructed* piece of work falls (if not within paragraph [a][51]) within paragraph (c), being a property of a similar description of use (ITAA97, section 995.1[1]). The fact that paragraph (b) of ITAA97, section 995.1(1) includes reproductions means that the definition is broad. As Chevet (2018) notes:

> Digitized art refers to art pieces created, stored, used and delivered digitally. This definition encompasses every piece of art that can be put in a digital format: image, sound, video games, video, etc [citation omitted]. The definition also entails that a physical art piece, such as a painting, can be digitized and stored in digital form separate from the first one, the digitized version is considered a different version of the physical asset, with its own properties. (p. 44)

Khezr and Mohan (2021) similarly explore the notion of digital art in contrast to more traditional conceptions of art and, further, the subset of digital art distributed via crypto art galleries or channels using blockchain technology.[52]

Following the same process of interpretation that concludes that Bitcoin is property and is therefore a CGT asset,[53] the authors accept that NFTs can equally be characterised as property given the breadth of what "property" entails—i.e., as stated in *Yanner v Eaton* (1999) 201 CLR 351, 365-7 [19], the term "property", in law, "does not refer to a thing":

[50] See, generally, ATO (n.d.-f).
[51] For example, a drawing can be digitally created using drawing tools and a digital camera produces digital photographs.
[52] See also Franceschet et al. (2019)
[53] TD 2014/26 (ATO, n.d.-f).

> the High Court accepted that property refers not to a thing but to a description of a legal relationship with a thing; and, more specifically, to the degree of power that is recognised in law as permissibly exercised over the thing. Noting the difficulties in determining what is meant by 'property' in a thing, their honours quoted Professor Gray who stated '[a]n extensive frame of reference is created by the notion that 'property' consists primarily in control over access' [citation omitted]. (ATO, n.d.-g, [6])

The interpretation that establishes proprietary right in TD 2014/26 (ATO, n.d.-g) is also equally applicable to NFTs (such as CryptoKitties or Hashmasks). For example, in TD 2014/26 (ATO, n.d.-g), the Commissioner of Taxation identifies a number of approaches that could be taken in order to decide whether something amounts to property[54] but concluded that it is a weighing up of a range of factors, none definitive, that is necessary to determine this (ATO, n.d.-g). We can also consider the New Zealand judgement on whether cryptocurrencies are items of property under English common law (*David Ian Ruscoe & Malcolm Russell Moore v Cryptopia Limited (in liquidation)* [2020] NZHC 728), in which Gendall J found that the criteria established in Ainsworth could be satisfied for cryptocurrencies and these, therefore, were property.[55]

One area of concern for NFTs is the complexity that arises through the metadata where it is stored off-chain (including via IPFSs), as this off-chain element results in questions over (i) whether the notion that an NFT reflects a bundle of rights, and thus the asset reflects more accurately as a bundle of licensing or contractual rights that outweighs the categorisation of "artwork"; and (ii) of the true control and right to the artwork itself.

The Commissioner of Taxation has already highlighted, in terms of Bitcoin, the importance of the relationship between the digital representation of value arising from the crypto token[56] and the bundle of rights ascribed to those with access—in particular, the right to control and therefore trade (ATO, n.d.-g). However, for NFTs off-chain, there is some concern that the artwork itself (which could simply be a JPEG file on a private server) is problematic. The owner of the NFT has a right (ITAA97, section 108.10[3][c]) but does not truly have control—nor can the blockchain software (smart contract) stop a private server from going offline. However, marketplaces such as OpenSea and the use of the IPFS do provide further safety mechanisms to ensure that the NFT holders' rights are upheld (as discussed in section 3 of this paper).

Despite some concerns, it is accepted that NFTs would be captured as property in the same way as Bitcoin[57] or, at a minimum, a right to property (ITAA97, section 108.10[3][c]). This

[54] For example, the "Ainsworth Test"—reflecting the right being "definable, identifiable and capable of assumption by third parties, and permanent or stable to some degree" (ATO, n.d.-g) in *National Provincial Bank Ltd v. Ainsworth* [1965] AC 1175 at 1247—8; "excludability" (ATO, n.d.-g) in *Milirrpum v. Nabalco Pty Ltd* (1971) 17 FLR 141 at 272; *Potter v. Commissioners of Inland Revenue* (1854) 156 ER 392 at 396; "commercial value" (ATO, n.d.-g) in *Halwood Corporation Ltd v. Chief Commissioner of Stamp Duties* (1992) 33 NSWLR 395 at 403; and "enforceability" (ATO, n.d.-g) in *Wily v. St George Partnership Banking Ltd* (1999) 84 FCR 423 at 426. See also Morton and Curran (2022b) on p. 145.

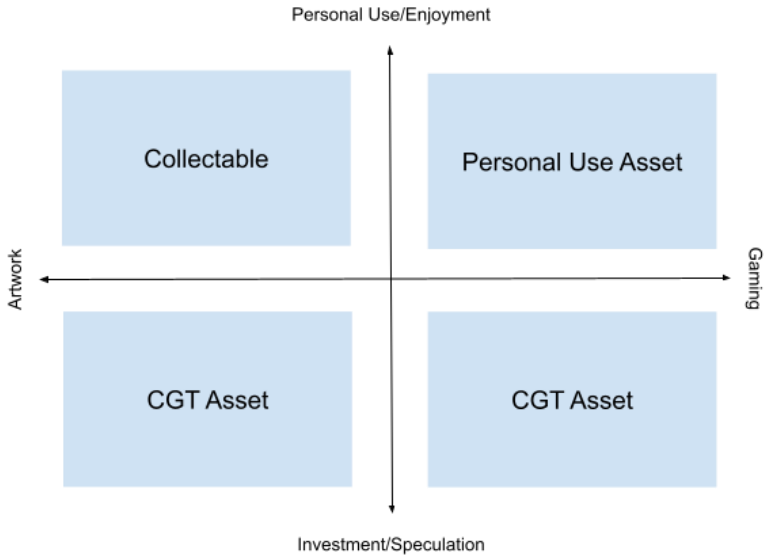
[55] See also Morton and Curran (2022b), who examine the four criteria where the private key is lost.

[56] For example, the "Bitcoin address; the holding or balance in that address; and the public and private keypair associated with that address" (ATO, n.d.-g, [8]).

[57] See paragraph (c) of the definition of artwork found in paragraph 995.1(1) of ITAA97.

assumes, however, that the NFT (if artwork) is kept for personal use and enjoyment, and relies on the taxpayer's intention of holding the NFT based on its artistic qualities rather than some other personal use. Therein lies the contrast with something that holds artistic qualities but is used for gaming purposes (which do not meet the threshold of professional gaming).[58]
For example, Hashmasks more readily reflect the ordinary meaning of art: they are a series of unique portraits without further immediate utility. CryptoKitties, on the other hand, although reflecting varying levels of "cuteness"—being cartoon cats—can be used for tournaments, trading, or breeding. Alternatively, they could simply be held for long-term speculative gains, rather than for their artistic or gaming qualities. In the latter case, they would reflect general CGT assets, rather than collectables or personal use assets (see Figure 3).

Figure 3: Comparing Primary Characterisation



Source: Authors' depiction

Both collectables and personal use assets rest on the notion that the holding or use is for personal use or enjoyment; however, the latter excludes the former. Specifically, *personal use assets* are defined as:

> (a) a CGT asset (except a collectable) that is used or kept mainly for your (or your associate's) personal use or enjoyment; or
> (b) an option or right to acquire a CGT asset of that kind; or
> (c) a debt arising from a CGT event in which the CGT asset the subject of the event was one covered by paragraph (a); or
> (d) a debt arising other than:
>
> (i) in the course of gaining or producing your assessable income; or
> (ii) from your carrying on a business. (ITAA97, section 108-20[2])

Numerous assets can be personal use assets. Prior examples considered by the ATO include items held for hobby or recreational use—such as a horse used by a taxpayer who races horses

[58] In which case, the CGT provisions would not be the point of reference. The activities could instead, for example, amount to business activities invoking the trading stock provisions (ITAA97, division 70).

as a hobby (ATO, 1990)—[59]or gold nuggets arising from hobby activities (ATO, 2003). Additionally, according to the ATO (2002), unused marble floor tiles that were originally acquired for laying in a taxpayer's residence were not "used", however they were nonetheless "kept" for personal use.

Bitcoin itself can be a personal use asset by virtue of the purpose of its acquisition in the event that it was acquired in order to facilitate the purchase of personal goods, such as clothing or music.[60] In *Favaro v FCT* [1996] ATC 4975, Branson J accepted the Commissioner of Taxation's position over the contrast between personal use and business/profit purpose: "the expression "personal use" is used in s 160B of the ITAA [ITAA 1936] in contradistinction to use for business or profit making purposes" (at 4987). Whilst this was covered in withdrawn guidance, the Commissioner of Taxation reflected on this position as one of mutual exclusivity between the two categories (ATO, 2011a).

There is, arguably, a broader set of circumstances that can apply to NFTs than to Bitcoin or other traditional cryptocurrencies. Unlike Bitcoins, NFTs such as Hashmasks and CryptoKitties do not yield the same primary objective as a means of exchange. Although NFTs can function as a means of exchange (as with any barter transaction) or speculative investment, they offer something additional: a unique right to property. If an NFT points to a digital piece of art and the intention behind holding that art was of a personal nature, the NFT would be a collectable—and so would the cryptoasset disposed of to acquire it. If an NFT points to a digital gaming item and the intention behind holding the item was for personal gaming, the NFT would be a personal use asset—and so would the cryptoasset disposed of to acquire it.[61]

Critically, it is necessary to consider the individual facts and circumstances when deciding whether something is kept or used for personal use or enjoyment (see paragraph 15 of *Favaro v FCT* [1996] ATC 4975). However, we argue that the mere act of acquiring NFTs as opposed to their real-world equivalents is not in itself sufficient to argue a lack of private use or intention. What needs to be recognised is that blockchain has created, and is evolving, a vast digital metaverse and what you may have traditionally done in your private home, such as collect Beanie Kids and Pokémon cards, is now occurring in a digitally enhanced, virtual reality. Just because something potentially has value and can be readily commodified, it is not precluded from being a collectable or personal use asset. Within the blockchain metaverse, there are communities upon communities that are created through shared interests, whether participants enter to play or to share their interest. The issue is that blockchain technology is breaking down barriers. The amassing of gaming equipment is no longer restricted to within the four walls of the game and owned collectables are no longer restricted to your childhood toy shelf. Although the *Favaro v FCT* [1996] ATC 4975 decision suggests that there is mutual exclusivity, on-blockchain participants cannot escape the notion that cryptoassets are commodified. However, this does not preclude the participants' main use of those cryptoassets being personal use or enjoyment.

There is clear uncertainty around what may, in fact, constitute artwork. The authors reflect, in particular, on the gaming environment, where there is a blurring of artistic creations within the

[59] Now withdrawn due to the particular example examined within Taxation Ruling IT 2585 (ATO, 1990) being considered a "straightforward application of the law" (ATO, 2017b, at paragraph [2]).
[60] See ATO (n.d.-g), paragraph 20.
[61] Consistent with the Commissioner of Taxation's interpretation: see TD 2014/26 (ATO, n.d.-g).

growing digital marketplace[62] and gaming activities.[63] In that sense, we could argue that a CryptoKitty could be artwork if held for its aesthetic appeal. The wording of section 108.10 of ITAA97 takes precedent over section 108.20 of ITAA97 in that we posit that if it is a collectable (e.g. artwork kept mainly for personal use or enjoyment), it is not a personal use asset (even if that asset is used within the context of gaming). However, what constitutes artwork is grey, with perhaps the utility and attributes of how the token is written into the code being a factor in determining its characterisation. For example, if an NFT code articulates that the core utility is a tool, this may sway the interpretation towards a personal use asset, whereas if the code has a core focus on visual attributes, this may sway the interpretation towards collectables. However, even this can be debated.

T. M. Evans (2019), for example, describes CryptoKitties as being "unique digital assets [that] are literary or artistic creations fixed in a tangible medium" (p. 219)—creative digital works. Adajian (2018) philosophically considers the various definitions of "art", from those provided by classical philosophers to contemporary/historical definitions. For example, Adajian (2018) speaks of Plato's interpretation being representational or mimetic (imitative) and how Hegel's incorporates beauty, being "the sensuous/perceptual appearance or expression of absolute truth." Many NFTs may be seen as such expressions or, more simply, as akin to a Beanie Baby, My Little Pony, or Pokémon card (Tepper, 2017). However, it is suggested that toys are not likely to meet the definition of artwork (C. Evans et al., 2018). Any characterisation therefore comes down to the particular use:

> Unfortunately it remains unclear whether this definition [artwork] would embrace items such as Persian carpets, tapestries and laser displays. They may come within the phrase "property of a similar description or use". Perhaps it depends upon whether the Persian carpet is on the floor or the wall. Falling back on an overused tax phrase "depending upon the facts", it is suggested that each of the items mentioned could be an artwork. (C. Evans et al., 2018, p. 51)

This can be reflected within the definition of artwork itself, being "property of a similar description or use" (ITAA97, section 995.1(1), paragraph c of the definition of artwork).

Importantly, what is well accepted is that a collectable is an item that is expected to appreciate over time. The value is likely to do so (or decline) in response to market forces rather than due to a taxpayer owning and using the particular asset (Cooper et al., 2020). This can be compared with personal use assets, which are likely to depreciate:

> A combination of policy and administrative concerns explain the separate identification of these assets and the special rules that apply to them. The policy concerns relate to the fact that most personal-use assets depreciate in value due to use. To allow a taxpayer to recognise a capital loss on the decline in value of her or his refrigerator, stove, bed, and so forth would be tantamount to allowing a tax deduction for personal consumption; that would violate fundamental principles of income taxation. The administrative concerns arise mostly because of the relatively small cost of many personal assets. Taxpayers are unlikely to retain records of cost

[62] For example, see "MakersPlace" (https://makersplace.com) for digital art collections that are backed by blockchain technology. The website describes these works as "truly unique digital creations" (MakersPlace, n.d.).
[63] For example, "Neon District" (https://portal.neondistrict.io/) offers a cyberpunk role-playing adventure, where players strategise and fight to progress through a dystopian world, collecting characters and gear: see JTobcat (2021). See also Thurman (2020).

> or sale price and it is unlikely that any paper trail will be available for auditors; in any case, the amount of tax imposed on the small gains would probably not equal the cost of administering CGT with respect to these assets. (Cooper et al., 2020, p. 104)

As such, one could argue that when CryptoKitties are held for their aesthetic qualities, rather than for gaming or speculation, does it matter that the founder describes it as a game?: "CryptoKitties is a game centered around breedable, collectible, and oh-so-adorable creatures we call CryptoKitties!" (CryptoKitties, n.d.-d). Simply put, no, it does not matter that assets may be mainly held or used in a manner contrary to their actual use: what is relevant is the intention of the purchase, as well as what they *have* mainly been kept or used for (ATO, 2002). Nor is it a single point of time that is relevant in assessing the predominant use (ATO, 2011b). One must consider the entire ownership period (ATO, 2011b). If the intended purpose of holding CryptoKitties is to sell them in a few years' time, when the value has increased, rather than for their aesthetics or gaming functions, the NFT will not be a personal use asset (nor a collectable). This was the case in *Favaro v FCT* [1996] ATC 4975.

3.3.1. Some implications for characterisation as a CGT asset

3.3.1.1. Special rules for CGT asset categories

Depending on the categorisation of the CGT asset, special rules apply, such as the threshold in treating CGT events as taxable, the inclusion or exclusion of element 3 costs, and the treatment of losses. The threshold for taxation is markedly lower for collectables—$500 element 1 (ITAA97, section 108.10), making it more likely to be caught within the taxpayer's taxable income. Relevantly, this assessment is based on element 1 costs. As such, the characterisation of transactions fees is important. For example, the Ethereum blockchain has experienced high transaction fees in the last couple of years, which can substantially increase the total cost base of an NFT acquisition. In this regard, we interpret transaction fees paid to miners as potentially being element 2 costs (ITAA97, section 110.25[3]). We interpret that this may fall within the cost of transfer (ITAA97, section 110.35[3]), in that the fee is paid in order for the miners to verify and commit the transfer of ownership onto the blockchain from one address to another. This occurs for both the acquisition and the CGT event, i.e. disposal (ITAA97, section 110.35[1]). Alternatively, when NFTs are disposed of, it may fall within the tenth incidental cost, being termination or other similar fees incurred as a direct result of ownership coming to an end (ITAA97, section 110.35[11]). As such, the transaction fees paid to miners would not contribute to the threshold.

Similarly, the turbulent and volatile nature of many NFTs (which experience hype at their release and experience significant drops thereafter) mean that many taxpayers may experience substantial tax losses. Accurate characterisation is critical, as losses from personal use assets are disregarded (ITAA97, section 108.20), collectable losses are quarantined (ITAA97, section 108.10), and general CGT asset losses are available to be applied against any capital gain or carried forward. The potential for NFTs to create substantial tax losses may pose a concern for the government over tax revenue leakage.[64]

[64] The risk of tax revenue leakage occurring was raised, for example, in the Bragg Report (Commonwealth of Australia, 2021).

3.3.1.2. Asset v. NFT creation: Part 1

Taxpayers can purchase NFTs but can also create NFTs. The creation of NFTs gives rise to further complexities from a tax compliance point of view. One key issue of note is where the metadata relates to an underlying asset off-chain. We argue that following section 109.10 of ITAA97, which interprets the time of creation of the asset, requires us to look further back than simply to the time when the NFT was minted. The date of creation can impact on the availability of the 50% discount (ITAA97, division 115.) as well as the issues of what is the asset and whether there are multiple assets.

There are, in essence, two to three points of note relating to the creation of NFTs, depending on whether the underlying asset is a physical or digital asset to begin with. For example, consider a piece of artwork by an artist who works with acrylic paints and who is not in business (e.g. a hobby artist):

> 1. The artist starts to create the piece of artwork by beginning to apply the acrylic paint to the blank canvas. This artwork is physically located in the artist's studio (item A).
>
> 2. Once completed, the artist scans the physical artwork with a high-quality scanner, and undertakes formatting and retouching work to ensure the quality of the digital version. The artwork is physically located in the artist's studio (item A) and there is a digital version on the artist's computer as, for example, a JPEG file (item B).
>
> 3. Once completed, the artist tokenises the digital version of the artwork by uploading a copy of the digital reproduction onto the blockchain platform (for example, OpenSea), creating the NFT. The artwork is physically located in the artist's studio (item A), digitally stored on the artist's computer (item B), and tokenised into an NFT on blockchain, which points to a file stored, for example, on IPFS (item C).

For items A and B, there are two separate assets, the physical artwork and the reproduction of that artwork. Both are CGT assets and could easily meet the definition of a collectable pursuant to ITAA97, section 108.10 (if held or used for personal enjoyment). Given that the CGT asset (whether a collectable or otherwise) is created and not acquired via a CGT event, section 109.10 of ITAA97 is likely to apply. This means that the CGT acquisition date is the date on which the asset's construction or creation started (ITAA97, section 109.10, item 1). For item A, this would likely be when the artist first began to work on the physical acrylic artwork. For item B, this could be the point that the artwork was scanned in order to generate the JPEG that produces a reproduction). For both items, the acquisition date is not readily available through perusal of the blockchain transactions.

The issue with item C is that it is necessary to determine whether it is a separate CGT asset distinct from item B, as discussed further below. Given that it points to the existence of a further reproduction (a copy of the file stored in a server, whether a private server or IPFS), it is likely to be a third asset of note. As such, the asset's point of creation is likely to be the time when the file (item B) was uploaded to the platform, even if the minting itself occurred at a later date.

Even if the NFT is completely on-chain, it is likely that the point of creation is contentious. Take, for example, the NFT BlockHorses (OpenSea, n.d.-a). Each horse is created by code. Interpreting section 109.10 of ITAA97, we argue that the acquisition of this NFT may point to when the code began to be created by the programmers or when they began to use an NFT standard. In both cases, it is arguable that it will not be the date of minting. Thus, it is not necessarily determinable by the ledger records on blockchain.

However, where NFTs are created due to the code within existing NFT smart contracts, the blockchain will more accurately identify the creation date. For example, CryptoKitties can "breed" from "parent" NFTs (i.e. two other CryptoKitties). Here, a new NFT is created at the time of "birth". In this case, a "birthing" fee is charged (a transaction fee).[65] This may reflect the date of creation for tax purposes.

3.3.1.3. Asset v. NFT creation: Part 2

Importantly, we argue that the different forms of the artwork would be characterised as separate CGT assets. That is, the artist has created three forms of assets: (item A) a physical artwork, (item B) a digital reproduction, and (item C) an NFT. This will impact the characterisation of the elements of cost (ITAA97, section 110.25). For example, if we see the process of tokenisation as a creation of a new asset, the minting cost could arguably be an element 1 cost (ITAA97, section 110.25[2]). However, if we see the digital artwork and NFT as a single CGT asset, the minting cost may be an element 2 or an element 4 cost (ITAA97, sections 110.25[3] and [5]).[66]

As to whether item C is a distinct asset, we argue that the process of tokenisation does not result in CGT event D1 applying, as the action of minting the NFT does not create a contractual right or other legal or equitable right in another entity (ITAA97, section 104.35[1]). You may create licensing criteria within the NFT, but you are not signing a contract, restraint of trade, or otherwise. We argue that it reflects the creation of the reproduction of the artwork (for example) and that artwork has restrictions of use akin to licensing. For example, MakersPlace (n.d.) states that:

> A unique digital creation is a digital creation (art, photograph, song..) that's been digitally signed by the creator and uniquely identified on the blockchain. In a world where anything digital can be infinitely copied, a unique digital creation can only owned [*sic*] by a single individual.

It adds that:

[65] If one of the NFTs is not owned by the taxpayer, a siring fee is also charged.

[66] It is debatable whether the cost of minting would meet the definition of incidental costs pursuant to ITAA97, section 110.35. However, the *lazy minting* could be more aptly described as a cost incurred to increase or preserve the asset's value or relating to the installation or moving of the asset (ITAA97, section 110.25[5]). Here, the minting could be described appropriately as installing the digital image on the marketplace and an act of preserving the value within the marketplace. However, given that it is only payable on sale, it is not likely to be considered incurred until the sale takes place. Identifying the cost base elements is important, as it impacts on the $500 and $10,000 element 1 thresholds applicable to collectables and personal use assets respectively. A further element 2 cost may be payable on OpenSea by the taxpayer selling the item where the taxpayer accepts an offer for sale as opposed to when the buyer simply purchases a fixed-price item (OpenSea, n.d.-c). Note that users also incur an account initialisation/set up fee, which is a one-off cost (OpenSea, n.d.-c). This is quite costly, dependent on the gas fee fluctuations. For example, it may have cost $90 in early 2021 but cost a few hundred dollars in late 2021. On Rarible, the only upfront costs are paid when you want to deploy a custom smart contract.

> Upon purchase, you'll be given the right to use, distribute and display the creation for non-commercial purposes. Since you own this unique creation, you can also re-sell the same non-commercial use rights, to the creation, on a secondary market or even directly on MakersPlace. (MakersPlace, n.d.)

As such, the NFT (item C) reflects a separately identifiable CGT asset—in particular, a collectable if held for personal use or enjoyment (ITAA97, section 108.10). Upon purchase, you can access the high-resolution digital file, which you can display on any digital device or even print out for personal use, all while knowing that you have the authentic piece verifiable on the blockchain.

There is no receipt on tokenising the NFT using the digital asset, rather a transaction cost incurred. This thereby impacts the asset's cost base.[67] At the time of analysis, OpenSea, for example, did not charge the user for minting the NFT up front but charged a 2.5% fee on the final sale price. This was referred to as "lazy minting" (OpenSea, n.d.-c).[68] As such, CGT event H2 is unlikely to apply (ITAA97, section 104.155). The reason for this is that the NFT was not transferred on-chain until the first purchase, or the first transfer is complete. Note, however, in October 2023, lazy minting ceased to be offered. Thus, these issues are restricted to minting activities prior to this date (OpenSea, n.d.-b).

On disposal, it will likely be either CGT event A1 or CGT event C1 (if, for example, the asset is destroyed). We argue that NFTs (item C) will not give rise to a situation of composite assets unless they relate to digital twins, where the NFT relates directly to a physical asset, such as the NFT assigning licensing and other rights or information (e.g. relating to quality or provenance) about item A. Where the NFT represents a form of digital twin, complex taxation issues can arise, as flagged by the UK Jurisdiction Taskforce (2019):

> Some cryptoassets are intended to represent or are linked to conventional assets external to the system, for example money or debt obligations, tangible goods or land, a share or unit in a company or fund, or a contractual right of some kind; those assets are sometimes referred to as *tethered*, *exogenous* or *off-chain*. Such an external asset is certainly property but what, if any, rights in it are conferred on the holder of the corresponding cryptoasset will depend on the contractual structure or legal rules of the system. (p. 11[33])

The contractual structure of the NFT will usually be found in the smart contract embedded in its computer code. These smart contracts can set out the terms and conditions, and any appropriate licence agreements pertaining to the use of the NFT. These, in turn, impact on the taxation treatment of the NFT. The UK Jurisdiction Taskforce considered the legal nature of smart contracts and noted, at paragraph 18, that:

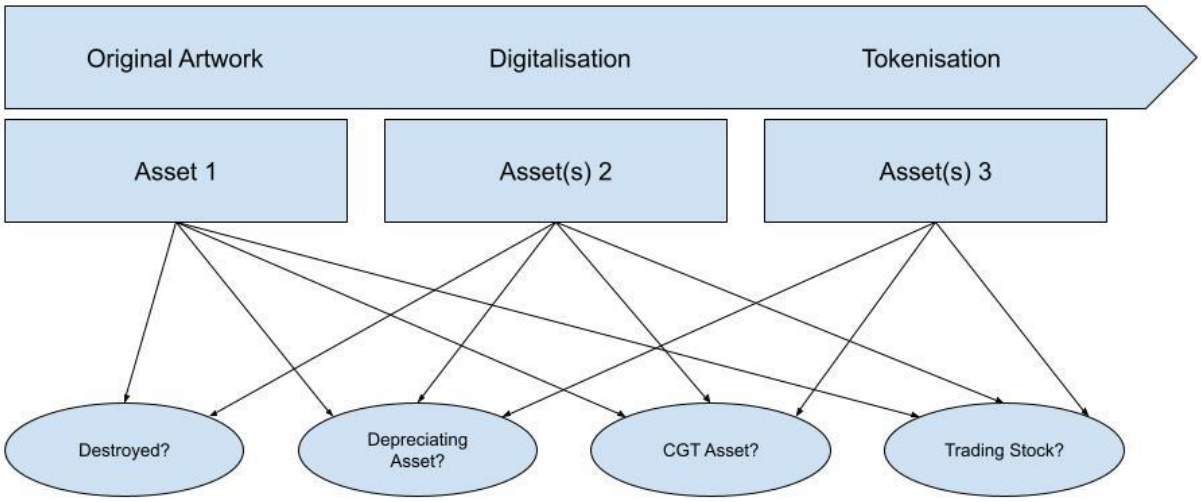
[67] As detailed in the next subsection, there are costs to mint and sell NFTs: see also OpenSea (n.d.-c).
[68] Other platforms charge up front. Please note that OpenSea stopped allowing lazy minting in October 2023 (OpenSea, n.d.-b).

> There is a contract in English law when two or more parties have reached an agreement, intend to create a legal relationship by doing so, and have each given something of benefit. A smart contract is capable of satisfying those requirements just as well as a more traditional or natural language contract, and a smart contract is therefore capable of having contractual force. (p. 8)[69]

The alternative here is that the NFT may be interpreted primarily as a bundle of licensing rights and, therefore, fall outside the scope of collectables. However, we argue that this is less likely to be the case. It is not unusual for any artwork to have certain licensing and use rights assigned, and the coding of the smart contract is the method by which they are inscribed for a particular piece of artwork, i.e. the primary or fundamental asset being created or transferred is the visual depiction or attribute encoded in the smart contract, which attaches certain rights or freedoms. The simple existence of terms and conditions does not preclude it from being artwork (although one must consider intention for it to be a collectable). Artwork can, after all, encompass an interest or right in artwork derived from NFT ownership (for example, ITAA97, sections 108.10[2]and [3]), a reproduction, or property of a similar description or use (ITAA97, section 995.1).

As such, the difference between the creation of the underlying digital asset and the minting may result in varying interpretations of what assets exist, when they exist, the cost base elements, and further considerations surrounding special rules and discounting eligibility (ITAA97, division 115). Moreover, it is also critical to appreciate what the artist then does with the original acrylic artwork (item A) and the digital version thereof (item B)—see Figure 4.

Figure 4: Possible Asset Mapping



Source: Authors' depiction

This will be discussed further in subsection 3.4 of this paper, which considers the situation in which a taxpayer is operating a business.

[69] It should be noted that the committee's recommendations about the characterisation of cryptoassets are not binding on a court of law in Australia. Nonetheless, its views were referred to at length by Gendall J in the recent NZ High Court decision *David Ian Ruscoe & Malcolm Russell Moore v Cryptopia Limited (in liquidation)* [2020] NZHC 728. See Morton and Curran (2022b).

3.3.1.4. Crypto composables and CGT "sets"

NFT standards enable add-ons, described as crypto composables, to be acquired. These cannot be separated from the main NFT but they can be transferred to other NFTs (i.e. a parent and child token):

> Imagine an in-game item like a shield, with 5 mounts for special gemstones. You find a few stones, mount them, and decide to sell the shield. You can take this composition to a decentralized market. Thanks to the composable interface all the assets can be enumerated for the sale. Only a single purchase is needed to trade the shield to it's [*sic*] new owner. Once received, the new owner can transfer the stones from the shield, perhaps equipping them to special armor where the combination is more powerful than it was with the shield. Lots to ponder. (Lockyer, 2018a)

This raises questions from a tax compliance point of view as to their treatment as separate CGT assets or, alternatively, as enhancements to existing CGT assets. When an NFT is sold, so too are the composables attached. If they are treated as separate CGT assets, their acquisition costs would be element 1 costs (ITAA97, section 110.25[2]) and they would likely be treated as collectable or personal use asset "sets" (ITAA97, sections 108.15 and 108.25 respectively). This will have implications for the $500 or $10,000 threshold respectively (ITAA97, section 118.10). If they are not treated as separate assets, they would likely be characterised as element 4 costs (ITAA97, section110.25[5]). Importantly, due to interoperability, they can be assigned to other NFTs. The purchaser can sell them as a different set. This shifting "set" will then need to be understood, as it will have varied implications, such as affecting the costs that will be included in the cost base of that set.

3.3.1.5. Loss or destruction

Can a capital gain or loss arise with respect to an NFT where the underlying asset is destroyed, such as when the private key to the wallet is lost, the private server on which the JPEG file is stored fails, some other loss of access to the metadata occurs, or the underlying physical asset is destroyed? In these circumstances, the issue that arises is whether CGT event C1 applies to bring to account the capital gain or loss in respect of the NFT. Morton and Curran (2022b) describe, in detail, the argument for cryptoassets to be lost and therefore come within the scope of CGT event C1. We look to the ordinary meaning of the words "to lose" or to be "destroyed".

The meaning of "destroyed" can be either voluntary or involuntary (ATO, 1999). Destruction can be defined as "to reduce to pieces or to a useless form; ruin; spoil; demolish" (The Macquarie Dictionary [3rd ed.], as cited in ATO, 1999, p. 2). If the metadata is off-chain, such as on a private server and the server fails, the NFT is still intact. However, it becomes seemingly meaningless, as it points to something that no longer exists. Is this sufficient for it to be considered wholly destroyed or wholly lost, rather than just damaged (ATO, 1999), where this utility is destroyed? The Commissioner of Taxation's view is that it can be a destruction of a discrete and identifiable part:

> This is not to say, however, that CGT event C1 cannot happen to a discrete and identifiable part of a CGT asset – being a CGT asset in its own right – if the part is wholly lost or wholly destroyed and not just damaged. (ATO, 1999, p. 2)

In that way, we argue that the metadata could, in practice, be seen as a discrete and identifiable part, and therefore be destroyed whilst the NFT itself remains intact. This would require apportionment of the reduced cost base in order to determine the extent of the destruction (we assume that no compensation is available). The taxpayer can then continue to own the NFT, which points to nothing more than a dead pathway with minimal value.

This assumes that there is a permanence to the destruction—i.e. if the server failed, it would need to be to the extent that the NFT would never be able to reconnect with that underlying image. If the server was only temporarily down, this would not be sufficient. This is a question of fact. Importantly, the NFT coding cannot be altered—the blockchain is immutable. As such, if a new location was provided for the image, this would still not be captured within the NFT, as the NFT would include the original link. The timing of such an event is the time that the destruction is discovered or the destruction occurred, again assuming that no compensation is available (ITAA97, section 104.20[2]).

We argue, in contrast, however, that where the underlying asset continues to exist independently, there may be two CGT event C1s. Referring to our earlier example, if it is the server that has been destroyed, the reproduction, i.e. the digital version (item B), and the NFT (item C) have been destroyed. The loss of the NFT could also occur in other ways, such as via the loss of a private key or the hacking of the account.[70]

3.4. Revenue Account

Irrespective of whether or not an NFT retains artistic or gaming merits, if a non-business taxpayer does not retain the asset for mainly personal use and enjoyment, it is a CGT asset. However, we must also recognise that the activities may amount to a business, going beyond the capital account and being considered to be on revenue account.

3.4.1. Hobby v business distinction

The normal proceeds of activities that constitute a business will take on the nature of ordinary income and are consequently assessable. The existence of a business is a question of fact. The circumstances of each taxpayer have to be compared to the criteria set out by the courts in leading cases such as *Ferguson v FCT* 79 ATC 4261 and *FCT v Walker* 85 ATC 4179. Furthermore, whether activities constitute a business is also relevant in determining whether an isolated transaction is assessable. Where an isolated transaction is a normal incident of the taxpayer's business and it gives rise to a profit, it may be assessable as a result of the decision in *FCT v Myer Emporium Ltd* 87 ATC 4363.[71] However, the courts have had difficulty in determining whether isolated transactions that are outside the normal activities of the business are assessable. The decisions in *FCT v Cooling 90 ATC 4472* and *FCT v Montgomery* (1999)

[70] This is discussed further in Morton and Curran (2022b).
[71] However, not all business receipts are assessable.

198 CLR 639 show that this can depend on how widely or narrowly the courts define the normal activities of the business.[72]

With respect to the hobby/business distinction, there has been a greater focus on the analysis of a taxpayer's crypto activities as an activity of crypto trading, i.e. the equivalent to share trading. A number of taxpayers have sought clarification about whether their trading activities amounted to a business of trading cryptocurrency.[73] TR 97/11 (ATO, 1997) is relied upon in considering the indicators of carrying on a business, including, in particular, the following factors:

- "whether the activity has a significant commercial purpose or character" (ATO, 1997, paragraph 13);
- "whether the taxpayer has more than just an intention to engage in business" (ATO, 1997, paragraph 13);
- "whether the taxpayer has a purpose" and "a prospect of profit from the activity" (ATO, 1997, paragraph 13);
- "whether there is repetition and regularity of the activity" (ATO, 1997, paragraph 13);
- "whether the activity is of the same kind and carried on in a similar manner to that of the ordinary trade in that line of business" (ATO, 1997, paragraph 13);
- "whether the activity is planned, organised and carried on in a businesslike manner such that it is described as making a profit" (ATO, 1997, paragraph 13);
- "the size, scale and permanency of the activity" (ATO, 1997, paragraph 13); and,
- "whether the activity is better described as a hobby, a form of recreation or sporting activity" (ATO, 1997, paragraph 13).

However, for NFTs, the comparison will not always be with share trading. NFTs can amount to more than just an investment vehicle.[74] As already described, NFTs can represent unlimited use cases, including artwork and gaming. As such, the business in question may be a micro business relating to the arts or retail sectors. It could be a professional artist, a gallery, or a professional sportsperson[75]—or a professional gamer. The level of activity will be more varied. An art studio may not need to have the same turnover as a share trader to be regarded as a business. Virtual property within the gaming context has previously been considered by Macrae (2008).

[72] The decision in *FCT v Myer Emporium 87* ATC 4363 also indicated that the proceeds from an isolated and unusual transaction are assessable if entered into in the course of the business for the purpose of making a profit from the transaction. See also *Greig v FCT* [2020] FCAFC 25. The second stand of *FCT v Myer Emporium 87* ATC 4363 applies where there is an assignment of a right to future income and the consideration received for the assignment is based on the present value of the income stream. In this situation, the consideration will be treated as revenue and not as capital, notwithstanding that the consideration is paid in a lump sum. However, the decision in *Westfield v FCT* 91 ATC 4234 illustrates that it does not follow from the first stand of *FCT v Myer Emporium 87* ATC 4363 that every profit made in the course of a taxpayer's business activity will be of an income nature. It is necessary to show that the taxpayer had the purpose of profit-making at the time of entering the particular transaction that produced the profit.

[73] For example, private binding rulings (PBRs) PBR7910123934223 (ATO, 2018b) and PBR5010050065720 (ATO, 2018a).

[74] See, for example, *London Australia Investment Co Ltd v FCT* (1977) 7 ATR 757; *AGC (Investments) Ltd v FCT* (1992); *Smith v FCT* [2010] AATA 576; *AAT Case 4083* [2011] AATA 545.

[75] See, for example, *Stone v FCT* (2005) 59 ATR 50; *Spriggs v FCT* [2007] FCA 1817*; Riddell v FCT* (2009) 72 ATR 148.

We can contemplate other technological developments in recent years in respect to the sharing economy, such as Airbnb, Uber and eBay, all of which may result in taxpayers either needing to recognise assessable income from personal services or, alternatively, from conducting a business. Sadiq et al. (2021) suggest that, along with the ATO's Black Economy Taskforce, the use of such facilitating websites make it difficult to argue that activities amount to a hobby.

However, for the blockchain's metaverse, as earlier described, we argue that it is not so simple. Recall that the metaverse is expanding into more and more virtual realities and communities. We argue that, again, simply entering the NFT space is not in itself enough to indicate a profit motive or intent, although we know that the lack of a profit motive is also not a line in the sand (*Stone v FCT* [2005] 59 ATR 50). Table 2 presents the list of significant business characteristics arising firstly from extant precedent[76] applied to the sharing economy as described by Sadiq et al., (2021), which we then compare with the blockchain metaverse.

Whether or not a taxpayer's activities constitute a business also has a bearing on the deductibility of losses or outgoings incurred in the course of conducting these activities. The second limb of ITAA97, section 8.1 enables a taxpayer to deduct losses or outgoings necessarily incurred in carrying on a business.[77] We now consider depreciable assets and trading stock.

3.4.2. Depreciating assets

The provisions dealing with depreciating assets are contained in division 40 of the ITAA97. A depreciating asset is "an asset that has a limited effective life and can reasonably be expected to decline in value over the time it is used" (ITAA97, section 40.30[1]). The first issue that arises is whether an NFT would fall within this definition. For example, if the taxpayer was a professional gamer,[78] would the NFTs that represented the equipment used in battle fall within division 40?

Given that the equipment is intangible, it could be argued (not withstanding obsolescence and gaming lifecycles) that it will continue to exist indefinitely and not decline in value with use. However, intangibles are explicitly included, for example, where the intangible is intellectual property, such as a patent or registered design.[79] As such, there is potential for division 40 to apply. Given that artwork and intangible intellectual property can be treated as depreciating assets, we argue that there is support for our view that an NFT can also be treated as a depreciating asset. If the NFT takes on the nature of plant[80] and it is used in the production of assessable income, it can be depreciated. The effective life could be calculated on the basis of the underlying asset that the NFT represents, although if the gamer also undertook recreational activities, rendering a portion of the use private use, this would create complexities in any claim.[81]

[76] For example, *Stone v FCT* [2005] 59 ATR 50; *FCT v JR Walker* [1985] 16 ATR 331; *Ferguson v FCT* (1979) 9 ATR 873; *FCT v JR Walker* (1985) 16 ATR 331.
[77] See *Spriggs v FCT* [2007] FCA 1817; *Riddell v FCT* (2009) 72 ATR 148.
[78] Comparable to a professional sportsperson. See *Stone v FCT* (2005) 59 ATR 50; *Spriggs v FCT* [2007] FCA 1817; *Riddell v FCT* (2009) 72 ATR 148.
[79] See ITAA97, section 40.30(2)(c). This is similarly noted by Macrae (2008) on pp. 331–332.
[80] See *Wangaratta Woollen Mills FCT* (1969) 119 CLR.
[81] Discussed in Macrae (2008) on p. 333.

Table 2: Comparing the Sharing Economy with the Blockchain Metaverse

Factor	Sharing Economy Factor	Blockchain Metaverse
Profit Intention	"pricing of the services on offer would indicate an intention to profit" (Sadiq et al., 2021, p. 247).	Tokenisation, marketisation, secondary markets, and royalty stream capabilities indicate an intention to profit.
Scale and Businesslike Manner	"the scale of the operation may be small, but this does not exclude the activity from being a business if it is conducted in a businesslike manner. Conducting the activity through a sharing economy website would be evidence of a businesslike approach" (Sadiq et al., 2021, p. 247).	Scale of activity varies, from micro to macro. Scale does not preclude characterisation of a business. Open-source nature, gamification, and experimentation, mean that activities do not necessarily reflect a businesslike manner. They can reflect gaming, community, and cultural activities. Token standards and marketplaces (such as OpenSea) enable businesslike activity to be carried out and could be evidence of a businesslike approach.
Commercial Approach	"a commercial approach is evident as the sharing economy websites require a level of detail and professionalism in the offering of the service. For example, Air BNB requires details of the facilities offered in the accommodation, and they require a certain level of standard" (Sadiq et al., 2021, p.247).	Significant choice and autonomy exist. Token standards enable interoperability and standardised features. However, platforms vary in requirements and the decentralised nature of the technology generally means that, beyond terms of use and codes of conduct, there are not detailed prescriptive requirements regarding what an NFT contains, nor the level of professionalism expected in operating or participating in these platforms. Often a platform's terms of use make it clear that it does not assure the quality or standards of works produced by creators. Whether or not a platform can be considered to be taking a commercial approach is dependent on the situation. Engaging with the metaverse requires a broader set of circumstances to exist than with, for example, Uber.
System, Organisation and Methods	"the provider is required to be organised and satisfy the requirement of the sharing economy website. For example, an Uber driver is required to meet certain requirements including a vehicle inspection" (Sadiq et al., 2021, p. 247).	Significant choice and autonomy exist. Token standards enable interoperability and standardised features. However, platforms vary in requirements and the decentralised nature of the technology generally means that, beyond terms of use and codes of conduct, there are no detailed prescriptive requirements regarding either what an NFT contains or the level of professionalism expected when operating or participating in these platforms. Often, a platform's terms of use make it clear that it does not assure the quality or standards of works produced by creators. Evidence of system and organisation will be established through the use of facilitating websites, which may extrapolate into the metauniverse. However, ad hoc activities can occur, as participants can utilise the metaverse for a variety of purposes and experimentation.
Sustained, Frequent Activity	"there may or may not be sustained and frequent activities, but when these activities are undertaken, they show many of the characteristics of a business" (Sadiq et al., 2021, p. 247).	Sustained activity may still only amount to a hobby, as participants may regularly engage with a community, such as a community of gamers. The characterisation of the interactions themselves are necessary in order to establish meaningful business characterisation from frequent activities in this space.

Source: Compiled from Sadiq et al. (2021) and extended by authors.

Recall, however, in our earlier example of the artist, that the NFT may not be the only relevant asset. There could be physical or digital assets that underly the NFT that was minted. Here, we can reflect on the Commissioner of Taxation's viewpoint that artwork can also be a depreciating asset with an effective life of 100 years (ATO, 2022b). This reflects the fact that its utility does not usually decline rapidly, if at all. As such, looking to a professional artist that reproduces their physical artwork as an NFT, the underlying artwork may be a depreciable asset (or alternatively trading stock or a CGT asset).[82]

We can extend the above artwork example and assume that an art gallery creates or acquires an NFT of digital artwork and imbeds the artwork in its web page in order to enhance the page's appearance. The purpose of the web page is to market the art gallery and generate new sales. It is suggested that, in this scenario, the NFT has taken on the nature of a depreciating asset and could be depreciated over 100 years, as the NFT represents a piece of artwork (ATO, 2022b). CryptoKitties create further curious questions, as they operate in a comparable way to livestock in their ability to "breed", but would not fall within the ordinary meaning of "animal" for the purposes of primary production (ITAA97, section 995.1). If they are not held for the purpose of trading, they could, similarly, fall within the capital allowance regime. Note here that the crypto composables will again need attention, this time with respect to separately identifiable assets that may form composite items.[83] Each situation would be unique and require individual analysis.

3.4.3. Trading stock

The provisions dealing with trading stock are contained in division 70 of ITAA97. Trading stock is defined as "(a) anything produced, manufactured or acquired that is held for the purposes of manufacture, sale or exchange in the ordinary course of business and (b) live stock" (ITAA97, section 70.10). This division specifically includes the disposable proceeds from trading stock as an item of ordinary income (ITAA97, section 70.80). Could an NFT be brought to account as trading stock? The answer is yes.

An NFT can be produced or acquired by a business for the purpose of sale or exchange in the ordinary course of business. In the above artwork example, the taxpayer created an NFT over a piece of artwork and sold it to a purchaser who keeps it for personal use. If the artist was a professional artist conducting a business, it would be trading stock:

[82] The artist may also destroy the original artwork to increase the value and authenticity of the NFT.

[83] A matter of fact and degree, considering all circumstances (ITAA97, section 40.30[4]). See also ATO (2017a), now withdrawn, which considered factors such as "use", "degree of integration", "effect of attachment" and "system" (paragraph 6). Note that the tax ruling made the following statement regarding intangible depreciating assets:

> While an intangible asset may consist of a number of rights, those individual rights cannot themselves be depreciating assets unless they are capable of separate existence and listed in subsection 40.30(2). A right that forms part of an intangible asset typically cannot be separated from that intangible asset. It follows that an entity cannot hold 'part' of an intangible asset as if it were a depreciating asset. Entities can only jointly hold (that is, have a share in), the entirety of the depreciating asset. (ATO, 2017a, paragraph 20)

> • In doing so, the taxpayer may create or acquire an NFT in respect of a piece of artwork and sell it within a business setting (e.g. gallery). Through its creation, absorption costing could be applied.[84]
> • If the NFT is sold to an art gallery, the acquiring art gallery will characterise the NFT as trading stock provided it was purchased for sale or exchange in the ordinary course of art gallery business.[85]

The purchase price would be deductible[86] and the proceeds from the sale of the NFT would be assessable as ordinary income.[87]

A further issue that will arise here is the calculation of the value of closing stock (ITAA97, section 70.35). The taxpayer has a choice of valuing closing trading stock at either cost, replacement, or market value (ITAA97, section 70.45). The taxpayer can ascertain the cost of an NFT, whether as a manufacturer or purchaser. However, replacement cost is only used if replacement items are readily available and substantially the same (ATO, 1997). A problem may also arise with respect to market value given that the NFT market is immature, volatile, and reflects unique property.[88] Furthermore, obsolescence could play a bigger part, as NFTs could easily become obsolete with changing market fads.[89]

3.4.4. Royalties

It is also relevant to note that smart contracts can enable the creators to receive a percentage of subsequent sales, and track and regulate the use of their art (Chevet, 2018). In particular, this offers the potential for a second income stream following the initial sale and with respect to the secondary markets.[90] In the context of this paper, the issue arises as to whether an NFT can give rise to royalty payments. The authors suggest that the answer is yes.

For taxation purposes, the term "royalty" is defined in two ways. Firstly, the ordinary meaning of the word and, secondly, the extended statutory meaning as defined in section 6(1) of ITAA36. The ordinary meaning of royalty is based on usage. That is, a royalty at common law is a payment made by one party to another, which gives that party the right to use or exploit

[84] See ATO (1986). See also *Phillip Morris v FCT* 79 ATC 4352. The core issue here is determining what shares of fixed and variable overheads are appropriate, as well as which direct labour costs ought to apply. Contemplating our artist example, where the creation of items A, B, and C need to be clarified, if we expand our discussion beyond NFTs to cryptoassets generally, the issue of costing mined crypto coins that become trading stock becomes critical.

[85] For the gallery in receipt of the NFTs, the concept of "on hand" becomes relevant. What can be inferred from the smart contract with respect to dispositive power (i.e. being on hand)? Consider, for example, the facts and circumstances in *All States Frozen Foods v FCT* (1990) 20 ATR 1874.

[86] According to section 8.1 and subject to the conditions outlined in section 70.15 of ITAA97.

[87] According to section 6.5 and section 70.80, and subject to timing conditions outlined in section 70.5(2)(b) of ITAA97.

[88] Although note that semi-fungible tokens may be marginally better placed here.

[89] See also ATO (1993). Similarly, due to the unregulated nature of blockchain technology and its emergent stage, it is likely to be at a higher risk of loss or destruction, such as via hacks and server breakdowns etc. See the ITAA97, section 70.115 operation with respect to compensation in the event of loss or destruction. Otherwise, the effect of section 70.35 of ITAA97 means that the year-end adjustment will implicitly account for these stock reductions.

[90] Assessable either under ITAA97, section 6.5 or section 15.20. See also, more generally, Chevet (2018). The United Kingdom has a droit de suite (subject to maximum rates for the creator), whilst the United States' first sale doctrine precludes authors from benefitting from droit de suite. Australia has the Resale Royalty Right for Visual Artists Act 2009, allowing for a 5% royalty in relation to the sale price when the price is $1,000 or more (Copyright Agency Resale Royalty, n.d.).

intellectual property of physical assets of another party, and the payment is directly or indirectly based on the usage or exploitation (*McCauley v FCT* [1944] 69 CLR 235; *Stanton v FCT* [1955] 92 CLR 630). The extended statutory definition is designed to recharacterise some types of payment as royalties when they may not be royalties according to the ordinary meaning of the term. The definition of royalty or royalties:

> includes any amount paid or credited, however described or computed, and whether the payment or credit is periodical or not, to the extent to which it is paid or credited, as the case may be, as consideration for: [for example]
> (a) the use of, or the right to use, any copyright, patent, design or model, plan, secret formula or process, trade mark, or other like property or right;
> (b) the use of, or the right to use, any industrial, commercial or scientific equipment;
> (c) the supply of scientific, technical, industrial or commercial knowledge or information…(ITAA36, section 6[1]).

The Commissioner of Taxation has taken the view that the right to use has taken on a wide meaning but that it does not include a contract for service (ATO, 1991). The purpose of this extended definition is to bring certain payments into the tax system for international tax purposes. Australia has entered into international double tax agreements that provide it with the right to impose withholding tax on royalty payments to non-residents. The section 6(1) definition is designed to expand the type of payments that are subject to a royalty withholding tax. It could be noted that section 6C of ITAA36 deems royalties that fall within the statutory definition to have an Australian source, therefore, to be subject to withholding tax when paid to a non-resident.

4. CONCLUDING REMARKS

NFTs create a broad range of complex tax issues and have the potential to make both unexpected gains and losses. Depending on their characterisation, vastly different outcomes can ensue. Particular consideration is required in regard to the special rules for collectables and personal use assets in contrast with general CGT assets in Australia; or, where the activities may amount to the carrying on of a business. Adequate record keeping beyond ledger entries of buying/selling activities is required in order to ensure that the tax implications can be adequately ascertained: i.e. the *who*, *what*, *how*, and *when*.

The Bragg Report (Commonwealth of Australia, 2021)'s push towards tax reform seeks an expansion of targeted treatment for certain categories of CGT assets or events, whilst the Board of Taxation completed a broader review of the taxation of digital assets and transactions, which was delivered to the government in early 2024. The outcomes of these reviews are yet to be published, but even if reforms are swiftly enacted, there is potential for them to occur without retroactive application and, therefore, lead to persisting issues via grandfathering, or a failure to adequately capture the pervasiveness of the crypto economy. We anticipate that there would be a continued period of complexity and challenge for taxpayers and tax practitioners alike. Any reform will need to balance the protection against revenue leakage and simplification of the compliance burden, whilst reflecting an understanding that the metaverse is an *alternate* digital universe to the one that we are so used to perceiving.

The traditional counterpart has facilitated neither the same capacity for ATO oversight or monitoring, nor necessarily led to the same level of complex tax compliance that the digital

metaverse is creating. Although collectable activities, such as CryptoKitties, appear somewhat trivial, we can, as can be seen through trading, experience a sudden shift in high value and high loss activities, which for the Australian tax system can lead to (perhaps unintended or unexpected) tax implications for taxpayers. Critically, for the next generation of "gamers", this can lead to the unintended trading of CGT assets resulting in realised taxable gains and losses. Tax compliance issues, whether consisting of the failure to disclose (intentionally or simply through lack of knowledge) or the incurrence of unexpected tax debts, could lead to both practical and social issues for the next generation embracing digitalised economies.[91]

Moreover, the interaction between on-chain and off-chain cannot be dismissed—and will not always be captured by the transparency of the technology. Blockchain offers a snapshot but cannot adequately capture the context—which is critical. With this in mind, we see, contemporaneously, a potential blurring or difficulty in conceptualising these tokens as either artwork or games, which again stems from the shift towards digitally native assets. Underpinning blockchain technology is the commodification of traditionally private—and personal—goods. Blockchain technology enables personal items to become transparent, on tax authorities' radar and, therefore, scrutinised. This is a stark contrast to their traditional counterparts—the ATO does not look through the walls of a taxpayer's house and review the dynamic blend of personal use assets, such as the knick-knacks on the walls that may include a taxpayer's gaming merchandise. The traditional tax system reflects this and recognises the balance involved in establishing the compliance burden and meeting its objectives.

Traditionally, equivalent activities would not have incurred the same sense of scrutiny. Transactional data was not so readily available to blur the lines between investment and personal usage. This reflects the inherent nature of this technology, of Web3, and of a digitalised, decentralised economy. However, the core issue here is whether the ability of a taxpayer to yield value from assets, together with the increasing ease at which commodification can occur, ought not to preclude these assets from being considered as personal use assets (or collectables)? The introduction of blockchain technology marks a clear distinction from the traditional notion of personal assets and collectables. It breaks down barriers. Buy, swap, and sell websites, such as eBay, were early examples demonstrating the ability to commodify, and gain from, personal use assets.

Within the blockchain metaverse, there are communities upon communities that are created through shared interests, whether participants enter to play or share their interests. As already noted, we recognise that *Favaro v FCT* (1996) ATC 4975 and the Commissioner of Taxation suggest that there is mutual exclusivity: with blockchain technology, participants cannot escape the inherent commodification. However, this does not preclude cryptoassets' main use from being personal use or enjoyment.

From one perspective, we recognise that NFTs have the potential to result in cracks in government revenues through the volatility in values and, therefore, the risks of tax losses. Taxpayers risk losses through participating in uncertain and novel ventures, and could succumb to scams and rug pulls. Yet, we are on the cusp of the tax system inadvertently discriminating between the digital and traditional means of being and thus risk the erosion of something that is mainly for personal use or enjoyment. We must recognise that policy reform will be truly challenged as the (crypto) environment reflects participation at a dynamic and individualistic level.

[91] This is an issue regularly raised within blockchain circles. See also Morton et al. (2023).

Part of this digitalised economy is, perhaps, the increasing capacity to yield value from what traditionally would have been seen as assets that depreciate. The ability of blockchain technology to erode the fundamental expectation of depreciation of value in personal use assets, combined with the complexity in compliance and capacity of the tax authority to scrutinise, is central to the dilemma of tax *compliance* with respect to NFTs. Recall the words of Cooper et al. (2020):

> A combination of policy and administrative concerns explain the separate identification of these assets and the special rules that apply to them. The policy concerns relate to the fact that most personal-use assets depreciate in value due to use. To allow a taxpayer to recognise a capital loss on the decline in value of her or his refrigerator, stove, bed, and so forth would be tantamount to allowing a tax deduction for personal consumption; that would violate fundamental principles of income taxation. The administrative concerns arise mostly because of the relatively small cost of many personal assets. Taxpayers are unlikely to retain records of cost or sale price and it is unlikely that any paper trail will be available for auditors; in any case, the amount of tax imposed on the small gains would probably not equal the cost of administering CGT with respect to these assets. (p. 103)

Blockchain technology—NFTs—are fundamentally challenging this premise. Blockchain technology, despite its growing virtual alternative to physicality, erodes the personal use concept through the very characteristics that yield so much attention: its transparency and capacity for scrutiny. This is a conundrum that policymakers must recognise when contemplating tax reform.

BIBLIOGRAPHY

Adajian, T. (2018, August 14). The definition of art. In E. N. Zalta (Ed.), *The Stanford encylopedia of philosophy*. https://plato.stanford.edu/archives/fall2018/entries/art-definition/

Animoca Brands Corporation Limited. (2019). *F1 Delta Time – White paper* (Version 1.0). Animoca Brands Corporation. https://images.animocabrands.com/wp-content/uploads/2019/06/F1-Delta-Time-White-Paper-v1.0.pdf

Australian Government. (2021). *Transforming Australia's payments system*. Commonwealth of Australia. https://treasury.gov.au/sites/default/files/2021-12/p2021-231824_1.pdf

Australian Government, The Treasury. (2023). *Token mapping: Consultation paper*. Commonwealth of Australia. https://treasury.gov.au/consultation/c2023-341659

Australian Taxation Office. (n.d.-a). *Crypto asset investments*. Australian Government. https://www.ato.gov.au/individuals-and-families/investments-and-assets/crypto-asset-investments

Australian Taxation Office. (n.d.-b). *Crypto asset transactions*. Australian Government. https://www.ato.gov.au/individuals-and-families/investments-and-assets/crypto-asset-investments/transactions-acquiring-and-disposing-of-crypto-assets/crypto-asset-transactions

Australian Taxation Office. (n.d.-c). *Crypto assets 2014-15 to 2022-23 data-matching program protocol*. Australian Government. https://www.ato.gov.au/about-ato/commitments-and-reporting/in-detail/privacy-and-information-gathering/how-we-use-data-matching/crypto-assets-2014-15-to-2022-23-data-matching-program-protocol

Australian Taxation Office. (n.d.-d). *Lifestyle assets data-matching program*. Australian Government. https://www.ato.gov.au/about-ato/commitments-and-reporting/in-detail/privacy-and-information-gathering/how-we-use-data-matching/lifestyle-assets-2013-14-to-2022-23-data-matching-program-protocol/lifestyle-assets-data-matching-program

Australian Taxation Office. (n.d.-e) *Non-fungible tokens*. Australian Government. https://www.ato.gov.au/individuals-and-families/investments-and-assets/crypto-asset-investments/transactions-acquiring-and-disposing-of-crypto-assets/non-fungible-tokens

Australian Taxation Office. (n.d.-f). *Ruling compendium: TD 2014/25EC*. Australian Government. https://www.ato.gov.au/law/view/document?LocID=%22CTD%2FTD2014EC25%2FNAT%2FATO%2F00001%22&PiT=99991231235958

Australian Taxation Office. (n.d.-g). *Taxation determination: TD 2014/26*. Australian Government. https://www.ato.gov.au/law/view/document?LocID=%22TXD%2FTD201426%2FNAT%2FATO%22&PiT=99991231235958

Australian Taxation Office. (n.d.-h). *Transactions – acquiring and disposing of crypto assets*. Australian Government. https://www.ato.gov.au/individuals-and-families/investments-and-assets/crypto-asset-investments/transactions-acquiring-and-disposing-of-crypto-assets

Australian Taxation Office. (1986). *Taxation ruling: IT 2350 – Income tax : value of trading stock on hand at end of year : cost price : absorption point*. Australian Government. https://www.ato.gov.au/law/view/document?LocID=%22ITR%2FIT2350%2FNAT%2FATO%22&PiT=20220119000001/1000

Australian Taxation Office. (1990, May 10). *Taxation ruling: IT 2585 (Withdrawn) – Income tax: Capital gains: Hobbyists – Acquisition and sale of non-listed personal use assets*. Australian Government. https://www8.austlii.edu.au/au/other/rulings/ato/ATOITR/1990/itr1990-2585/itr1990-2585.html

Australian Taxation Office. (1991, November 28). *Taxation ruling: IT 2660 – Income tax: definition of royalties*. Australian Government. https://www.ato.gov.au/law/view/document?docid=ITR/IT2660/NAT/ATO/00001

Australian Taxation Office. (1992a). *Taxation determination: TD 92/198 – Income tax: when can a taxpayer elect to use replacement value for valuation of trading stock under section 70-45 of the Income Tax Assessment Act 1997?* Australian Government. https://www.ato.gov.au/law/view/view.htm?docid=TXD/TD92198/NAT/ATO/00001&PiT=99991231235958

Australian Taxation Office. (1992b). *Taxation ruling: IT 2668 - Income tax: Barter and countertrade transactions* [1992] ATOITR IT2668 (13 February 1992). Australian Government. https://www8.austlii.edu.au/au/other/rulings/ato/ATOITR/1992/itr1992-2668/itr1992-2668.html

Australian Taxation Office. (1993). *Taxation ruling: TR 93/23 – Income tax: valuation of trading stock subject to obsolescence or other special circumstances*. Australian Government. https://www.ato.gov.au/law/view/document?docid=txr/tr9323/nat/ato/00001

Australian Taxation Office. (1997). *Taxation ruling: TR 97/11 – Income tax: am I carrying on a business of primary production?* Australian Government. https://www.ato.gov.au/law/view/document?docid=txr/tr9711/nat/ato/00001

Australian Taxation Office. (1999, December 15). *Taxation determination: TD 1999/79 – Income tax: capital gains: does the expression 'lost or destroyed' for the purposes of CGT event C1 in subsection 104-20(1) of the Income Tax Assessment Act 1997 apply to: (a) a voluntary 'loss' or 'destruction'? (b)intangible assets.* Australian Government. https://www.ato.gov.au/law/view/pdf/pbr/td1999-079.pdf

Australian Taxation Office. (2002). *Interpretative decision: ATO ID 2002/795 - Income tax capital gains: personal use asset - floor tiles*. Australian Government. https://www.ato.gov.au/law/view/document?docid=AID/AID2002795/00001

Australian Taxation Office. (2003). *Interpretative decision: ATO ID 2003/451 - Income Tax CGT: personal use assets - gold nuggets.* Australian Government.

Australian Taxation Office. (2011a). *Interpretative decision: ATO ID 2011/9 (Withdrawn) - Capital gains tax: collectable - art work acquired for investment.* Australian Government.

Australian Taxation Office. (2011b). *Interpretative decision: ATO ID 2011/37 - CGT small business concessions: maximum net asset value test – disregarded assets – assets being used solely for personal use and enjoyment*. Australian Government. https://www.ato.gov.au/law/view/document?docid=AID/AID201137/00001m

Australian Taxation Office. (2017a). *Draft taxation ruling: ATO TR 2017/D1 – Income tax composite items and identifying the depreciating asset for the purposes of working out capital allowances*. Australian Government. https://www.ato.gov.au/law/view/document?DocID=DTR%2FTR2017D1%2FNAT%2FATO%2F00001&PiT=99991231235958&path=law&path=view&path=document

Australian Taxation Office. (2017b). *Notice of withdrawal taxation ruling – Income tax: capital gains: hobbyists – acquisition and sale of non-listed personal-use assets.* Australian Government. https://www.ato.gov.au/law/view/pdf/pbr/it2585w.pdf

Australian Taxation Office. (2018a). *Private binding ruling: ATO PBR 5010050065720 – Income tax – assessable income – business and professional income – carrying on a business.* Australian Government.

Australian Taxation Office. (2018b). *Private binding ruling: ATO PBR 7910123934223 – Cryptocurrency.* Australian Government.

Australian Taxation Office. (2019, April 29). *ATO receives cryptocurrency data to assist tax compliance* [Press release]. Australian Government. https://www.ato.gov.au/media-centre/ato-receives-cryptocurrency-data-to-assist-tax-compliance

Australian Taxation Office. (2020). *Private binding ruling: ATO PBR 1051694175099: Cryptocurrency – non-fungible tokens*. Australian Government. https://www.ato.gov.au/law/view/document?docid=EV/1051694175099

Australian Taxation Office (2022a) How our advice and guidance protects you. Australian Government. https://www.ato.gov.au/general/ato-advice-and-guidance/how-our-advice-and-guidance-protects-you/.

Australian Taxation Office. (2022b). *Taxation ruling: TR 2022/1 – Income tax: effective life of depreciating assets (applicable from July 2022).* Australian Government. https://www.ato.gov.au/law/view/document?DocID=TXR/TR20221/NAT/ATO/00001

Avan-Nomayo, O. (2021, February 01). Digital art project sells out $10m in NFTs in four days. *Cointelegraph*. https://cointelegraph.com/news/digital-art-project-sells-out-10m-in-nfts-in-four-days

Berg, C., Davidson, S., & Potts, J. (2019). *Understanding the blockchain economy: An introduction to institutional cryptoeconomics*. Edward Elgar Publishing.

Berg, C., Potts, J., & Davidson, S. (2018). KodakOne could be the start of a new kind of intellectual property. *The Conversation*. https://theconversation.com/kodakone-could-be-the-start-of-a-new-kind-of-intellectual-property-89966

Bevacqua, J., Marsden, S., Morton, E., Xu, L., Devos, K., Morgan, A. (2022). *Australian Taxation* (2nd ed.). Wiley.

Board of Taxation (n.d.) *Review of the tax treatment of digital assets and transactions in Australia.* https://taxboard.gov.au/review/digital-assets-transactions-aus

Cameron, C. (2020). The regulation of cryptocurrency to remunerate employees in Australia. *Australian Journal of Labour Law*, *33*(2), 157–182.

Case, A. (2015, October 04). Why the internet needs IPFS before it's too late. *TechCrunch*. https://techcrunch.com/2015/10/04/why-the-internet-needs-ipfs-before-its-too-late/

Chalmers, J., & Jones, S. (2022, June 22). *Crypto not taxed as foreign currency* [Press release]. Ministers: Treasury Portfolio. https://ministers.treasury.gov.au/ministers/jim-chalmers-2022/media-releases/crypto-not-taxed-foreign-currency

Chevet, S. (2018). *Blockchain technology and non-fungible tokens: Reshaping value chains in creative industries* [Master's thesis, HEC Paris]. SSRN. https://doi.org/10.2139/ssrn.3212662

Chipolina, S. (2021, August 23). Visa buys CryptoPunk NFT for $165,000 in Ethereum. *Decrypt*. https://decrypt.co/79163/visa-buys-cryptopunk-nft-nearly-50-eth

CoinGecko. (n.d.). *Wrapped virgin gen-0 cryptokitties*. https://www.coingecko.com/en/coins/wrapped-virgin-gen-0-cryptokitties

Commissioner of Taxation, Australian Taxation Office. (2016, February). *Notice of data matching program – Lifestyle assets (Gazette C2016G00243).* https://www.legislation.gov.au/Details/C2016G00243

Commonwealth of Australia. (2021). *The senate: Select committee on Australia as a technology and financial centre: Final report.* Commonwealth of Australia. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Financial_Technology_and_Regulatory_Technology/AusTechFinCentre/Final_report

Cooper, G. S. (2015). The defective jigsaw. *Australian Tax Forum*, 30, 783–817.

Cooper, G., Dirkis, M., Stewart, M., & Vann, R. (2020). *Income taxation: Commentary and materials* (9th ed.). Thompson Reuters(Professional) Australia Ltd.

Copyright Agency Resale Royalty. (n.d.). *About resale royalty*. https://www.resaleroyalty.org.au/About.aspx

CryptoKitties. (n.d.-a). *About*. https://www.cryptokitties.co/about

CryptoKitties. (n.d.-b). *Cost to play*. https://guide.cryptokitties.co/guide/gas/cost-to-play

CryptoKitties. (n.d.-c). *Faq*. https://www.cryptokitties.co/faq

CryptoKitties. (n.d.-d). *Homepage*. https://www.cryptokitties.co/

CryptoKitties. (2018, May 17). The ethereal summit and the $140K cat. *CryptoKitties, Medium*. https://medium.com/cryptokitties/the-ethereal-summit-and-the-140k-cat-a3b561545a44

CryptoKitties craze slows down transactions on Ethereum. (2017, December 05). *BBC News*. https://www.bbc.co.uk/news/technology-42237162

The CryptoKitties Team. (n.d.). *CryptoKitties: Collectible and breedable cats empowered by blockchain technology: White Pa-purr* [White paper]. CryptoKitties.

DappRadar. (2021, February 02). Dapp industry report: January 2021. *DappRadar*. https://dappradar.com/blog/dapp-industry-report-january-2021

de Zilva, N. (2018). The evolving tax treatment of cryptocurrencies. *Taxation in Australia, 52*(7), 372–374.

The Digital Millennium Copyright Act. (1998). https://www.copyright.gov/dmca/

Emery, J. (2016). *Decoding the regulatory enigma: How Australian regulators should respond to the tax challenges presented by bitcoin* (Tax and Transfer Policy Institute Working Paper 1/2016). Crawford School of Public Policy, Australian National University. https://doi.org/10.2139/ssrn.2730966

Evans. C., Kayis-Kumar, A., & Russell, T. (2018). *Australian CGT handbook, 2018-19*. Thomson Reuters (Professional) Australia Ltd.

Evans, T. M. (2019). Cryptokitties, cryptography, and copyright. *American Intellectual Property Law Association Quarterly Journal*, *47*(2), 219–247.

Finzer, D. (2020, January 10). The non-fungible token bible: Everything you need to know about NFTs. *OpenSea Blog*. https://blog-v3.opensea.io/articles/non-fungible-tokens#What_is_a_non-fungible_token

Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., Perkins, J., Morgan, J., & Hernández, S. (2019). *Crypto art: A decentralized view*. Arxiv. https://arxiv.org/pdf/1906.03263.pdf

Hashmasks. (n.d.-a). *Frequently asked questions*. https://www.thehashmasks.com/faq

Hashmasks. (n.d.-b). *Gallery*. https://www.thehashmasks.com/gallery

Hashmasks. (n.d.-c). *Home*. https://www.thehashmasks.com/

Hashmasks. (n.d.-d). *NCT token*. https://www.thehashmasks.com/nct

Hashmasks. (n.d.-e). *Overview*. https://www.thehashmasks.com/overview

Hashmasks. (2021, March 17). On the permanence of the hashmasks artwork. *TheHashmasks, Medium*. https://thehashmasks.medium.com/on-permanence-of-the-hashmasks-artwork-50abd16baa55

Heydon, J. D. (2015). How far can trial courts and intermediate appellate courts develop the law? *Oxford University Commonwealth Law Journal*, *9*(1), 1–46. https://doi.org/10.1080/14729342.2009.11421499

The Income Tax Assessment Act 1936 (Australia). https://classic.austlii.edu.au/au/legis/cth/consol_act/itaa1936240/

The Income Tax Assessment Act 1997 (Australia). http://www5.austlii.edu.au/au/legis/cth/consol_act/itaa1997240/index.html

James, N., Field, R., & Walkden-Brown, J. (2019). *The new lawyer: Foundations of law* (2nd ed.). Wiley.

JTobcat. (2021, January 20). Neon pizza: How to play guide. *Blockade Games, Medium*. https://medium.com/blockadegames/neon-pizza-how-to-play-guide-5a4cc33b286f

Kahan, D. (2021, March 31). Do you really* own your NFT? Chances are, you don't. *The Defiant*. https://thedefiant.io/do-you-really-own-your-nft-chances-are-you-dont

Khezr, P., & Mohan, V. (2021). Property rights in the crypto age: NFTs and the auctioning of limited edition artwork. *SSRN*. https://doi.org/10.2139/ssrn.3900203

Kirby, M. (2005). "Judicial activism"? A riposte to the counter-reformation. *Otago Law Review*, *11*(1), 1–16.

Lane, R. (2022, April 05). F1 Delta Time, one of the first major NFT games, has shut down. *PC Gamer*. https://www.pcgamer.com/f1-delta-time-one-of-the-first-major-nft-games-has-shut-down/

Larva Labs. (n.d.). *CryptoPunks*. https://www.larvalabs.com/cryptopunks

Leland. (2018, August 07). The great dapp takeover. *Blockchain at Berkeley, Medium*. https://medium.com/blockchain-at-berkeley/the-great-dapp-takeover-5c82eb4cbc96

Liao, S. (2017, December 13). This man has made more money trading cryptokitties than investing in his IRA. *The Verge*. https://www.theverge.com/2017/12/13/16754266/cryptokitties-ethereum-ether-game-cats

Lockyer, M. (2018a). Crypto composables — Building blocks and applications. *Coinmonks, Medium*. https://medium.com/coinmonks/crypto-composables-building-blocks-and-applications-65902709298c

Lockyer, M. (2018b). Crypto composables ERC-998 update #2. *Coinmonks, Medium*. https://medium.com/coinmonks/crypto-composables-erc-998-update-2-4b160df79836

Lockyer, M. (2018c). Introducing crypto composables. *Coinmonks, Medium*. https://medium.com/coinmonks/introducing-crypto-composables-ee5701fde217

Macrae, M. (2008). Taxation of virtual property. *Tax Specialist*, *11*(5), 324–333 & 335–338.

MakersPlace. (n.d.). *Frequently asked questions*. https://makersplace.com/faq/

Malwa, S. (2021, February 06). Secret message reveals 'rarest masks' in DeFi NFT project hashmasks. *CryptoSlate*. https://cryptoslate.com/secret-message-reveals-rarest-masks-in-defi-nft-project-hashmasks/

MH10K. (2018). I wasn't playing cryptokitties when kittyhats was launched. *Medium*. https://jphornbrook.medium.com/i-wasnt-playing-cryptokitties-when-kittyhats-was-launched-639b3366f280

Morton, E., & Curran, M. (2022a). Technical and legal aspects of tax debt collection and cryptocurrencies. *Australian Tax Forum*, *37*(1), 1–26.

Morton, E., & Curran, M. (2022b). The loss and destruction of cryptocurrencies and CGT event C1. *The Tax Specialist*, *25*(3), 145–151.

Morton, E., Curran, M., & Hinchcliffe, S. (2021). COVID-19 responses and the contemplative worker's home occupancy expense claim. *Australian Tax Review*, *50*(2), 81–104.

Morton, E., Devos, K., Vesty, G. & Nguyen, L. (2023). The crypto-economy and tax practitioner competencies: An Australian exploratory study. *eJournal of Tax Research, 21*(2), 203–252.

Morton, E., Lloyd, D., Greig, L. & Dell, H. (2024). The ATO compliance approach: evolving ATO web guidance and crypto token wrapping. *The Tax Specialist*, *27*(4), 209–218.

Nerd, T. [@PetrolHeadDE]. (2021, February 04). *I wondered, what the Moby Dick bookpage as a background on my mask shall mean. I think I found it!* [Image attached]. [Post]. X. https://twitter.com/PetrolHeadDE/status/1357349067169255428

OpenSea. (n.d.-a). *BlockHorses*. https://opensea.io/collection/blockhorses

OpenSea. (n.d.-b) *What is minting?* https://opensea.io/learn/nft/what-is-minting-nft

OpenSea. (n.d.-c). *Who pays the gas fees on OpenSea?* https://support.opensea.io/hc/en-us/articles/360061699514-Who-pays-the-gas-fees

Pirovich, J. (2021). Shifting to more equitable and DAO-based global economies: The case for micro auto-taxing standards and a framework for auto-tax revenue-sharing. *Australian Tax Review*, *50*(4), 221–233.

PricewaterhouseCoopers. (2021). *PwC annual global crypto tax report 2021*. PwC. https://www.pwc.com/gx/en/insights/pwc-annual-global-crypto-tax-report-2021.pdf

Ram, A. J. (2018). Taxation of the bitcoin: Initial insights through a correspondence analysis. *Meditari Accountancy Research, 26*(2), 214–240. https://doi.org/10.1108/MEDAR-10-2017-0229

Rarible. (n.d.). Rarible help center: What is verification and how do I apply? *Rarible.com*. https://help.rarible.com/hc/en-us/articles/360060619032-What-is-verification-and-how-do-I-apply-

Rarible. (2020, October 10). Rarible terms of service. *Rarible.com*.

Reichert, C. (2021, March 09). Twitter CEO Jack Dorsey is selling his first tweet ever as an NFT worth millions. *CNET*. https://www.cnet.com/tech/mobile/twitter-ceo-jack-dorsey-is-selling-his-first-tweet-ever-as-an-nft-worth-millions/

The Resale Royalty Right for Visual Artists Bill 2009 (Australia).

Richter, C., Kraus, S., & Bouncken, R. B. (2015). Virtual currencies like bitcoin as a paradigm shift in the field of transactions. *International Business & Economics Research Journal*, *14*(4), 575–586. https://doi.org/10.19030/iber.v14i4.9350

Russell, K. (2021, September 03). The loot project flips the script on NFTs. *TechCrunch*. https://techcrunch.com/2021/09/03/loot-games-the-crypto-world/

Sadiq, K., Black, C., Hanegbi, R., Krever, R. E., Jogarajan, S., Obst, W., & Ting, A. K. F. (2021). *Principles of taxation law* (14th ed.). Thomson Lawbook Co. Australia.

SaladChefs. (2021, February 16). We're all hashmasks: How NFT art will define the web. *Salad, Medium*. https://medium.com/salad-technologies/were-all-hashmasks-how-nft-art-will-redefine-the-web-cd0bcf02ae2e

Sedgwick, K. (2018, March 23). Crypto collectibles are worthless without a website. *Bitcoin.com*. https://news.bitcoin.com/crypto-collectibles-are-worthless-without-a-website/

Shorish, J., Stephenson, M., & Zargham, M. (2021). *A practical theory of fungibility* (WU Interdisciplinary Research Institute for Cryptoeconomics, Working Paper 1/2021). Vienna University of Economics and Business. https://research.wu.ac.at/ws/portalfiles/portal/19011638/Formalizing_Fungibility.pdf

Sihvonen, T., Serada, A., & Harviainen, J. T. (2019). CryptoKitties and the new ludic economy: How blockchain introduces value, ownership, and scarcity in the digital world. *Proceedings of DiGRA 2019, the 12th Digital Games Research Association Conference, 6-10 August 2019, Kyoto, Japan*. http://www.digra.org/wp-content/uploads/digital-library/DiGRA_2019_paper_103.pdf

Smith, C. [@corwintines], Schulz, J. [@JohannesSchulz97], Shorewala, V. [@vardhanshorewala], Ponnan, J. P. [@MrJithil], Wackerow, P. [@wackerow], Pilehchiha, S. [@spilehchiha], Gyver, M. [@MatthieuScarset], Ira [@irakojf], Almidan, H. [@Hakeemmidan], Yilmaz, E. Y. [@ensaryusuf], Slightlyfloating [@slightlyfloating], Cordell, R. [@ryancreatescopy], Richards, S. [@samajammin], Gontijo, A [@arturgontijo]. (n.d.). ERC-20 token standards. *Ethereum.org*. https://ethereum.org/en/developers/docs/standards/tokens/erc-20/

spencecoin.eth [@spencecoin]. (2021, February 03). *Woah, some hashmasks can be pieced together like a puzzle?!* 👀 [Image attached] [Post]. X. https://twitter.com/spencecoin/status/1356816149053284352

Srinivasan, S. (2017, May 27). Thoughts on tokens: Tokens are early today, but will transform technology tomorrow. *news.earn.com, Medium*. https://news.earn.com/thoughts-on-tokens-436109aabcbe

Telford, T. (2021, May 24). Charlie's last bite: Viral video will leave YouTube after fetching $760,999 in NFT auction. *The Washington Post*. https://www.washingtonpost.com/business/2021/05/24/charlie-bit-my-finger-nft/

Tepper, F. (2017, February 03). People have spent over $1M buying virtual cats on the Ethereum blockchain. *TechCrunch*. https://techcrunch.com/2017/12/03/people-have-spent-over-1m-buying-virtual-cats-on-the-ethereum-blockchain/

Thurman, A. (2020, November 08). 300 ETH sale caps wild week for Axie Infinity. *Cointelegraph*. https://cointelegraph.com/news/300-eth-sale-caps-wild-week-for-axie-infinity

Treasury Laws Amendment (Measures for Consultation) Bill 2022. https://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/Bills_Search_Results/Result?bId=r6946

Tse, N. (2020). Decentralised autonomous organisations and the corporate form. *Victoria University of Wellington Law Review, 51*(2), 313–356. https://doi.org/10.26686/vuwlr.v51i2.6573

The UK Jurisdiction Taskforce. (2019). *Legal statement on cryptoassets and smart contracts*. The LawTech Delivery Panel.

Wrapped Kitties. (n.d.). *Home*. https://wrappedkitties.com/

Xie, L. (2021, January 4). *A beginner's guide to NFTs*. https://linda.mirror.xyz/df649d61efb92c910464a4e74ae213c4cab150b9cbcc4b7fb6090fc77881a95d

Young, J. (2017, December 11). CryptoKitties sales hit $12 million, could be Ethereum's killer app after all. *Cointelegraph*. https://cointelegraph.com/news/cryptokitties-sales-hit-12-million-could-be-ethereums-killer-app-after-all