

THE ENTANGLED VIRTUAL ECONOMY

by

Rob Cripps  
A Dissertation  
Submitted to the  
Graduate Faculty  
of  
George Mason University  
in Partial Fulfillment of  
The Requirements for the Degree  
of  
Doctor of Philosophy  
Economics

Committee:

Richard E. Wagner

Director

Carl Hays

CR Coyne

Q. B. N.

Department Chairperson

CR Coyne

Program Director

M. J. King

Dean, College of Humanities  
and Social Sciences

Date: April 1, 2022

Spring Semester 2022  
George Mason University  
Fairfax, VA

The Entangled Virtual Economy

A Dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy at George Mason University

by

Robert B Cripps  
Masters of Systems Engineering  
The George Washington University, 2014  
Bachelor of Science  
Westminster College, 2002

Director: Richard E. Wager, Professor  
Department of Economics

Spring Semester 2022  
George Mason University  
Fairfax, VA

Copyright 2022 Robert B Cripps  
All Rights Reserved

## **DEDICATION**

This is dedicated to my loving wife Chelsea, and my four wonderful children Gideon, Serenity, Gavin, and Jasper.

## **ACKNOWLEDGEMENTS**

I would like to thank the many friends, relatives, and coworkers who supported me along the way. My loving wife, Chelsea, listened to me endlessly spin, form, and refine ideas. My children played games with me and explained many of their rules to me as part of my research. My study group, which included Bryan Cutsinger, Slade Mendenhall, Patricia Saenz Armstrong, Eric Wilhelm, Malhaz Jibladze, John Vandivier, John Schuler, and Josh Ingber, enlightened and encouraged one another the whole way. I also must thank Professor Richard Wagner for believing in me, being interested in my topic, and giving me the chance to explore it.

## TABLE OF CONTENTS

	Page
Abstract.....	vii
Chapter One .....	1
What is a Virtual Environment?.....	1
The Growing Popularity of Virtual Environments.....	3
Case 1: Virtual Environments can teach us economic truths about the real world.....	3
Case 2: People are increasingly using Virtual Environments to further their real-world ends.....	10
Case 3: The Economies in Virtual Environments are rich and complex .....	14
Case 4: Virtual Environments form genuine societies .....	21
Case 5: All of the above activities are overlapping with real life with increasing commonality.....	31
Conclusion.....	37
Chapter Two.....	38
Introduction .....	38
De Soto and his work .....	39
The History of Virtual Property part I: Digital Ownership of Digital Items: .....	40
History of Virtual Property part II: Real Money to Lease Virtual Items .....	44
The History of Virtual Property Rights part III: Personal Ownership of Digital Goods .....	47
Why did Virtual Property Rights Emerge? .....	52
Conclusion.....	63
Chapter Three.....	64
Introduction .....	64
What is Web 3.0? .....	64
New Rule Creation in Virtual Environments Today .....	66
The Demand for Regulation.....	68
Child Labor and Company Scrip.....	68
Virtual Sex Work.....	70
Intellectual Property Theft.....	74
Cyberstalking/Sexual Assault.....	79

Data/Privacy Management .....	83
Fraud .....	85
Virtual Slavery.....	86
The Political Economy of Virtual Regulations .....	89
The Difficulty With Online Regulation .....	93
EVE Online (Autocracy) .....	94
Final Fantasy XIV (Democracy) .....	97
Minecraft 2b2t (Anarchy).....	99
Conclusion.....	102
References.....	103

## **ABSTRACT**

### **THE ENTANGLED VIRTUAL ECONOMY**

Robert B Cripps, Ph.D.

George Mason University, 2022

Dissertation Director: Dr. Richard E. Wager

This dissertation discusses virtual environments, their dramatic increase in use in recent decades, and the implications for economic and legal activity.

Chapter 1 discusses how virtual environments are places of increasing amounts of human activity in type, number, and complexity. Entire new economies are being created, communities are forming, new social norms within and across virtual environments are emerging. Property laws are evolving, real-world governments are interacting with virtual worlds through taxation and legal enforcement. Recently Robux outperformed the Ruble, and at one point an Everquest server equaled the GDP of Bulgaria. An increasing number of people are earning their living online, interacting with digital services and items. This paper explores the implications for economists of this new area of human activity.



Chapter 2 explores the economic theory of virtual property rights, using Hernando de Soto's theory of "Dead Capital," discussing the ways in which people benefit from having intentional and legal title of their virtual property. (U) When people own either their real or virtual property, they can sell it, borrow against it, use it to make a living, and pass it to their heirs. This chapter also discusses the evolution of virtual property - from gaming console cartridges in the 1970s, to leased property in the 2000s, to Web 3.0 and individual ownership of virtual goods - and the economic incentives that caused movement in that direction.

Chapter 3 discusses potential demand for real-world governmental oversight of virtual spaces and transactions. Unsavory and criminal activity have always occurred online in virtual spaces. Those spaces have never been as popular, nor as high-stakes as they are today, due to the new technology of virtual ownership and the increased amounts of money being spent in these environments. Because of this popularity and increased stake, demand for what users see as predictable, universal, and fair rules of governance surrounding their property will likely increase. The paper explores the sources of some of the likely demand, and some potential difficulties in implementation.

## **CHAPTER ONE**

### **Introduction**

The number of people using virtual environments for increasing amounts of human activity in type, number, and complexity, is growing. New economies are being created, communities are forming, new social norms within and across virtual environments are emerging. Property laws are evolving, real-world governments are interacting with virtual worlds through taxation and legal enforcement.

The field of economics should have something to say about this evolving and exploding area of human activity, but yet has not focused much in this area. This paper makes the case for an expansion of study in this area, while norms within and surrounding virtual environments are still forming.

#### **What is a Virtual Environment?**

A virtual environment is any online computer-generated environment where people (or their electronic avatars) congregate and perform human activity. Simple human interaction such as communicating via social media are virtual environments (Facebook, Instagram). More complicated interaction such as buying, selling, trading, producing, consuming, etc., are all performed in various ways in various online

environments. Everything from the Microsoft game store, where gamers log in to purchase proprietary Microsoft currency, and then purchase games, to complicated and advanced games like Second Life, where players use available materials to create new goods for each other (fashionable clothing items, new houses, etc.), and trade amongst themselves. The popular social media site Facebook once had its own currency and gaming network, and briefly qualified as a virtual economy. File trading sites such as Limewire or Kazaa could also be considered virtual economies, with their own norms, currency, and types of spontaneous order.

Virtual worlds began as text-based games in the 70s, with the famous text-based adventure game *Zork*. They exploded in the 70s and 80s, with the creation of *NetHack*, *Super Mario Brothers*, *The Legend of Zelda*. Multiplayer games were created in the late 1980s with text-based multiplayer games called MUDs, or Multi-User Dungeons (MUDs). These evolved into graphically represented worlds like *Ultima Online* and *Runescape*. Eventually in the early 2000s the most popular Massive Multiplayer Online Roleplaying Games (MMORPG) emerged, *Everquest*, *Eve Online*, and *World of Warcraft* (Kent, 2001), (Donovan, 2010).

As the worlds gained complexity by adding features for “jobs” (such as armor crafters), and currency, and auctions, and trade mechanisms, giving players the ability to interact with the environment in ways other than just killing monsters or solving puzzles, markets emerged and social interactions became more complex. Social rules were formed, humans cooperated and exchanged, and in each iteration, the complexity of the behavior increased.

## **The Growing Popularity of Virtual Environments**

In 2010, the worldwide virtual goods market was measured at \$7.3 billion in total worth (TechCrunch, 2010), was \$38 billion in 2017<sup>1</sup>, and is estimated to grow to \$189 billion by 2025 (Adroit Market Research, 2019). Today in 2019 more than 2.4 billion gamers worldwide interact with one: exploring, fighting, harvesting, crafting, trading, and creating whole, complex virtual economies (Gough, 2019).

In 2005, economist Edward Castranova calculated that 420,000 EverQuest players had an economic output equivalent to the 5.1 million people in the country of Kyrgyzstan, with a value of \$2.2 Billion USD in goods and services (Castranova, 2006). The average number of hours per week among participants of virtual economies is high; one survey of over 4,000 World of Warcraft players found an average of 21.9 played hours per week (Yee, 2004), another found 30 hours per week (Statista, 2014). One third of the player base of EverQuest at its height spent more time in game than they did at their full-time jobs (Castranova, 2003). The players of these games take their activity seriously, and virtual environments will continue to grow as technology continues to improve capture more spheres of human activity.

### **Case 1: Virtual Environments can teach us economic truths about the real world**

Since the Electronic Numerical Integrator and Calculator (ENIAC), the first digital computer, was booted up in 1943 at the University of Pennsylvania, computers

---

<sup>1</sup> Compare this to 2017 worldwide box office revenue, \$39 Billion (Watson, 2019)

have become increasingly intertwined in human life, becoming more and more the means through which human activity occurs (Haigh et al., 2016). Technology and computers have permeated nearly every corner of human activity across the globe; communicating via cell phones, working via desktop computers, driving with the aid of computerized traffic lights, and enjoying cheaper goods through automated manufacturing equipment. Every year more dollars are spent on computers and computing [citation needed], and every year computers increase their penetration of human activity [citation needed].

When computers are networked together and humans use them to communicate, transactions occur, markets form, norms form, and even communities and societies form. The first sale facilitated on the internet was marijuana by two Stanford University Students in 1971 (Markoff, 2006) (although the money was exchanged in person). The first sale totally conducted online was in 1994 when a New York man sold a copy of Sting's "Ten Summoner's Tales" album to a friend in Philadelphia. The friend paid \$12.48 plus shipping via his credit card, the information for which he sent using encrypted software. This event made the New York times in an article entitled, "Attention Shoppers: The Internet is Open" (Lewis, 1994).

During the computer revolution in the 1940s and 1950s, the computer was viewed as another tool in the economist's toolbox to further his study of human interaction. It allowed for larger data sets to be gathered, computed, and analyzed. It stored larger data sets and allowed for faster and more accurate information dissemination.

Nobel laureate Vernon Smith used computers in this way when he computerized his economics lab at the University of Arizona (Smith, 2018). At first his experiments

were conducted with 3 x 5 note cards handed out in class, defining how his students would interact with one another to simulate markets. The cards had “willingness to pay” prices on them as directions to his students, and as they interacted with one another, markets emerged exactly as predicted by the classical models, forming a nice supply and demand curves, and settling right where equilibrium was supposed to be. Even Vernon Smith was surprised at how cleanly and neatly the experiment lined up with the models. He increased the complexity of his experiments, eventually moved to computer-aided experiments, testing how markets behave in the areas of communication and electricity. The computers were a tool, a substitute, a facilitator for experimentation to study human action.

Robert Axelrod famously conducted game theory experiments wherein he took various computer programs and competed them against one another to see what strategy worked best in a series of repeated prisoner’s dilemma games. (Axelrod & Dawkins, 2006). Each program had different rules for how it would behave in the contest, whether it would cooperate or defect, how often it would do each, and rules for “forgiveness”. He ran this experiment in the early 1960s with refrigerator-sized computers, to determine the superior strategies.

His research has had enormous implications in the real world, and has been applied to the Cold War (Goldmark & Smith, 2018), and in explaining the Christmas cooperation along the World War I warfront in the winter of 1917 (Abumrad & Krulwich, 2019)

Axelrod's paper was just one of many in the field of agent-based modeling that exploded over the next few decades in the social sciences. Programmers create an environment, and populate it with "agents", atomistic code elements that simulate differing preferences among each one. The programmer begins the simulation and observes how the agents interact with one another. Order often emerges as the agents interact - these models have simulated the way ants search for food, leaving pheromones along the way which other ants will then follow (Deneubourg et al., 1989). They simulate pedestrian traffic (Manenti et al., 2012), the spread of the Coronavirus (Cuevas, 2020), and numerous other applications. Governments at all levels purchase software packages or hire consultants to simulate and model various issues such as urban development, etc.

Each agent in the model is programmed to pursue its own goals, given the constraints and parameters set for it by the programmer. Markets and equilibrium emerge, allowing economists to evaluate how parameters might affect large groups of people. Computers in the past have been used mostly to answer the question, "How do humans behave in real life, in response to institutional constraints?"

In 2005, an event called the "Corrupted Blood Incident" occurred in the game World of Warcraft, wherein a boss monster infected players' and their pets with a plague as they fought. Players would put their infected pets away and bring them back out again in areas of civilization where other players gathered to sell things. Surrounding players would then become infected with the plague, and then infect others. The plague spread throughout the game, killing hundreds of players at a time. Blizzard Games had to reboot their servers after several attempts to fix the problem.

This event has been the subject of some study. Epidemiologists published papers in journals (Balicer, 2007) discussing how virtual environments could model real-world situations, given that real people were driving the avatars in the game (Lofgren & Fefferman, 2007). Newspapers wrote articles about the incident, touting how the event might shed light on behavior surrounding epidemics, how they are transmitted, and how humans avoid one another, or head into epicenters attempting to sate their curiosity (Pileci, 2009). Players who ignored the quarantine were particularly interesting to the doctors studying the outbreak.

A published economic paper commented on the ongoing discussion in the monetary world regarding the idea of cartelism (the creation of money by a state), versus the spontaneous appearance of money. In *Diablo II*, in an instance of hyperinflation, players spontaneously agreed upon high value, low-volume items in the game to exchange instead of money. Prices emerged via message boards. (Salter & Stein, 2014)

Economist Edward Castranova tested Milton Friedman's Quantity Theory of Money in the virtual environment of an *Everquest* server in a paper published in 2008 (Castranova et al., 2009), and the journal *PLoS One* published in 2014 a study examining the question of how, in a closed economy, where all players start on equal footing, does economic inequality arise (Fuchs & Thurner, 2014)? The study concluded that users who had more robust trade networks, and traded with a higher number of more highly-connected users, had more in-game income over those who didn't. The number of things which can be studied and tested in online environments are endless.



Shopify's CEO, Tobi Lütke, uses the way players behave in the game Starcraft to model and expand his business (Mike, 2019). Starcraft is a "real-time strategy" game where players collect resources and build defensive and offensive buildings and armies to repel and attack their opponents. The game is very reactive, and requires the players to observe their opponent's actions and strategies, and change strategies and construction on the fly. Lütke describes it as an "iterative loop". He describes how a game of Starcraft includes a micro layer (individual units and unit composition), a macro layer (the bigger picture, and how a player prioritizes production, expansion, and upgrades), and a meta layer, where the two interact. Every race has its own individual characteristics, which creates a more optimal upgrade path and strategy accordingly. One of the three races in the game is the "Zerg", which lives within an ecosystem called "creep" which spreads like a living carpet across the map. Most of their resources can only be built on creep. They also gain strength in numbers, and are much more threatening as a swarm. Lütke frequently compares the Shopify strategy to the Zerg, making it easier for entrepreneurs to "spawn" sites and to use the Shopify tools to compete against much larger businesses like Amazon. He's so confident in his win-by-creeping-increment strategy that when a Twitter analyst predicted that Amazon would purchase Shopify in 2019, he jokingly responded that he'd rather purchase Amazon in 2029. In a 2019 interview, he repeatedly highlighted Shopify's "read and respond" mindset to a player of Starcraft (Martell, 2019).

Each of these instances demonstrated a way in which a virtual/simulated/play environment demonstrated already existing economic principles. The field of economics has always wanted for places where experiments could be conducted to bolster or

demonstrate economic theory and conclusions which are drawn from those theories. Economists are masters of using natural experiments for their benefit, i.e. analyzing either time or geographical-based differences to analyze how different outcomes are produced from different conditions. With the addition of virtual environments in the economists' toolbox, people like Vernon Smith can imagine experiments which demonstrate effects or forces that economists have been modeling for decades.

A number of criticisms have been leveled at experimental and laboratory economics in general, and these certainly apply to experiments conducted in virtual environments. Participants might find the lack of incentives sufficient to elicit representative behavior that would be observed in the real world (aka “no skin in the game”) (Agner & Loewenstein, 2012), or participants may change their behavior based on financial incentives offered during an experiment (James E. Parco et al., 2002), (Holt & Laury, 2002). Participants in laboratory experiments know they are being watched and evaluated, which may lead participants to change their behavior to act in ways which they think meet the researchers' expectations (Zizzo, 2009). Participants of lab experiments are often not representative of the wider population, and usually fall into the “WEIRD” cohort - Western, Educated, Industrialized, Rich, and from Democratic societies (Henrich et al., 2010). Experimental design and framing can affect the outcome of experiments (the use of the word “partner” vs. “opponent”, for instance) (Gintis, 2001). Behavioral Economics, which has seen a large number of laboratory experiments published over the last couple of decades, has been criticized for accepting remarkable or “sexy” outcomes. Often experiments in the social sciences have transparency or reproducibility issues

(Christensen, 2016). Also some economists have made the case that behavior in virtual environments are not representative generally of how people would behave in the real world (Earle, 2020b), (Earle, 2020a).

These criticisms are valid of all social science experiments, the knowledge that is gained from them, and the application of that knowledge. Studies are subject to flaw, but social sciences cannot abandon them, but must instead take care to design, conduct, review, and apply them responsibly and rigorously. The amount of breadth and depth of knowledge and truth that experiments can convey regarding human nature and the principles of economics is large, and must be taken seriously.

### **Case 2: People are increasingly using Virtual Environments to further their real-world ends**

United States census records have found that 89% of US households have a computer (including a smartphone), and 81% have a broadband internet connection. Nearly half (48%) have “high connectivity”, a term used to describe a house laptop or desktop computer, a smartphone, a tablet, and a broadband internet connection. (Ryan, 2018)

As of 2018, 70% of Americans play video games (mostly on smartphones) (Crecente, 2018). In the US as well as the wider world, people are becoming more “digitally native”, as increasing numbers of people are connected to the internet, and in the number of activities for which people use the internet.

As of 2020, 223 million people in the United States use their Facebook accounts at least once per month, and the number is expected to continue to rise to 235 million by 2025 (Clement, 2020). As of 2019, Skype had 300 million users who were active monthly (S. Perez, 2019), and has been so popular since its launch that in 2014 the word “Skype” was added to The Oxford English Dictionary (*New Words List June 2014*, 2014).

Even cutting edge technology has grown tremendously over the past few years; over 4 million users are registered for the Virtual Reality app “VR Chat”, and as of July 2020, the concurrent user base is around 12,000 users at any given time (Au, 2019), (Lang, 2020).

Even before the 2020 Coronavirus outbreak, which pushed a great deal of human activity online, 33.5% of students in 2014 took at least one class online (Allen & Seaman, 2014), and 5 million US employees (making up 3.6% of the US workforce) worked from home at least half of the time. Since the Coronavirus outbreak, it is estimated that by the end of 2021, 25-30% of the workforce will be working from home multiple days per week (Lister, 2020). The conference call software Zoom grew to 300 million users in the spring of 2020 (Warren, 2020).

Online interactions and the conducting of human affairs with computers have become so pervasive that whole cultures have evolved around online spaces. A “YouTube voice” or accent has developed and spilled over into real life, and has been studied by linguists (Hagi, 2017) (Beck, 2015). Ethicists and philosophers have written regarding the ethics of Virtual Reality, and the use of people’s likeness after they are

dead (Ruhl & Cooke, 2020). Virtual spaces and online life are more becoming more pervasive all the time, and are changing the way humans operate and interact, for good or for ill.

In the spring of 2020, *Animal Crossing* became the fastest selling video game of all time for the Nintendo Switch system, selling 13 million copies in the first 6 weeks (Browne, 2020). This was almost certainly partially due to the coronavirus, but the game quickly became a cultural phenomenon. Celebrities such as Elijah Wood, politician Alexandria Ocasio-Cortez, and singer T-Pain tweeted their friend codes and visited people's virtual islands (Andrew, 2020), (Park, 2020), (Sommerfeld, 2020).

In addition to enabling and increasing the productivity of human activity that already existed, computer and virtual environments create opportunities which never before existed.

In 2013 James Delaney created a company called Blockworks, where he created maps and structures as a side-project for gamers who wanted custom worlds and maps. His project quickly grew, and now he employs 60 designers and architects from around the world, from film studios to marketing firms to educational institutions. He and his team have created maps commemorating the Great Fire of London in 1666, and real-world cities that demonstrate climate change technologies. He is pursuing his degree in Urban Planning and hopes to expand his company into real-world urban planning (Delaney, 2020).

In 2019, *Fortnite* celebrity Tyler "Ninja" Blevins made \$17 million, placing him in the Forbes first ever published ranking of top gaming earners. Most of this money was

earned through streaming (YouTube and Twitch), and corporate sponsorships from well-known companies such as Redbull and Adidas. The ten top-earning gamers have a combined 270 million followers across YouTube, Twitch and Mixer and earned a combined \$121 million last year. These celebrity gamers are known for their play on a variety of platforms, from Minecraft to League of Legends (M. Perez, 2020)

Graphic artists produce custom character avatars for VR chat depending on the artist's skill level and the complexity of the avatar. Artists combine their artistic and technical talent to make character avatars with custom races, clothes, gestures, and equipment. Prices range from \$5 to \$500 (Hibby, 2020). Participants in VRChat use these avatars to represent themselves, and value the experience to represent themselves as they see themselves.

Participants in VRChat sell a number of other services, such a DJ'ing for a virtual gathering, organizing a party, creating custom worlds, dancing, watching movies, gaming, and even cuddling. (*24 Best Vrchat Services To Buy Online | Fiverr*, 2020).

Video streamers on the Twitch platform, where streamers play games and cast the video with their commentary to their audiences, is quickly growing in popularity. It has more than 15 million active users every day, with between 2.2 and 3.2 million monthly broadcasts. A streamer can make between \$3000 and \$5000 each month by playing and streaming around 40 hours per week (*Twitch Affiliate Partner Program - Reviews, News and Ratings*, 2020). They can make additional money via advertisements and donations, tournament winnings, sponsorships, and affiliate links. Some of the top streamers make between \$20 million and \$65 million per year (Wang, 2020).

### **Case 3: The Economies in Virtual Environments are rich and complex**

Famously, the most complex virtual economy is EVE Online (“Eve”, for short), made by CCP, which came online in May 2003. The game is built from the ground-up to be market-centered; most players interact with online games (such as World of Warcraft or Everquest, two of the largest) by killing monsters, completing quests, gaining more powerful items and equipment, and repeating this cycle - but in EVE, the game is all about resources and construction, bigger ships and area control. Players, after creation, are given a small ship to begin their journey, and told to begin gathering resources from various places in the galaxy, which they will then turn into more complicated and more powerful items in their quest to eventually build bigger and more powerful ships. Players gather resources like iron, aluminum, coal, etc., from planets, moons, wormholes, and other ships. After earning money from some of these resources, players can purchase blueprints for the construction of refineries, smelteries, and factories.

All things that can be built in EVE Online requires a blueprint. This represents a license to build an object within the game. Everything from clothing, to space docking stations, to refineries, to giant space ships require a blueprint. There are two types of blueprints: Blueprint Originals (or BPOs), and Blueprint copies (BPCs). BPOs can be purchased for a large amount of in-game currency (ISK) from non-player characters (NPCs), and BPCs can then be made from those originals. The BPCs disappear after a number of uses, but the BPOs are a permanent inventory item for the character, once purchased.

A small-time producer may want to purchase a BPC for the production of just one ship, for himself, while a producer will want to purchase a BPO, so he can continue to build ships for a long time, and sell them to other players, that he might realize a long-term return for his expensive purchase.

Every BPO has on it a recipe for making items within the game. It contains on it the amount of materials needed to construct the desired item, along with the amount of time it takes to construct the item. Players can invest in improving their BPOs, to reduce the amount of materials and the amount of time needed to construct in-game items, and any copies which are thereafter made from these BPOs also contain these improvements.

BPOs have levels of efficiency associated with them, associated with both time (identified as Time Efficiency, or TE) and materials (Material Efficiency, or ME). Each BPO then has a rating from 1-10 in each category, and can be, for example, a TE3, ME5, or something like a TE7, ME6. A BPO which has both ME10 and TE10 is the best a blueprint can ever get.

The amount of time and money it takes to improve the BPOs varies by the item. Things like ammunition are relatively simple to max out in both ME and TE, but blueprints for large, complicated, powerful capital ships can take years of research and a lot of ISK to max out, and as a result are extremely valuable. The amount of materials and time needed to manufacture items on the blueprints decrease constantly as the levels go up from 0 to 10. At level ME0 on one blueprint, for example, you might need 100,000 units of Tritanium to manufacture the item. At ME 1, 99,000 units are needed, and at ME



2, 98,000 units are needed. However, the amount of time and ISK needed to progress from ME 0 to 1 to 2, etc., increases at an increasing rate.

This blueprint, production, and research schema encourages specialization. Since obviously not every player will be able to purchase BPOs for every item (because they are expensive), different players purchase different BPOs, and pour a lot of time and energy into improving those BPOs, so that they can use the least amount of time and materials for the production of the items that their blueprints use. All players in the economy benefit from the principle of comparative advantage. Players who research their BPOs to make them more efficient can either sell BPCs to players directly, or use their BPOs to manufacture the items, and then sell the items directly to their customers. Both methods are used in EVE Online by players who specialize in manufacturing.

There are three levels of technology in EVE Online currently. The game was released with only technology level 1 items, but over the years has released new content and new technology levels. Technology level 1 items in the game are normal items in the game, and make up most of the thousands of things that can be manufactured and used in the game. Technology level 2 items are next generation type items, and technology level 3 items are next-next generation items which were added recently, can only be manufactured from resources gathered from remote moons and wormholes, and are associated with alien technology. It is estimated that of the manufacturers in the game, 2% of the player base manufactures technology level 2 items, and only 0.5% manufactures level 3 items (Kirithkodachi, personal communication, 2017).

An in-game mechanic exists for players organize themselves into groups of like-minded individuals called “corporations”. When a corporation is formed by a person, the person forming it is designated as the CEO, and 1000 “shares” are available to hand out to other players, in order for them to become members of the corporation. These shares do not pay out assets, but instead they are used to signify membership to the corporation, and they allow certain things to be done in-game. People possessing shares are allowed to vote on certain matters, like choosing a new CEO, locking certain assets inside a corporation’s base, and voting on when to go to war with other corporations. Certain membership roles in the corporation can issue new shares to new players, above and beyond the 1000 limit, if the members of the corporation vote, and authorize the increase of the shares. Being a part of a corporation also gives members access to communication channels inside the corporation, and provides access to other people to play the game with. People in a corporation might go on a mining run, or a raiding run together, for instance, or take a job protecting a transport ship as it crosses space that is inhabited by pirates, who are played by other players in-game, and who have their own pirate corporation.

To encourage and facilitate trade in the game, the game engine provides an interface so that EVE players can see the prices of any commodity by calling up a Bloomberg-like terminal in-game, and allowing them to check to see what the bid/ask price is for any resource, structure, ship, or other item in the game. Having this information is a tremendous asset for players, when they decide what they want to specialize in, in the game. Some players to specialize in just in resource gathering,

building ships and equipment made for mining. Some players specialize in arbitrage, constructing transport/cargo ships, and checking the trade screen to look at the difference between the bid and ask prices, and moves cargo between the lowest sellers and the highest buyers. Sometimes these ships employ security ships, if they are knowingly going through dangerous space where pirates operate. Some players become essentially day traders in EVE, sitting at the trade terminal in game, never leaving the docking station, but buying and selling in-game items from person to person, making money between the sales by buying and selling.

Brokerage and escrow are two very important pieces to conducting business transactions with people who are unknown to each other. EVE user Chribba has become well-known in-game for his brokerage services, he's been doing it for many years. He estimates that he's facilitated approximately 50,000-60,000 transactions over the course of his EVE gaming career, and he's one of the most wealthy players (measured by in-game currency) who play EVE (Chribba, personal communication, 2017).

People approach him for recommendations when they are in the market to either buy or sell high-valued assets, like large capital ships, and they also involve him in the escrow services for the transaction. During the handoff process that takes place during a sale (one user steps out of the ship, the other user climbs in), to prevent the buyer from getting in the ship and disappearing with it without payment, Chribba holds the money in escrow, taking a 10% fee. He also gets used as an escrow service in hostage, ransom, or safe passage situations. When a user stumbles into a group of pirates who threaten to

blow up a ship unless a payment is received, the payment gets transferred to Chribba, to prevent the pirates from taking the money and blowing up the ship anyway.

In the game Minecraft, purchased by Microsoft in 2014 for 2.5 Billion (Pagliery, 2014), players can host a private game for just a few other players, or they can host a public server on which hundreds of thousands of players could theoretically join. Minecraft server owner Hypixel hosts a server which regularly has 100,000 concurrent players (Minetrack Data, 2020), and an incredible 18 million unique registered users, meaning that half of all the people who have purchased Minecraft Java edition logged into his server at some point (Collins-Laflamme, 2020).

On the LoverFella server in Minecraft, the game engine has been modified such that players can own property, which they demark with special building blocks that outline the limits of their property. Inside the blocks, each player sets the rules for what other players are allowed to do to their land and house. If a person who does not have permission attempts to destroy or move blocks, they reappear instantly. Real-world dollars can be spent to purchase L-bucks, which allow players to purchase “roles”, which allows players to perform extra actions in the game, such as turning any item into a hat, or making their username animated so it is more noticeable. Players hire each other to perform tasks, such as sell items from a shop they have built, or to design a house, or to gather raw materials for crafting finished goods such as armor or swords (J. Cripps, personal communication, July 2020).

The game Roblox is a sandbox environment with 158 million active monthly users (Shadwell, 2020), where developers can create their own game worlds and modes,

varying from racing games to hide and seek, to puzzle games, to fighting games. It was released in 2005, but was gained immense popularity years later when it was also released on tablets, Xbox, and smartphones. Each game can have its own currency and markets, and draws its own crowds. All games use the overall currency robux (sold by the developer for real money), used to purchase items that your character avatar can wear or equip. The custom currencies within each of the sub-games, however, cannot be transferred between games. The Roblox corporation pays the developers of these individual game worlds according to how many players they attract to each world, and by how many Robux players spend in their worlds. Roblox announced in 2019 that they paid developers \$30 million, with the top earner earning \$3 million, a teenage developer (Weinberger, 2019).

In Nintendo's Animal Crossing, trade is a part of the built-in experience, but remarkably a player formed a company that would pick virtual weeds on other player's islands. They don't charge fees for their labor, but instead rely on tips in in-game currency. The founder says that people pay them well. (Carpenter, 2020) Some players in Animal Crossing created a website to track prices and coordinate trades. (Tan & Fox, 2020), (Wigglesworth & Lewis, 2020).

According to the World of Warcraft economic tracking website [www.theunderminer.com](http://www.theunderminer.com), there are approximately 111,000 unique items available in the game available for quest rewards, manufacture, and trade. This makes for a varied, complex, and vibrant economy, full of trade, specialization, a structure of production, price indices, exchange rates, inflation, speculation, recessions, etc.

Some companies hire economists to assist with virtual environments. In 2007, CCP games, hired Eyjolfur Gudmundsson to help manage their virtual economy. To answer the problem of players exchanging in-game money for real-world money, he created a system whereby players could spend real-world money in exchange for game subscription time, which became traded among players as another currency (Jack, 2015). Before he became the Greek Minister of finance and the leader of a political party, Valve software hired economist Yanis Varoufakis in 2012 to help manage and plan the virtual economy of the Steam digital delivery platform. He studied digital exchange rates and trade deficits, and began blogging about it in 2013 (Varoufakis, 2014).

Crowd Control Productions (CCP) publishes EVE Online quarterly macroeconomic data, which includes many different types of graphs and data, such as the value of virtual assets produced versus destroyed by game region, trade balances by region, figures on the in-game money supply, the velocity of the in-game money supply, consumer price indices, figures on the number of players online by region, etc. (Monthly Economic Report, 2020)

Complex virtual economies can behave like complex real-world economies, and suffer inflation and sometimes hyperinflation (Salter & Stein, 2014).

#### **Case 4: Virtual Environments form genuine societies**

What makes a society? What determines if people within an area can be counted as a community?

In his book “The Cement of Society”, Jon Elster outlines the theory that a society is defined as the ability of groups of people in a co-located area to come together to negotiate resources and shared problems. Social order forms with “stable, predictable patterns of behavior and cooperative behavior” (Elster, 2008), Elster reviews the economics of collective action problems, bargaining, social norms, and the interactions between all of these in his analysis. These analyses also apply to virtual environments and the people who inhabit them, albeit sometimes within a set of different rules, costs, constraints, and institutions.

Despite their sometimes very complicated and accommodating tools provided by in-game software, the players of online games often conduct unsupported, unfacilitated, unenforced transactions, trades, and agreements, with their own rules and institutions surrounding them. These transactions are conducted mostly using in-game communication channels.

In World of Warcraft, players fight monsters for experience (to level up), gold, and better equipment. There are many monsters in the game which cannot be vanquished without assistance, sometimes as many as 40 players are needed to fight and kill the most difficult monsters. These large groups called “raids” meet regularly and delve into the game’s most difficult dungeons to attempt to get the best gear. The raid bosses have lists of equipment that they drop called “raid tables”, and certain pieces of equipment only drop a small percentage of the time, after each raid. Individual characters will often join raid groups repeatedly, seeking certain pieces of gear. To account for the fact that some characters participate in raids frequently, and get lesser desirable gear, or no gear at all,

but their participation helped others in the group get their gear – raid groups began implementing what became known as “Dragon Kill Points”. Someone in the raid would keep a spreadsheet of all the participants, and awarding them points for attending a raid, and allowing players to “spend” their points on equipment when it dropped. This would help ensure that the best or most desirable pieces of equipment would be awarded to those who worked for it the hardest. Without this system, the game allows a simple dice-roll-off for equipment when it drops, and a new player who attends a raid for the first time might be assigned a piece of gear, instead of a player who had been “grinding” for it for a while. This “DKP” system is not suggested, supported, or enforced by the game engine – this system came about as an agreement between players, and is a widely-adopted system of assigning raid drops (Cavender, 2015).

Also in World of Warcraft (classic version), there is an extremely rare flower named The Black Lotus which players who have spent points specializing in Herbalism can gather, and either or sell directly in the in-game auction, or use via other skills (like Alchemy) to create potions which make their characters stronger temporarily. Something like property rights spontaneously emerged among WoW Lotus farmers from 2019-2020 on the Pagle server when player Robba organized a flower-picking cartel with his fellow Black Lotus pickers. He noticed many of the same names of other players who were constantly “camping” in the same spots and having conflict with other players who also camped at those same spots. He created an online forum, sent out invitations, and then began deconflicting the Black Lotuses and the players who wanted them. There are 40 places in the WoW map where these flowers spawn, on 30-40 minute timers, and he kept



track of who was sitting where, and for how long. He would have a queue of people waiting for open spots, that he published among the participants, and they self-governed by signing up and giving up their spots when the queue was too long.

Player Robba took into account the needs of individual players when he assigned them specific spots to harvest; for instance one man who was a teacher needed to camp while he was teaching an online course for the high school where he worked, so he needed a place that didn't have any monsters that would wander by and kill him while he was teaching class. Robba assigned him an appropriate spot with no nearby monsters.

Robba and his fellow self-names "Farmer's Guild" members would defend the spots where they picked the Lotuses. They only needed about 25-30 of them to accommodate their guild members, and they encouraged people who were not members of their guild to move to spots they weren't occupying. This included gold farmers from other countries, and other players who were not members of their guild. They did this by taking an advantage of an in-game mechanic: when a Black Lotus spawns at a pre-designated spot, a player will attempt to harvest it by clicking on it. But these flowers are so high level, and require such skill, that the harvest is not an automatic action with guaranteed success – it only works about 50% of the time (with maximized skill). If two players of equal skill are competing for the Lotus, it is essentially a coin toss that decides who will get the Lotus. If a player who was not part of their Guild began camping at one of their sites, a guildmember would put out a call to the rest of the guild, requesting assistance, and 3 or 4 other guildmembers would show up at the spot, and when the flower spawned, if 4 of the 5 players who clicked on the flower were members of the

guild (who would all agree to assign the flower amongst themselves later in a manner agreed to by all of them), they were essentially stacking the deck in favor of a member succeeding to pick the flower. Often when a non-guildmember saw the gathering, he or she would get the message and leave. The Farmers Guild lasted approximately 8 months on the server, until Blizzard received enough complaints from other players who wanted to pick Lotuses that they increased spawn points of them, and disrupted the equilibrium (Robba, personal communication, 2020).

In the MMO *Fallout 76* published by Bethesda Game Studios, players roam an apocalyptic wasteland and gather supplies for survival. Players battle monsters, collect weapons, armor, and building materials, and form communities. In September of 2019, a group of players called the *Fallout Five-o*, a group of in-game “first responders”, stumbled upon the camp of a raider group governed by the *Vultures*, a group of raiders who survive in the wasteland by killing other players and stealing their equipment and homes (Hernandez, 2019a). A fight broke out, and instead of killing the leader of the *Vulture* raiders, a character named *Warlord*, the *Fallout Five-o* captured him and took him prisoner. They decided to try him in a virtual legal procedure, complete with a judge, witnesses, and lawyers. A player spent hours building an in-game courthouse, and the legal proceedings will be livestreamed. If the raider leader is found guilty, he will be killed. A character who is killed in *Fallout 76* can respawn, but the player does suffer permanent consequences, in that the character can no longer be used as a part of the larger unfolding in-game story.

An interesting facet of a complex society has emerged in *Fallout 76*: class warfare. (Brown, 2019) Bethesda offers a \$100 per year subscription to players, who receive special clothing, special emotional expressions (called “emotes” in game), which sometimes caused the players paying the subscription to be targeted in-game. A group of subscribing players banded together so they could offer each other protection and the ability to discuss the perks of subscription among each other without being yelled at or degraded on common communication chat channels. There is some satirical element to the group of subscribers as well, as they post on social media calling the non-subscribers “peasants” and say that they are “better”, fanning the flames of the class war (Hernandez, 2019b).

In the app VRChat, accessible on the PC and made to be maximally enjoyed with a virtual reality headset, the community suffered from users who would harass other players, gaining enjoyment from other players’ annoyance. Over time, through community struggle, discussion, policing, and interaction with the developers, the players and developers coproduce rules and norms by which more players can enjoy the environment (Hobson, 2020).

In the MMO *Sea of Thieves*, a “parley” system evolved after players learned that chasing down smaller ships with larger ships was not always successful. Now, often the smaller ship will invoke “parley” to make a deal with the larger ship, agreeing to hand over half of its cargo in exchange for being free to continue on its way (Marshall, 2018). This mirrors in many ways the real-world “efficient plunder” arrangements described by Leeson and Nowrasteh in the 18<sup>th</sup> and 19<sup>th</sup> among privateers and their victims, wherein

the two parties often negotiated peacefully for the transfer of goods between them, rather than suffer deadweight losses associated with the destruction of combat. Players have also worked out a sort of “honor code” among sloop captains whereby if they observe a galleon chasing another sloop, they consider it their duty to join the fray to aid the other sloop against the larger galleon. This naturally makes galleon captains more cautious and more observant of their surroundings.

Communication signals often spontaneously emerge among players of multiplayer virtual environments (such as briefly crouching when meeting another player in the game *Rust*, to signify peaceful intent), and *Sea of Thieves* is no different. A dark ship means, “leave me alone”, while a flashing lantern indicates communication, often in Morse code. A ship pointing its cannons to the sky is communicating that it is not hostile, while another ship decorated with a red or black sails and hull is communicating hostile intent – again almost perfectly mimicking behavior seen in real life and documented in Leeson’s *Invisible Hook*, whereby pirates used flags to intimidate and encourage surrender (Leeson, 2011).

In *Eve Online*, no in-game mechanism has been provided for the enforcement of long-term financial agreements, so institutions such as banking or investments have very difficult to facilitate and organize. Banking ventures, for instance, have been extremely difficult to coordinate throughout *Eve Online*’s history. It is a well-known trope for *Eve* players that if someone is asking for bank deposits, that they will likely steal the deposits by transferring the money to a second or alternate character (an “alt”), and then delete the

character under whose name they committed the theft. The ease of anonymity provides a barrier to long-term financial contractual agreements in virtual worlds.

Despite this difficulty, in 2013, an Eve Online player by the name of KirithKodachi borrowed money from some his friends to buy blueprints for an in-game structure, to sell to other players. He succeeded, and over the course of a few months, he profited, and returned to his friends their original investment plus interest.

In 2016, CCP software added new content to EVE Online, and because his previous venture had been successful among friends, he decided to make a public offering. He was able to do this because he had been keeping a blog of his EVE Online experience since 2008, and had gained the respect of many players, and was familiar to them. Many EVE Online players liked his blog, read it, and trusted him, and felt like he probably wasn't going to steal their money and delete his character, so many players sent him money. He asked for \$25B ISK, and actually raised \$50B ISK because of the weight of his reputation. He refunded the extra funds, purchased the blueprints, and began production. Over the next year, he made \$34B in profits, and paid out \$20B of those. He kept the remainder, to increase the holdings and resources of his company (Kirithkodachi, personal communication, 2017).

This experiment is likely not reproducible on a large scale, because KirithKodachi had to have such a high regard among the player base to accomplish the monumental task of convincing people to invest their money in his plan, which was remarkable given the atmosphere surrounding the previous banking frauds. Also as the numbers of investors

increases, the value of the investments might surpass the value of Kirithkodachi's reputation, so the overall risk of the investment will increase.

In Eve Online, joining a corporation is a completely "facilitated" transaction supported by the game engine, wherein you are added to a list of existing players in the corporation, and given access to the corporation's docking bays, communication channels, controlled areas of space, and membership lists. Gathering membership dues, however, is not a feature that is implemented in-game, but occurs between players. These dues are used to provide members of the corporation access to services like insurance.

As part of being a member of a corporation, users are expected to be reachable quickly when they are offline. This is to ensure that should a corporation need to defend its territory or get involved in a battle, that the members of its corporation will be reachable quickly, and that they can respond by logging in and bringing ships of their own in short order. The problem with this arrangement is that sometimes people will be hesitant to show up to a battle to fight with the ship they have invested a lot of time into, and they will be concerned that their ship will be destroyed. To allay this concern, corporations began offering insurance, paying out to replace destroyed ships with in-game currency.

The insurance is a complicated affair, requiring an accumulation of "participation points", to ensure that only players who are dedicated to the corporation and assist in the mutually identified causes and battles are the ones who are the recipients of corporate money.

The forms are complex and the conditions are demanding; in many ways it is like filling out paperwork for a real-world claim. The forms ask the user to identify what their ship's loadout was, and require them to check to see if the loadout followed corporate guidelines. Payments are higher to ships which heal other players, because those ships are seen as less appealing to play, as opposed to ships which damage and destroy opponents' vessels.

A corporation has been formed by Eve players, called "Eve University". This University is meant as an outreach program to new players of the game. More experienced players teach classes to less experienced players here, player throughout the game donate in-game money to the University, and the University subsidizes new players' purchase of "implants", which have the effect of enabling a character to learn in-game skills more quickly from that point forward. Old players benefit from the retention of new players, and the new players benefit from the instruction and the implants, making this transaction mutually beneficial.

Not all emergent Eve behavior is prosocial, or overall beneficial – a few players have figured out how to create the institution of slavery in EVE. In 2016, Crowd Control Productions decided to allow players to play Eve Online with a free-to-play option, which brought a rush of new players to the game. Since Eve is an intimidating game with a high learning curve, and the pressure to join a group in-game is high, a trade alliance named Standing United took advantage of this to recruit new players to mine resources for them. Player Scottmw15 would befriend English-speaking players, and then bring them to an area of the game where the players only spoke Russian. Players were then told to do

repetitive, grinding work of killing low-level enemies and mining. If the players tried to leave, they would be stranded alone, which would likely mean in-game death. Creating a new character or abandoning the account would mean the loss of potentially hundreds of hours of play. Scottmw15 held the local corporate tax-rate so high that no one could make any profits on selling any goods, and outside of the game, also made his alliance members click on links to dating sites he had created to generate revenue. This treatment eventually horrified enough other players that an in-game bounty was set on Scottmw15's head, and a massive coalition of players with over 60 ships lead by player, Scooter McCabe attacked and freed all of the captives (Mell-Taylor, 2020).

**Case 5: All of the above activities are overlapping with real life with increasing commonality**

In increasing amounts, in-game economic activity is being created, and in-game economic behavior is emulating and affecting real-life economies. Members of virtual communities are relying on reputation markets to exchange money and goods, and creating new in-game opportunities that didn't previously exist. As technology penetrates more and more into the lives of humans on Earth by putting computers and smart phones in the hands of more people over time, and in increasing the amount and type of human activity that can be conducted online, economists should be present to have opinions about the ways humans will use virtual environments to conduct human activity.

In the game of Second Life, you as an actual real-life human person can purchase and own title to a virtual piece of real estate. Location matters in virtual worlds as well,



and the prices of a plot of land in Second Life range from \$40 for a plot of virtual land that is 1024m<sup>2</sup> to \$3 for a plot the same size in a less desirable location (*Welcome to Second Life Land Auctions*, 2020). With the purchase of the virtual land comes a virtual “tax”, depending on the size of your plot of land, ranging from \$4/month for a 512 m<sup>2</sup> plot, to \$60 per month for an entire region of virtual land, measuring 65,536 m<sup>2</sup>. This money helps maintain the servers on which Second Life runs. The title to these lands can be traded in real life, given away, sold, or passed down. None of this is against the terms of service. On your land you can build buildings, host social gatherings, install art, wear fashionable clothes that other players design, etc. It’s a place where any number of human activities can occur virtually.

Even the European Union sees the overlap between virtual and real worlds – the sale of virtual land to citizens of the European Union is subject to the Value Added Tax (VAT), and must be reported to the government as property (*Value Added Tax / Second Life*, 2020).

The United States Internal Revenue Service recently removed wording from their website classifying Fortnite’s virtual currency, V-Bucks (virtual bucks), as a virtual currency subject to taxation. The idea that it the policy of taxing virtual currencies from virtual environments will reemerge at some point is not far-fetched. The exchange of virtual property for virtual currency represents human work, and value added to the economies of the people involved; it’s not surprising that Governments of various kinds would want to interject themselves into the management, regulation, and taxation of these activities. (*Virtual Currencies / Internal Revenue Service*, 2019)

Blizzard in 2012 released *Diablo III*, which had a mechanism called the “real money auction house” (RMAH). This was supposed to allow players who had more time than money, and those who were in the opposite situation, to exchange money and goods so more players would get more utility from playing. Blizzard had long been fighting against the sale of in-game World of Warcraft gold for real money, and they realized that this was not a preventable problem, but that they should try to allow it, and capitalize on the opportunity. After two years of tweaking, adjusting, listening to players, restricting, and reopening, in March of 2014 *Diablo III* shut down the RMAH (*RMAH - Diablo Wiki*, 2014). Blizzard released a statement that said that they felt that the RMAH was detracting from and circumventing the core fun mechanisms of the game, which killing monsters to gain better loot (G, 2018). During its time however, many players made real money through the auction house, often opening multiple accounts to allow them to sell more items simultaneously. One reddit user, TheTrashPandaMatrix, stated that over the course of its run, he made \$80,000 (*How Much Money Did People Generally Make from the RMAH in Diablo 3?*, 2019), and another Reddit user, WishboneTheDog, claimed he made \$10,000, and posted his PayPal transaction history to back up his claim (*I've Made \$10,000+ Legitimately from the D3 Market. AMAA*, 2013).

Even though the experiment with the RMAH failed at Blizzard games in *Diablo III*, over the last few years World of Warcraft copied an innovation from CCP games with “subscription tokens”, which can buy one more month of the game subscription (normally \$15.99) with in-game money. Players can exchange this item on the auction house just like any other in-game good, and the price fluctuates with the rest of the

economy and is subject to inflation, deflation, etc. For a few years the in-game subscription fee was the only thing that could be purchased with this token, but in 2017 Blizzard announced that the tokens could actually be transferred out of the WoW ecosystem and into other Blizzard games, such as the card game Hearthstone. This made the subscription tokens substantially more valuable, since now time spent in-game in World of Warcraft could purchase digital assets in other games. With each of these steps, these subscription tokens approach the fungibility of real money.

There are a number of other multiplayer games on the market today that still trade real-world money and items without restriction for in-game items. Linden Bucks from Second Life can be traded in and out of the in-game environment (the current exchange rate as of August 2020 is \$1 to 320 Linden dollars). Another MMO called *There* has an exchange rate of \$1 to 1800 Therebucks (World, 2019). *Entropia Universe's* exchange rate is 10 Project Entropia Dollars for \$1. One Project Entropia gamer purchased a space station for \$100,000 (“Virtual Property Market Booming,” 2005).

Numerous legal cases have been filed in the US court system regarding virtual property. In 2007, Pennsylvania Attorney Marc Bragg (Marc Woebegone in Second Life) filed suit against Linden Labs after they terminated his account. Marc had performed “URL hacking” to gain access to an auction that would not have otherwise been visible, and gained title to virtual land normally valued at \$1000 for \$300. The lawsuit stated that by terminating his account, Linden Labs was depriving Marc of his rightfully acquired virtual property, to which he held virtual title, and was valued at between \$4000 and

\$6000. The case was settled out of court, and Marc's account was restored (Duranske, 2007).

In 2007, two strikes broke out in two different virtual worlds, in protest of two separate real-world events. In Second Life, Italy's IBM branch was in negotiations with Italy's IBM labor union, the Rappresentanza Sindacale Unitaria IBM Vimercate (RSU). Negotiations regarding salary raises could not be reached, so IBM employees logged onto Second Life and virtually picketed IBM business locations in-game, blocking access, shouting slogans, and disseminating information about IBM's labor practices (Banks, 2007). In Eve Online, rumors began circulating that a player occupying a high-level position in an in-game corporation was a CCP developer, in direct violation of CCP's terms of use. The rumors also stated that this player/developer was creating and gifting rare in-game items to his close friends. This set off a firestorm among players, who threatened to cancel their subscriptions, and flooded Eve Online forums. CCP had to launch an official investigation, which led to several developers publicly acknowledging their guilt, and were fired (Blodgett & Tapia, 2011).

In another example of real and virtual environments overlapping, teachers in Poland and the US used the popular recently-released 3D game, *Half-Life Alyx* to teach during the pandemic. In the very early stages of the game, there is a set of windows and some markers available, so a few teachers came up with the idea to start recording, and to use this surface to draw, to explain concepts such as math, physics, and vocabulary. Some of these lessons were recorded and streamed to Twitch, Facebook, and Youtube, and lasted over two hours (Bretan, 2020), (Oloman, 2020).

Real and virtual world overlap in black and grey markets, where players exchange real money for in-game items (via Ebay or other game-specific websites), often against games' Terms of Service Agreements. Animal Crossing players can buy items that do not normally exist in the game from hackers, even though it puts their save files in jeopardy (Favis, 2020). Players who desire to own rare items, or to skip lengthy in-game play sequences or “grinds” will often look to spend real money on in-game items. Players risk being their accounts being banned from their games of choice for activities like these, but these markets are large and demand is high. Multiple a high-profile sites such as BitSkins, StoneFire, Skinbaron, and Gameflip sell in game cosmetic items for very popular games such as Counterstrike: Global Offensive (CSGO), Defense of the Ancients 2 (DotA2), Team Fortress 2, Rust, and Z1 Battle Royale.

Economist Edward Castronova predicts in his book *Wildcat Currencies* that eventually a virtual economy will get so widely adopted that its currency value is reported in the nightly news along with stock reports in the stock tickers (Castronova, 2015). He predicted in 2005 that virtual income would be taxed.

Should non-gamers care about virtual environments, virtual currencies, and virtual property? As more of human activity is conducted online, by more people with more electronic devices, the chances become higher and higher that an activity conducted will touch, or interact with a complex economy. Virtual environments outgrow their original intents all the time. This year due to the Coronavirus pandemic, graduation ceremonies were held in Minecraft (Meisenzahl, 2020), wedding ceremonies were held in Animal Crossing (Liao, 2020), business meetings were held in the popular Playstation

game Red Dead Redemption 2 (Vaičiulaitytė, 2020). The people using these environments had access to all the items, tools, communication channels, currencies, activities, avatars, emotes, and groups that were previously built by gamers. It's fully within the realm of imagination to think that this will continue to happen more and more as time moves forward.

### **Conclusion**

If a new country was formed on the planet Earth, economists would hasten to gather their calculators and spreadsheets and official publications to record the economic activity, exchange rates, and GDP, to study their comparative advantages with imports and exports. Public choice economists might rush to study their institutional arrangements, the incentives of their political structures, and the outcomes of their policies.

Large sums of real money is being spent engaging in human creativity, communication, connection, trade, and relationships. The time for dismissing virtual environments as “hobbies” or “games” will very soon be past, if they are not already. In the very near future it will be obvious to all economists that virtual activity should be studied and measured and reported. Economists would benefit from studying and advising the growth of these environments, their rules, their interactions, their varying levels of communication with their software developers, their incentives and activities, while the industry is still growing and learning, rather than afterward, when the industry norms and practices have already reached various equilibriums.

## CHAPTER TWO

### Introduction

In *The Mystery of Capital: Why Capitalism Triumphs in the West and Fails Elsewhere*, economist Hernando de Soto makes the case that formal asset property title gives people control over their wealth and lives, allows upward mobility, forms communities, and creates and safeguards the wealth people spend a lifetime accumulating (De Soto, 2000). He applies this principle to land, homes, and businesses in the third world, and explains how robust institutions, clarity, and positive control surrounding ownership creates this wealth. He names untitled property *dead capital*, because of its uselessness to its owners in accessing the underlying wealth that it represents. It can't be sold, transferred, or leveraged to get a loan.

In recent years, a flurry of activity in virtual spaces has shown these same principles to also apply to *virtual* property. This paper expands the ways which insights gained from Hernando de Soto's work in the real world apply to property in virtual worlds, and examines the ways actors in those spheres are beginning to demand that they too have recognized control over their property, and how it can create wealth in the future. Gamers and other owners of digital assets are beginning to demand that their virtual property be individually titled and attached to them as a person, and no longer "dead".

### **De Soto and his work**

In 1979, the Institute for Liberty and Democracy was founded by Hernando de Soto, the head of a group of Peruvian businessmen who were all frustrated by the red tape surrounding business licenses, regulatory barriers, and property title. He saw how business was conducted in Switzerland, and knew that it did not have to be cumbersome, disorganized, and slow. A common refrain was that Peruvians were just not culturally fit for business in the same ways that Europeans were, but De Soto refused to accept this explanation, observing entrepreneurship and business acumen all around him. He founded the institute to study the problem, gather data, and perform solutions. (*ILD - Our Origins*, 2015)

Over the course of the next few years, he gathered data, hired researchers, and performed field work. He discovered many disturbing facts and figures – in 1995, *Business Week* reported that 280,000 farmers out of 10 million had their land titled by the Peruvian government. Rather than conduct business legally through the established legal system, businesses conducted transactions, traded assets, and provided services through an extralegal system.

He coined the phrase *dead capital* to describe the concept of land, businesses, homes, or other property that was not properly, formally, government-titled, and could not be leveraged to gain loans, which cut off vital avenues of credit and locked people into their homes and businesses. In his 2002 book *The Other Path: The Economic Answer to Terrorism*, he outlined how this practice of inefficient government, failing institutions,



and murky bureaucratic processes allow terrorism to foment (De Soto, 2002). People within the broken system become angry and frustrated, and turn to violence and propaganda to solve their problems, to redress their grievances and their poverty. De Soto's input was a major contributor to the "Washington Consensus", a set of policies adopted by International Monetary Fund, the World Bank, and the United States Department of the Treasury in the late 1980s (Williamson, 1989). In 2015, De Soto attended the 1<sup>st</sup> annual blockchain Summit hosted by billionaire Richard Branson, where he outlined that the blockchain could serve as a verifiable, decentralized, uncorruptable record where titles could be recorded *virtually* for *real* property.

Today virtual property owners face a similar problem – *dead virtual capital*. Blockchains and virtual title are being created for virtual items. Virtual property had to evolve to that point over a several decades, however.

### **The History of Virtual Property part I: Digital Ownership of Digital Items:**

Virtual environments have evolved over time, moving to the current place where digital consumers demand title for their digital goods. In the beginning of the digital era, interaction with virtual items was minimal or nonexistent, evolved to server-based virtual environments where players could lease access to their digitally-owned items, forming complex economies with specialization, contracts, labor markets and digital currency, and then to games supported by blockchains, where full virtual and real-world exchange is possible.

Games in which digital interaction with digital property began in 1961 when Steve Russel coded *Spacewar*, the first interactive computer game.

The first games provided interaction with virtual objects, but property *per se* wasn't really part of the game. Pong (1972) allowed the player to bounce a ball back and forth between flat pads. In Space Invaders (1978), players shot lasers at aliens. In Pac Man (1980), on-screen items could be consumed, and territory could be “controlled” from the virtual ghosts.

In Zork (1980), the game allowed for a new way to interact with virtual items – they could be manipulated in a much greater number of ways than before. Items could be picked up, used, consumed, read, played with, worn, dropped, given away. The virtual items even *persisted between game sessions*; that is – effort spent in previous sessions gathering items would continue to yield rewards to the player when next she logged into the game. They retained their value over time and acted in a number of ways like property in the real world. The player could take, steal, control, buy, sell, give, combine and destroy items all within their single-player virtual environments.

The Legend of Zelda (1986) was another famous example of this trend in virtual property. Items could be purchased, discovered, earned, and upgraded, and the game was an extremely notable example of a single-person virtual economy, in which the player collected virtual currency (Hylian rupees) with which to purchase in-game items and upgrades.

In-game crafting systems eventually showed up, which allowed players to harvest or find materials, and transform those inputs into more complex, usable items. Some of

the structures of production were quite complex, with hundreds of available technologies, items, skills, and pieces of equipment. In 1999, Pokemon Gold and Silver both released, which contained a Pokemon breeding system (Francis, 2015). The Pokemon creatures are both pets and weapons, with many traits that can be bred together in various ways. This in-game feature spawned numerous breeding guides with each new Pokemon game release, and is considered a key component of serious play today (Lento, 2020).

These virtual property systems still persist today, allowing players to perform a very wide number of activities which continues right up through modern day single-player hits like Fallout 3 (2008), Grand Theft Auto V (2013), and Cyberpunk 2077 (2020), with complex inventory systems, materials, patterns, currencies, workshops, territory, in-game arbitrage, etc.

In 2006, in The Elder Scrolls IV: Oblivion, a brand new game mechanic first appeared on the scene: virtual items purchased with real money. Oblivion's developer, Bethesda games, offered stylized horse armor to players, for a real-world cost of \$2.50 (Fahey, 2016). A player could use his real-world dollars to purchase the in-game armor, as a one-way transfer of funds. In some games, real person could spend money to make his virtual avatar richer. This caused an uproar online among gamers (Hall, 2015) – many feared that this would be the beginning of a trend where content was kept from gamers, only accessible through payments above and beyond the cost of the game. Double Dragon 3: The Rosetta Stone (1990) was an arcade game that was disliked among the gaming community for its use of microtransactions, whereby the players could deposit quarters and gain in-game power ups such as additional health, weapons, special moves

and additional characters. However, the Elder Scrolls IV: Oblivion was the first time a game company charged money for *cosmetic* items. Many gamers saw this as the beginning of in-game content that would be walled-off from players, who, after paying full price for the full experience of a game, would additionally be charged for in-game items that many saw as things that should have been included in the game in the first place. Virtual goods are not scarce, after all. Turns out, the gamers were correct; microtransactions in gaming has become a growing trend ever since.

Some virtual property is combined with a real-world analogue. Activision's *Skylanders* game (released in 2011) has physical toys that can be purchased in many big-box stores. The toys contain an RFID chip, and is scanned over a special reader, or "portal", attached to a gaming console, which adds the character or item to the game, or unlocks a level to be played. Nintendo has a similar concept with its "Amiibos", which unlock in-game items, power ups, characters, moves, companions, and levels. These toys can be freely bought, sold, and traded in the real-world (for instance, on eBay or in video game stores), and their in-game equivalents come along with them.

In 2011, in the game Minecraft, Mojang began offering a special in-game cape that a player could wear that could be seen when playing single and multiplayer games. These capes could be only be obtained with the purchase of a ticket to its Minecraft convention, MINECON (*Cape*, 2020). These capes cannot be traded or sold to other players, they're attached to a single user account.

Sometimes the sale of these digitally owned items occurs in the real world. As of this writing, a Pokemon Sapphire game cartridge, released in 2002, with all Pokemon

captured, is listed on eBay with a “buy it now” price of \$479.99. A Marvel vs. Capcom Dreamcast game, (disk and memory card), released in the year 2000, with all 56 characters unlocked selling for \$249.99.

### **History of Virtual Property part II: Real Money to Lease Virtual Items**

In these types of virtual environments, players interact and trade with one another on a centrally owned and hosted server. There are markets between players, often facilitated by in-game trading mechanisms such as auction houses. Prices are discovered via the law of supply and demand. Entrepreneurial behavior brings new goods into the in-game markets. These virtual worlds are rich, complex, storied, often with complex economies and lengthy in-game content.

In these virtual worlds, a player leases access to his character, usually by paying a monthly fee to a centralized server where the game is located. His character, his inventory, and his story progress carries over from game session to game session. A player might gather new swords, armor, spell ingredients, pets, vehicles or ships. A game session might be spent acquiring better equipment, better capabilities, or in some more complex games, actual capital goods, allowing players to manufacture other in-game items. A vast array of virtual environments fall into this category, which includes most of the well-known Massive Multiplayer Online (MMO) games.

The first of these types of games appeared as Multi-User Dungeons, or “MUDs” in the 1980s. These were text-based games where multiple players would log in, explore environments, interact with other players, and engage in story elements – all in text. Some popular MMORPGs were released in the late 90s/early 2000s: Electronic Art’s

*Ultima Online* in 1997, Verant Interactive's *Everquest* in 1999, Jagex's *Runescape* in 2001, CCP's *EVE Online* in 2003, and of course the behemoth, Blizzard's *World of Warcraft* in 2004.

In addition to containing extremely complex economies with thousands of items and production structures and virtual property and full-fledged markets, these games lead to very complex social interaction between players, which, in the early days, defined the rules surrounding property and virtual environments.

In *Ultima Online*, the first large-scale MMORPG with graphics, the player experience was extremely different from what one might find in a modern version of the same genre. Players were avoiding other players, or when they did interact, a stronger player would often get robbed of their belongings. Some players would strip down to their underwear to move across the world to complete quests, in the hope that the stronger, more opportunistic players who were rampaging through the world would allow them to travel without being killed. The game developers noticed this widespread behavior among the player base, and began a conversation regarding how to fix these problems. Some of the solutions that the lead developer, Sir Richard Garriott came up with, formed property norms which are considered given in today's MMOs. (Donovan, 2010).

As a result of many of the norms set in *Ultima Online*, many in-game items are now "soulbound" to a certain character – meaning they can't be given away to another character, or stolen. Some items are "bind on equip", meaning that once a character puts on/equips a certain piece of equipment, or uses it in some way, that the items becomes

soulbound. More rare items are “bind on pickup”, meaning that as soon as a character interacts with the equipment in any way (picking it up), it becomes bound.

Some in-game items and equipment are restricted to characters of certain levels or higher. This is a very common method of property restriction in MMOs, as it means that high level, or more experienced, characters cannot gather powerful equipment from quests or enemies in the game, and just hand it to their lower-level friends, or alternative characters (alts). Each player must earn his or her own of the most powerful items. Since the effort required for weaker characters to earn the most powerful gear is greater, the MMO companies earn more monthly subscription fees. Other pieces of equipment or gear are restricted by faction, location, activity, character profession or class. Items which are not bound can be traded, given away or in some cases, auctioned through an in-game auctioning mechanism. In almost every case, however, in-game items cannot be bought or sold for real-world money – only in-game currency.

Different games handle property and death differently. In more “hardcore” games, items and property are lost when the character dies. In EVE Online, the motto is, “don’t fly [a ship] you can’t afford to lose” (Koensayr77, 2020), as everything you own disappears. In World of Warcraft, a player must run back to the place they died to retrieve their items, which must be repaired for an in-game cost. In other games more geared toward beginners or children, the penalty might include just relocating the character who died.

Restrictions, rules, and scarcity naturally form grey markets. These grey markets are forbidden by their games’ terms of service, and can get players banned from their

games, but these grey markets persist. They consist of selling in-game currency, in-game items, in-game escorts, or even offers to play your character for you, to gain your character experience and items.

Depending on the game, players might be allowed to put real-world money into the game, to purchase in-game currency, which can be used to purchase equipment, items, clothing, mounts, etc. This is the case with World of Warcraft, in the form of WoW tokens (*Introducing the WoW Token*, 2015), and EVE PLEX (CCP, 2020). This is also the case with other popular in-game items like Fortnite character skins, or purchasing loot boxes in games like EA's Star Wars Battlefront 2. There are card games which allow in-game card packs to be purchased with real money, but where cards are not permitted to be traded among players, like Blizzard's Hearthstone, or Wizard of the Coast's Magic: The Gathering Arena.

### **The History of Virtual Property Rights part III: Personal Ownership of Digital**

#### **Goods**

These types of environments are rare and are a fairly new development in the world of virtual gaming, and only a few environments fall into this category – but more environments of this type are coming online every month. Digital items in this type of environment can be bought sold for real money, traded to other players, and sometimes created.

Wizard of the Coast's Magic: The Gathering Online (MTGO) is a popular example, with a robust player base that has been active since MTGO went active in 2002.



Human players purchase virtual cards to play the game, and can then buy, sell, or trade their cards for real money. In most modern games this is against the terms of service, but it is part of the business model of MTGO. Second Life is another notable example of category D, where humans actually hold actual human title to virtual property. Clothes, houses, furniture, and even land can be bought and sold. The European Union considers the virtual land in Second Life as an asset, and charges Value Added Tax on it (Linden Labs, 2019).

Hasbro has been considering using NFTs to facilitate electronic trading and playing with Magic cards (Hall, 2021). With 35 million players as of December 2018 (Webb, 2018), and 20 billion cards produced from 2008 to 2016 (Rosewater, 2017), this is a huge market to bring to the NFT space. The game earned Wizards of the Coast \$420.4 million in profit in 2020 (Griep, 2021), so clearly they would not put such a valuable property at risk if they did not believe there was opportunity, growth, and utility for doing so.

Blizzard's Diablo III, when it released in 2012, contained within it a "Real money auction house", wherein players could take gear they found in the game, place it on the auction house, and sell it for real money. This was extremely controversial among the player base (being called "play to win" generally), and was removed from the game entirely in March of 2014 (RMAH - Diablo Wiki, 2014).

In Valve's Counterstrike: Global Offensive, players unlock loot boxes as they play the game, which unlocks new skins for in-game weapons. In their game Team

Fortress 2, players unlock boxes containing silly hats. In each case, players are allowed to sell (in a curated marketplace), to other players, for real money, those virtual items.

In the past few years, crypto blockchains have emerged as a way for gamers to hold title to virtual items they find or earn in games. This allows them to bring the item to another game (that also uses the protocol), or to sell it in real life for real dollars. Until recently, this practice has occurred, but would usually get your account banned on the gaming server. The phrase *cryptoproperty* has been coined to describe a virtual item tied to a blockchain, that is owned by a person (Sillytuna, 2017).

In order to maximize the ownership of virtual capital, players and developers have been moving more and more toward a model that would prevent virtual items from becoming dead capital.

A few Blockchains have been created to facilitate the recording of title of virtual items. This allows virtual items to be owned by a person, and to be transferred between virtual environments. This record of virtual ownership requires a new generation of virtual games to take advantage of it, but these companies have made millions of dollars so far. The owner of one such company, Forte, was featured on in a June 2020 episode of Econtalk (Roberts, 2020). They are networked with over 20 gaming companies who will use the Forte blockchain, which allow users to use digital items and art in multiple games (Forte, 2019). The Forte developer is calling this concept, “community economics” (Hwang, 2020), where multiple creators sell and trade digital items in exchange for real money, in a digital world.

In 2015, another Blockchain was created entitled, “FreeMyVunk”, by a former oil and gas exploration geophysicist Tyler Smith. “Vunk” is short for “virtual junk”, and has the same mission as Forte – to record title to virtual items, which can be used in many virtual environments, or bought and sold the same as any physical items – the same as they can in the real world with real world items (“THE REVUNKOLUTION,” 2016).

Another recent trend, “NFTs”, or non-fungible tokens, have emerged in the market as of 2018, and exploded in 2020. These NFTs represent authenticity and title, are recorded on a blockchain (usually Ethereum), and can be sold and transferred to others for real money. Digital pictures of art, title to virtual land, and agreements for residual income can all be recorded and enacted using NFTs. Digital assets can be copied, but some consumers value uniqueness or collectability. In July 2020, William Shatner sold 10,000 packs full of 125,000 trading cards of headshots, pictures, and historical Star Trek moments and scenes on the Wax blockchain. The cards sold out in just 9 minutes. The cards contain a digital contract that gives William Shatner a small piece of the transaction price each time a card is traded, providing him with a passive income. (Jackson, 2020).

The game CryptoKitties went live in 2017. The game was centered around allowing users to collect and breed digital kitties. The game designer Axiom Zen describe the game as “breedable beanie babies” (Abram & Brangan, 2018). Users can buy, sell, and trade digital kitties that were each released a new NFT. In the first week it opened, the game generated \$2.7M in revenue and accounted for 15% of the traffic on the Ethereum network that week. (Tepper, 2017). In 2018 an NFT picture of Donald Trump was sold in the game Cryptocelebrities sold for \$121,000 (Shankland, 2018). NBA Top

Shot, a crypto platform created by Dapper Labs in partnership with the basketball league, sells sports memorabilia. This includes short video clips of players and digital basketball cards. Sales volume was \$147.8 million in one seven-day period in February of 2021. Shark Tank entrepreneur and Dallas Mavericks owner Mark Cuban is participating in the NFT world, and buys and sells on the platform (Browne, 2021). Famous real-world auction house Christie's is also getting pulled into the NFT trading world. On March 11, 2021, they opened bidding on their very first digital NFTs, and bidding rocketed into the millions on many pieces. One piece of digital art called, "The First 5000 days" by a digital artist named, "Beeple" sold for \$69 million, the highest price ever paid for an NFT to date. The CEO of Twitter sold an NFT of his first tweet from 2006 where he said, "just setting up my twttr" for \$2.5 million. (York, 2021). Another investor paid \$222,000 to purchase the title of a segment of a digital race track set in Monaco, in the F1 Delta Time game. This owner will receive 5% of the sales of future digital tickets that people purchase to attend racing events that occur on that race track. (Haig, 2020). It appears that the concepts of digital property and digital title have hit the big leagues are here to stay.

NFTs, and the record they carry with them on the blockchain, allows for provenance, a quality that digital items lacked before very recently. A picture of the "disaster girl" meme was created by the girl featured in the picture – a small girl standing, smiling in front of a burning house, recently sold for \$500,000 (Schneider, 2021). The Guardian reported that NFTs are helping digital artists solve the vital problem of who owns a piece of artwork. If an artist creates an NFT of a piece when it is created, the artist can prove the date of creation, and its original owner (Paul, 2021).

### **Why did Virtual Property Rights Emerge?**

In his famous paper, “Toward a Theory of Property Rights”, Harold Demsetz analyzed the Native Montagnes in Canada in the 18<sup>th</sup> century, contrasting them to a century before, and studied how property rights emerged. His conclusion was that the Montagnes wanted to internalize externalities, and that property rights are formed when the cost of organizing and tracking property becomes cheaper than not doing so (Demsetz, 1967). The surrounding beaver population was dwindling due to French fur trappers, so property rights were established to ensure that they were not over-trapped in a tragedy of the commons situation. He contrasted the native Canadian population with the Native Americans in the southwestern plains, who did not establish property rights – they were not faced with a similar pressure/externality, and thus did not need to bear the cost of doing so.

Demsetz’ famous paper is often summarized as, “property rights are formed to internalize externalities”. This principle has been applied again and again in real world examples. In Demsetz’ famous paper, The Emergence of Property Rights, the Native Americans did not worry about formal rules of governance and cooperation before the French fur trappers showed up, they only made arrangements and agreements regarding land and trapping use after the resources became more competitive and scarce, after others who wanted to hunt the same beavers were impacted to such a degree that formal rules of transferability and enforcement had to be created. Demsetz’ insights can be applied both directly and indirectly with respect to virtual property rights.

Applying Demsetz' theory directly and within individual virtual environments, there are many examples within games of players and groups cooperating with one another, spontaneously forming rules to organize and allocate resources. Inhabitants of virtual worlds take very seriously their interactions with others in those virtual worlds. Even though players are usually anonymous from their real-world selves, and do not personally (in the real world) bear the costs of discoordination, breaking social rules, or virtual death, complicated social norms and social agreements emerge among the participants of virtual worlds. In EVE Online, a social order among pirates emerged that encouraged the honoring of ransom payments. (Mildenberger, 2015). The pirate reputation was being treated as a "common" in the game EVE Online, shared among all pirates. Pirates are those who choose the career path of gathering resources by attacking others, destroying their ships and harvesting their resources. An alternative, less risky source of income was the hostage-taking industry, whereby a pirate could threaten destruction on another ship, until it was paid a ransom by the ships' owner or corporation. Most pirates were honorable and released their hostages according to their agreement, but occasionally a pirate would take a ship hostage, collect the ransom, and then also destroy the ship to collect its resources (essentially gaining a double payday). This was profitable for the individual pirate, but caused pirates generally to lose reputation such that hostages would refuse to pay their ransom fees. As Mildenberger outlines in his paper, a social order emerged among the pirates, whereby individuals and groups of pirates would act in ways so that they could preserve their reputation. "Honest" pirates (who honored their ransom agreements) sent out messages to the players on the EVE server that pirate

reputations were important, and honest pirates would punish and destroy dishonest pirates. A feedback system was created and encouraged, whereby hostages could notify honest pirates of bad behavior, so they could provide retribution to the dishonest ones, to preserve their future stream of ransom income. Honest pirates would punish and destroy dishonest pirates. By this system, the externality of the reputation decrease from dishonest pirates was internalized by honest pirates, and the cost was forced back on the dishonest pirates.

Demsetz' moral might be reworded: people who operate within a system care about the rules by which that system operates, such that they will coordinate and cooperate, forming strategies whereby the environment and resources within it are governed. This rewording explains the symbiotic rule-creation relationship between game developers and gamers in the last couple of decades.

Gamers also have stakes in their environments and games. Not in every situation or system is their input taken into account, but in recent years, developers take increasing amounts of feedback from their players as they develop their games, their rules, their environments, their resources. Gamers have many choices these days, and developers know this.

It's somewhat of an in-joke these days that games only release in early betas, and numbers of gamers enrolled in betas is increasing over time (Clement, 2021), but one reason is so that the games can gather as much feedback as possible before they officially open. Developers routinely gather feedback. They want their games to attract to the most players possible, and for their games to feel fair. Gamers certainly have a stake in how

the rules evolve. They are treating these virtual environments like property, by having an opinion about it, providing feedback, becoming co-creators of the agreements and systems and economies.

Developers of games increasingly gather direct feedback from the gamers who play their games. With increasing regularity, games operate in “open betas” specifically so feedback from players regarding gameplay, interactions with other players, or economic factors can be reconsidered. It makes sense that the software developers do this because it maximizes their player base, if their games are considered more “fair”. The gaming industry is highly competitive these days and gamers have many alternatives. Websites that discuss gaming industry issues advise companies to hold open betas in their software development cycles (Putze, 2021).

Minecraft is a famous example of a lengthy and successful Beta period. It launched in 2009 and stayed in Beta for 2 years, where it accumulated \$30 million and a user base of two million gamers (Rosenburg, 2011). Actively taking feedback from users, implementing features they highly valued, made users more inclined to be involved in the feedback process and more likely to play. The failure of the Valve game Artifact is at least partially believed to be because the developers were not taking feedback from users, even very high profile, professional card-game players (Stubbs, 2019). This is consistent with Hirschman’s hypothesis in his famous book, *Exit, Voice, and Loyalty*, whereby a dissatisfied customer/user/citizen can either voice his discontent, or exit the relationship (Hirschman, 1970). Developers actively seek feedback, and some rely extremely heavily on user feedback. This principle is baked into the recent software development



methodology of “agile”, as outlined in the Agile Manifesto written in 2001, to include user feedback as a foundational part of software development. This methodology has become pervasive in software development, it is now taught in certification courses and in college classrooms. (Beedle et al., 2001)

In the early days of Ultima Online, one of the very first MMOs, creator Richard Garriott was dismayed to see that a group of players were killing other players and taking their possessions. The robbed players were becoming discouraged, and Richard found one of the thieves online and confronted him. When asked why he was playing the game in such a way, and making the experience miserable for other players, he responded that his character was a thief, and that he was supposed to steal from other players and take their possessions. That he was playing the game as it was meant to be played. Richard was surprised by this answer, he had not considered it. Over the following months, Richard gathered feedback from the players regarding how rules surrounding property, conflict, and death should be handled. He made rules that some equipment could only be equipped by characters of a certain level, that some areas in the game were designated safe zones, that even after dying a character’s items could still not be taken, etc. Richard and the players had become co-creators of the rules of the game; the players had a stake in the rules, the outcomes, and the interactions that the allowed and prohibited.

Even after the rules of the environments are decided and set, players within some games or environments form cooperative rules with other players. Players in Fallout 76 spontaneously created watch patrols, trials. EVE Online players created pirate rules, and enforced them among outlaw bands. People who do not have a stake in the treatment of

their environment, or do not think they will participate in systems long-term, do not create cooperative systems regarding the conduct of players, the fairness or the distribution of resources (lotus cartel in WoW), or the punishment of players who harm other players. Gamers have a stake, they care, they persist, they create, they cooperate – they are treating these virtual resources and virtual environments as property.

Another property framework is applicable to virtual environments: the Lockean property theory, or the “homesteading principle”, or the “labor theory of property”. In *The Second Treatise of Government*, published in 1689, Locke explained that if a person mixes their labor with untouched land, they now own the land (Locke, 2018). This would include improvements such as removing trees from or plowing a field, constructing fences, irrigation systems, or constructing housing. He argued that putting work and time, extensions of people themselves, into the land, the land became an embodiment of the person’s labor, and that no other person had any higher claim to it than the person who mixed their labor with it. He caveated his theory by saying that land that was as good as the land taken from common must still be leftover for others. The theory goes that since a person owns themselves, and that they own their life, they decide how their time is spent. Their time is an extension of, or a manifestation of, their life, and the labor they spend is also theirs. They can either use it to build and manufacture and improve things around them for themselves, which they then own (because who would have a higher claim?), or they can sell their labor to others in exchange for a wage. Gamers and other users of virtual systems put their labor into the environment to make improvements, to better their situation, gaining power, forming relationships and institutions and systems and gathering

wealth. It makes sense that gamers would become attached to these things, and consider them their own, and to behave as if they were.

People already behave as if virtual property (even property they have leased access to, and agreed to the terms of agreement for), is something they own. they buy, sell, and trade, even when doing so is against the terms of service of the virtual environment. In most MMORPGs where players spend a lot of time, an average of 25 hours per week according to a report by IGN Entertainment (Batchelor, 2005), selling or buying in-game items for real money will get a player's account banned, denying access to his characters and items. Despite this, however, a large demand for these exact type of services still exists. Sites like [www.g2g.com](http://www.g2g.com) and [www.igvault.com](http://www.igvault.com) cater to MMO players of all shapes and kinds, offering a range of services from leveling your character for you, to selling you items and equipment on every World of Warcraft server that exists in any faction, to selling full accounts, coaching, and even selling items that normally only be obtained from defeating a dungeon with 40 people working together. Complaints of gold farmers persist on every forum and message board that discusses MMOs – there is clearly a demand that exists for these services, despite the risk to the player of using them. Some gamers want to buy and sell items, and exchange their time for in-game money.

People treat their virtual property as property in other ways – there have been real-world legal disputes, contracts, intellectual property questions, and markets which have emerged, all demonstrating the idea that the inhabitants of virtual worlds view and treat their assets as their property.

The boundary between virtual property and intellectual property/copyright law has quite a bit of overlap. In October 2000, an EverQuest game developer banned player Mystere for creating virtual fanfiction. The fanfiction outlined the rape of a dark grey elf girl “of barely 14 seasons”, and was posted to a third party message board, IGN. An anonymous party contacted the EverQuest game developer, who banned Mystere. She appealed the decision, saying that the story wasn’t posted to any EverQuest board, and that it was fiction, but the ban was upheld. The incident was discussed in two *Gamespot* articles (Parker, 2000), in 2006 in the lead game designers blog (Smedley, 2006), in academic papers (Taylor, 2002), and law journals (Garlick, 2005). The incident caused the removal of a questline in Everquest that involved the murder of a pregnant Halfling, because many gamers objected that the fanfic story didn’t contain anything more objectionable than the game itself had in it. Gamers rankled at the idea that the game developers could ban a player for something that did not occur in game, that was decided unilaterally, and deprived a player of the things they had spent time acquiring in the game world.

In 2007, Reuters reported that the maker of a virtual bed in Second Life filed a lawsuit against another Second Life resident who copied his idea and was selling it for cheaper. The virtual bed allowed users to click through and select 100 different sexual positions for their avatars to co-participate in, and display the corresponding animation (Mistral, 2007). The Second Life Terms of Service are unique among MMOs, giving players explicit ownership rights over the intellectual property that they create in-game. The terms and conditions state that players “retain copyright and other IP rights with

respect to content you create in Second Life”, and that players, “will comply with the processes of the Digital Millennium Copyright Act regarding copyright infringement claims covered under such Act” (*Terms and Conditions / Linden Lab, 2017*).

In 2011, a 43-year-old Japanese woman deleted her lover’s online persona in the game “Maple Story”, and was arrested by police. She was charged with illegally accessing a computer system (she had her lover’s password). She was transported 620 miles to the jurisdiction where her lover lived to be tried, and faced prison and a possible fine of up to \$5,000 (Siemaszko, 2008).

Artists today in Virtual Reality Social Media program VRChat sell user skins that they have designed and configured to be usable in the game. The market for these skins range from \$20-\$800, depending on the complexity of both the art, the avatar attributes, and the movement characteristics the skins have (Schultz, 2018). Some skins have wings, a tail, unique dances or catchphrases, etc. VRChat is embracing this model where users create and sell content and services, and is hiring “economic managers” to design, configure, and regulate this new frontier (Schultz, 2019). VRChat, as it moves from an “anything goes” environment with respect to artwork, avatar designs and environments, will have to wrestle more with copyright issues, and will have to actively monitor sales and imagery in their marketplace.

In 2003, Chinese gamer Li Hongchen filed a lawsuit against gaming company Hongyue, also known as “Red Moon” in Beijing Chaoyang District People's Court, for not sufficiently securing their gaming servers, and allowing a hacker to steal his hard-won virtual in-game items. The court found in his favor, that the software company had

been negligent in their maintenance, and ordered Hongyue to restore his items and status (Lyman, 2003). He had spent more than two years and more than \$1200 playing the game and purchasing his virtual arsenal. The gaming company contended that his virtual property was only “piles of data” that had no real world value. The Chinese court did not with that assessment, in what was speculated was a first-of-its-kind case at the time, in either China or the US.

These incidents, and the discussions surrounding them, highlight the idea among gamers and other users of virtual environments that intellectual and virtual property *is* property. People get upset when they are deprived of it, or when someone else copies it. They buy and sell it. They innovate, they create. They spend time in virtual environments, they do work improving their characters, learning how the environment and rules within it work. They form relationships, contracts, agreements, and institutions. Clearly gamers have a real stake in their environments, they possessions, their ideas, and their time. Courts and governments are starting to recognize virtual property rights, it will likely not be long into the future before more robust rules expand even further and become more commonplace.

Having real, personal, legal title to virtual property lowers the opportunity cost of spending time in online environments. In 2001 University of Indiana Professor Edward Castronova calculated that the nominal hourly wage of playing online is about \$3.42, based on the economic value of virtual items produced by gamers while playing (Castronova, 2001). If players can sell their property, their time is recognized as valuable, and can be reimbursed. Things earned, improved, created, or formed online have value to

people because of the time-value of money; people spend their time doing the thing that has the lowest opportunity cost for themselves. People perform activities online because they value those activities, and other people are very often willing to pay for the things that others have created or improved.

The dollar value of virtual items, even if not explicit with markets and prices with real buyers and sellers, is calculated regularly anyway, even if in the form of a shadow price or an approximation. Occasionally in EVE Online, a battle will occur and an outlet will publish how many thousands of dollars of effort were destroyed. A missed “protection” payment cost a virtual corporation \$300,000 in damages when they were attacked by the corporation providing the protection (Kelly, 2014), and a well-laid trap destroyed multiple dreadnought-class warships (the most expensive ships in the game) to the tune of \$17,000 (Yancy, 2017).

Not only do gamers who spend time in virtual environment anyway want to reduce their opportunity cost, allowing content creators to sell their art opens up entire markets that did not exist before. Artists who have no connection to a gallery, an agent, or a market can now access all of those things online. Also importantly, the artist-buyer transaction can remove layers of middlemen who typically charge very high fees, sometimes 75-80% of an artist’s commission, according to cryptoartist Sillytuna, who has some digital art selling at famous auction house Sotheby’s in early June 2021 (Sillytuna, 2021) to host and display art, generate buzz , and locate buyers.

## **Conclusion**

Just as people in the real world benefit from real, scarce, recognized, legal, official, transferrable, transparent, verified, open title to their real-world businesses and homes, ala Hernando de Soto – so will virtual inhabitants. Virtual property is an asset that gamers and virtual inhabitants want to transact with, to improve their lives and their enjoyment. The evolution of virtual property over the course of the last 60 years since the first video game was invented has been toward personal and transferrable title. Given the economic incentives, it is not hard to see why.



## **CHAPTER THREE**

### **Introduction**

Web 3.0 and Virtual Environments make personal ownership of virtual assets possible. As an increasing amount of human activity migrates into these virtual spaces, owners will expect uniformity, predictability, and fairness surrounding the governance of their property, causing the demand for government regulation and legislation of online spaces to increase.

This paper discusses some areas of criminal activity which could cause demand for regulation to occur, what form the regulations might take, and why virtual environment legislation might prove to be difficult.

### **What is Web 3.0?**

Web 1.0 was the first-generation internet, where webpages replaced business cards and phone books. Companies published information, and users could view the content. Web 2.0 was a much more interactive web, starting somewhere in the early 2000s, where user-published content and social media became popular. The newest evolution, which is being referred to as Web 3.0, is built on blockchain technology, mostly decentralized, like the popular virtual currencies of Bitcoin and Ethereum. Blockchain technology uses electronic ledgers to record information and transactions for users, of many types. One type of record, Non-Fungible Tokens (NFTs for short), have exploded in popularity in the last year or two, with users recording real-world ownership

of many types of virtual goods, including songs, art, virtual clothes and accessories, virtual collectibles, virtual property, etc. Web 3.0 allows real-world users to own virtual items, and control those items in all the usual ways that owning things in the real world means. Owners can buy, sell, donate, transfer, or destroy their virtually owned items. The NFT market is now valued in billions of dollars, with large multinational corporations investing in web 3.0 applications, which will continue to grow the market even larger.

Virtual Environments are similar to Web 3.0 in that users can own (in real life, as a human person) digital/virtual items. They usually form online spaces where users interact with one another in various ways. It could be as simple as a virtual chat room, only made for conversing, or it could be as complicated as a Massive Multiplayer Online Role Playing Game (MMORPG) such as World of Warcraft or EVE Online, where complex interactions with the virtual environment are possible, and full economies form with buying and selling of virtual resources. Some prominent examples are Second Life, VR Chat, and Roblox, which have all gained popularity in recent years.

Current regulations are mostly concerned with how life operates in the real world. Real, physical property, money, crimes, contract, titles, licenses, etc. Virtual Environments have traditionally been viewed as the purview of gamers and nerds, and as an online hobby. Any disagreement between parties is usually managed by individual game developers, if it is “handled” at all. A fraudulent trade, an unkept promise, a deceit, a trade based on asymmetric information – this was all mostly ignored by people who were not involved in these environments, or often just taken as part of the game. There are some regulations which address ownership of digital items, or behavior in digital

spaces, but they are likely very inadequate in addressing the types and complexities of human interactions, transactions, and ownership questions which will emerge due to the new complex technology of ownership of virtual items, and the increased popularity which these environments will enjoy.

With the recent explosion in popularity of Non-Fungible Tokens, actual people and organizations can actually own virtual things. Discussions of the “Metaverse”, virtual land runs, and multibillion-dollar international corporations investing money and infrastructure in these environments, and it is only inevitable that very soon the calls for regulation of these spaces will become too great to resist for an entrepreneurial regulator or legislator to resist or ignore. The economic return to legislating these spaces, in the form of gaining or maintaining office will provide the incentive to do so.

### **New Rule Creation in Virtual Environments Today**

Virtual Environments as they exist today are largely self-regulating. Software developers interact with their players to create online, virtual spaces where the players may have experiences of various types. There are fantasy world, science fiction, and virtual spaces that emulate life in the real-world. The game engines that are created by the creators define the possible activities available to players, whether it is killing monsters, flying between planets, or building party houses to hold social gatherings. Players often make requests for increased functionality of the games and their game engines, which are considered by the software developers mostly from a business case. Are the new features

compatible with my current set of features? Will they enhance gameplay? Are they likely to retain current players or attract new ones?

Regulators and legislators, on the other hand, pass and enforce laws to modify behaviors, enforce norms and agreements, and to provide redress to parties who have been harmed. They are often used to attempt to control externalities, the act of placing a cost on a person not involved in a transaction, to increase overall societal utility. They are also used ostensibly to combat market monopolies. Their ideal goal is to ensure safe, competitive delivery of a service while not disrupting that service. They can also be used to restrict or prohibit delivery of a good or service, by ensuring that the sellers have licenses, or that the buyer is of legal age. It can require products to be subject to inspection, expiration or reporting.

Usually laws and regulations are made to protect personal autonomy and property. As the stakes increase in online environments with real ownership, large amounts of money, and people become more concerned with “virtual body autonomy”, the demand for online regulation will increase, and at some point politicians and regulators will become the norm.

In recent years, various activities occurring online might normally meet a threshold for regulatory or legislative attention, but virtual environments and web 3.0 are still so relatively unknown that it is very likely that regulators are either not yet aware of these activities and places, or they do not yet understand them. Some current laws already apply to some of these situations, but are not enforced, and in other cases no laws currently exist or apply. This paper speculates that most or all of the activities outlined in

this paper will eventually lead to laws being created once a popularity/awareness threshold is reached.

## **The Demand for Regulation**

### **Child Labor and Company Scrip**

In August of 2020, a YouTube journalist named Quintin Smith, using his channel “People Make Games”, reported on the issue of the online game Roblox exploiting child labor. Roblox is a sandbox environment that mostly caters to the under 13 demographic, which allows its users to play games, and to create games that other players can enjoy. Games of all kinds can be played in the environment, there are games of tag, hide and seek, racing, experiences that mirror the popular Doom games from the 1990s, or even games that recreate the experience of the contestants from the fictional show “Squid Game” from late 2020. Over 40 million individual gaming experiences have been created and uploaded to Roblox. Roblox began trading on the open stock market in 2021, and is currently valued at \$38 billion, and has over 200 million unique users every month. It advertises that when other players play a developer’s game, Roblox will enter into a profit-sharing agreement, and that in 2020 they paid out \$250M to its developer partners (Curry, 2020).

There are several main problems with Roblox, as Quintin Smith points out, one of which being that the platform takes 75.5% of the revenue generated a creator’s games (*Developer Economics*, 2021). In contrast, the Epic game store takes 12% of revenue, (Sweeny, 2018), as does Microsoft (Booty, 2021), and Steam takes 30% (*Steam*, 2018).

Another problem stems from the fact that the minimum payment out to Roblox game developers is and from the fact that the minimum payment to a developer is \$1000, and only then if a developer is paying \$5/month for a Roblox premium subscription. To make the payout arrangement even more egregious, when you remove/transfer \$1000 worth of in-game Robux into the real world, Roblox only pays you \$350 for it, with the explanation that the \$650 that you didn't get are for fees and supporting the in-game development tools. Because of this terrible conversion rate, most of the Robux in the game stays in the game. In Roblox's SEC filings in November of 2020, they declared that only 17% of the developer earnings are paid out in cash (Baszucki, 2020). For contrast, in the MMO "Entropia Universe" which freely allows its in-game money to be traded for real US dollars, the minimum withdrawal is \$100 (*Entropia Universe - Withdrawal FAQ*, 2022). Linden Labs' Second Life's minimum withdrawal amount is \$10 (*Process Credit (Withdrawal) Requests*, 2020). Another challenge facing young developers in Roblox is that given that there are approximately 40 million games on the Roblox platform, it's exceptionally difficult to get your game noticed so that it will catch the attention of players (but of course you can pay Roblox to have it advertised). Most games never make anywhere near this amount, so the game creators have to accept their payout in "Robux", the in-game currency that can be used to purchase items or in-game cosmetic skins – a practice that Smith compares to paying workers in company script, which became illegal under the Fair Labor Standards Act of 1938 (Fair Labor and Standards Act, 1938).

Since Roblox specifically targets and serves children, these practices become especially problematic, and may eventually garner the attention of legislators and

regulators. Tami Bhaumik, the Roblox Vice President of Marketing, in an interview with *alistdaily.com* said, “From the very beginning, it was about having kids develop games for other kids. We barely spent any money on user acquisition—it was all viral. It’s young developers making games for their friends.” (Wong, 2017). For a game that has increased its valuation from 1.1 billion in 2017 to \$38 billion in 2021, Smith asks – are they creating value on the backs of children? Considering all the restrictions, implications, charges and fees that (mostly child) developers are subjected to, it would be surprising if virtual worlds weren’t a target for an update of the Fair Labor and Standards act of 1938, also where child labor was outlawed.

### **Virtual Sex Work**

Legislation surrounding sexual activity has a longstanding history. Prostitution, pornography, sex shows, etc., have been the constant target of law, whether prohibiting or restricting access, or licensing laws, taxes, etc. The first anti-prostitution laws in the United States were passed in the 1800s, and legislating sex work hasn’t stopped since.

Virtual sex work has occurred for decades, likely ever since the ability to communicate between computers was invented, but with the increase in popularity of virtual environments, and the popularization of real-world money transactions in virtual spaces, it likely won’t be too long before the sordid and salacious tales on online sex reach the ears of politicians and their constituents. Some of the most recent federal legislation being work is of course a source of regulatory attention already, with some of the latest regulations being FOSTA (Fight Online Sex Trafficking) and SESTA (Stop

Enabling Sex Traffickers Act), both becoming law in April of 2018 (Office of the Federal Register, 2018).

In December of 2020, a New York Times article titled, “The Children of Pornhub” drew a tremendous amount of attention to potentially questionable actresses on the website, and the fact that some videos existed which may or may not depict actual sexual trafficking, rape, or sex with minors. Groups on the left end of the political spectrum wrote pieces saying the conservative right was overreacting, overblowing the problem, and using a minor problem to stoke a moral panic about pornography in general. Two huge pieces of fallout resulted from the discussion surrounding the issue – both Mastercard and Visa stopped servicing Pornhub, and in response, Pornhub purged millions of pornographic videos and began a “certified registration program” for its content creators. Videos that drew millions of eyes to the website, and even defined it as a source of content, were deleted because of the stigma and the response to it, of adult content creation (Kristof, 2020).

Observing the Pornhub discussion, also in December of 2020 the website Onlyfans made an announcement that sexually explicit content would no longer be allowed on its platform. Onlyfans began as a website for celebrities, musicians, chefs, and other types of content creators to interact with and release exclusive content to their fans, but over the pandemic quickly became known for its adult content, which overwhelmed all other types of content. Amateur adult performers could produce pornographic videos, and users could either subscribe, or purchase videos a la carte. After an enormous backlash to the announcement, Onlyfans reversed their announcement after



only a few days, declaring that the banks would not cease processing payments in their case. The fact that a website that grew during the pandemic from \$20 Million to over \$2 billion worth of business, most of it adult content, demonstrates the enormous stigma against content of that type, and that companies will often voluntarily police themselves rather than run the risk of drawing enough attention to be the subject of legislation (Barry, 2021).

Attempts at self-policing, as Pornhub and Onlyfans did, are not always an effective way to avoid legislation. Sometimes it works, but it doesn't always. The level of moral outrage and moral panic surrounding the issue of sex, sex work, protecting children from exposure to these topics, and preventing harm to children sometimes result in events like the debunked conspiracy theory "Pizzagate". Pizzagate was a false news story spread in 2016, alleging that hacked emails from Hilary Clinton's campaign manager contained coded messages outlining details of a hidden child sex ring in the basement of a Washington DC pizza restaurant. Conservative news outlets spread the story, and it showed up on places like 4Chan and 8Chan. It's sometimes considered to be the precursor the QAnon movement. A person who believed the conspiracy showed up at the restaurant and fired a rifle at a locked storage door in an attempt to rescue what he thought were trapped children. A political base who believes that conspiracy theories of this sort are not always likely to be appeased when a platform which hosts or delivers adult content announces that it will self-police its content.

Regarding sexual subjects in virtual environments, Rolling Stone covered a story in September of 2020 regarding clandestine strip-clubs in the kid-friendly Roblox, where

the creators of these strip clubs purposely evade detection and censorship by the Roblox content moderators, recreating their environments even after being repeatedly deleted from the platform. (Dickson, 2021) To partially address this issue of adult interactions and discussion being hosted on what is mostly a gaming platform for children, Roblox seniors are considering a “rating system” like the movie industry’s MPAA ratings, or the record industry’s RIAA, in order for parents and children to better know what content will be found within various in-game worlds (Jargon, 2021).

In the Virtual World Second Life, where users can own virtual homes and property and decorate their homes with customized furniture while wearing customized clothes, there are 78 “adult only” destinations listed in the virtual directory (citation [secondlife.com/destinations/adult](http://secondlife.com/destinations/adult)), with a number of them being virtual brothels or clubs, where customers pay to spend time with real sex workers, interacting with their avatars either socially or sexually. These brothels and clubs operate much like real brothels, where (mostly) men either walk in or make appointments, to engage in all types of social interaction. Sometimes voice chat is involved (\$15-\$25 per hour), sometimes only text (\$10-\$15 per hour). There are specialized pieces of furniture, rooms, clothes, and items to facilitate sexual encounters of all types and kinds. Each virtual sex worker sets their own prices, and the virtual brothel or club takes a cut, usually 20%. There are BDSM (acronym) activities where a payer can let the sex worker take total control over their avatar, or players can be virtually tied up in various positions, or hung from the ceiling by ropes. There are virtual control settings for semen, who gets to control when ejaculation

happens, and animations and permission settings for who controls the semen once ejaculation happens (like getting rid of it by taking a shower, for example).

Given the technical complexity, explicitness, specialization involved, the sexual environments filled with sexual paraphernalia, the fact that real money changes hands – and the fact that virtual environments are gaining in popularity over time, it would not be surprising at all to see regulation eventually which places restrictions, legal licenses, zoning laws, age limits, or even prohibitions in certain cases on virtual sex work. Most Second Life brothels and clubs perform self-policing and age verification, but that doesn't mean that regulators and legislators won't become interested in legal solutions and management eventually.

### **Intellectual Property Theft**

Another area in which regulators may very soon become interested in is how virtual worlds and Web 3.0 environments are handling IP theft.

Web 3.0 is enabling enabled many opportunities for artists and musicians and authors. Musicians can sell their music under several models – there is a direct ownership model, where users can own copies of songs and albums traditionally, just like buying a record or purchasing the music from iTunes, or a model where an artist sells “shares” of a song or album, allowing everyone who owns a share of the song to make money whenever the song is played. There is a lot of discussion in the music industry that this technology and these sales models will allow singers and songwriters to move away from streaming services such as Spotify or Pandora, whose payouts to artists are famously low.

Virtual Environments and Web 3.0 have unfortunately enabled a tremendous amount of intellectual property theft, as well, however. For example, enough creators of Roblox games have used music without the artist's permission, that a major music publisher have brought their first lawsuit against Roblox for allowing game creators to use their songs without paying the licensing fees (Needleman, 2021). The lawsuit, representing artists such as Ed Sheeran, Ariana Grande, and the Rolling Stones is asking for \$200M in damages. It includes major record labels such as Universal Music Publishing, Big Machine Records, Concord Music Group, Downtown Music Publishing, and Kobalt Music Group and others, and alleges that Roblox, with its 42.1 Million daily users as of March 2020, sells virtual music players, or boomboxes, in its virtual item store, which can be inserted into games and virtual worlds, where they play music. The songs these items play includes songs from popular bands such as Imagine Dragons and Deadmau5. These virtual music players have been purchased by hundreds of thousands of players. Roblox allows users to upload audio files onto their platform, for a fee, which they then can later play on these boomboxes, and allows them to copy other users' audio files. What has resulted from this is that users pay to upload popular songs, which are then shared between users.

Game designer Jason Rohrer made a game called, "The Crypto Doctrine", based on acquiring art through either bidding or theft. In the making of his game, he copied pieces of visual art from various artists who published work in the last few decades, 145 in total. The art in his game represents a virtual item, so it can be viewed and appreciated within the game, and occupies space within a virtual world. It can be owned by only

person at a time, and can be moved, carried, bought, sold, stolen, gifted, etc. After he created this collection, he reached out to some of the artists who owned the art, many of whom were not happy that their art had been made into a virtual object without their permission. Many have asked him to remove their art from the game, a request which he has so far respected. Many NFT-minters are not as conscientious or as respectful as he is, however (Grayson, 2021).

A game studio has accused real-life weapons manufacturer Kalashnikov of stealing one of its in-game shotgun designs, and using it for the design of a real-life shotgun, and then handing the design to another game studio (Skrebels, 2021). A contractor working for Kalashnikov approached the gaming studio to ask if it could use the gun design, the fictional EPM28 Mastodon Shotgun, for a real-life weapon. The game studio was excited to enter into talks with the contractor, but soon the weapons manufacturer unveiled its new design, the MP-155 Ultima, which was almost identical to the studio Ward B's shotgun design. After the announcement, studio Ward B discovered that a game called *Escape from Tarkov* had been granted the use of the design by Kalashnikov. Ward B is not pursuing a lawsuit because Kalashnikov is based in Russia, but has spoken out vocally about the issue to raise awareness of the IP theft.

Roblox at some point may encounter legal trouble over some of its user's game worlds which replicate existing intellectual property. Listed in the most popular games section of Roblox are games which directly replicate characters, mechanics, gameplay elements, storylines, and worlds from fictional stories and universes. Among them are games which replicate gaming experiences on other platforms, such as Five Nights at

Freddy's, Doom, or Among Us, Fortnite, Uno, and Payday 2 among others. Yet other worlds recreate movie worlds and experiences such as Squid Game, popular anime JoJo's Bizarre Adventure, or Star Wars. Some games recreate real places or theme parks like Disneyland or Universal Studios. These are very visible, very popular games and virtual worlds which are often created, updated and maintained by a team of developers, and earn money. It's not difficult to imagine that legislators or regulators might gain an interest in stopping the use of other company's intellectual property.

Non-fungible tokens, or NFTs, exploded into the mainstream in 2020, and are being used to form unique digital items. These items can be virtual land, virtual equipment, skins, songs, or art. Some can be (and are) used to track ownership of virtual assets in virtual environments, some aren't, but generally the issue of IP theft and NFTs is an enormous one. At the moment NFTs are something of a "wild west" with very little regulation or oversight, with numerous "caveat emptor" warnings being issued by Forbes and other investment advisory firms (Conti, 2021).

NFTs may provide a unique challenge, however, because if an artist's work is stolen, there is often no "platform owner" to appeal to, as the very nature of most blockchain technology and NFTs are usually based on is that it is decentralized, and that no one entity, organization, company, or institution has authority over it. Recently, in an attempt to register frustration with these Chinese-owned blockchain company Binance's permissiveness regarding copyright infringement of artists' work, some users began minting NFTs from the Tiananmen Square Massacre, since there was no central authority to register their frustration with, or file takedown notices to. (Pan, 2021). They also made

another app called Slavery, comparing smart contracts and earning interest on loans to slavery. Their hope was to force Binance to remove the tokens from their blockchain, proving that it could be done. As of January 2022, both Slavery and Tanks of Tiananmen are both still on the Binance blockchain, seemingly demonstrating that an NFT, once minted, actually cannot be removed from a decentralized blockchain.

The United States has a number of very powerful and well-known laws associated with protecting intellectual property, The Digital Millennium Copyright Act of 1998, to handle online copyright infringement. Knowing or unknowing, an incident of copyright infringement online could cost a person \$750 to \$30,000 per infringement. If it is found that a person knew that a piece of intellectual property was already owned, but sold it anyway, the damages can climb up to \$150,000 per infringement.

A recent story took the NFT speculator world by storm. A 12-year old programmer announced on Twitter that he was launching an NFT line called Weird Whales of 3,350 pictures, and almost instantly sold out based on people's reaction to the his heartwarming story. The prices began at \$66 per picture, but quickly skyrocketed up to \$6,000 per picture. One buyer did a bit of online research, and discovered that the whales were based on a picture the programmer found online, and tweeted the results of his research. Investors and buyers scrambled to dump the NFTs, worried they were now holding a worthless asset. The prices now sit back around \$100 on the Opensea blockchain, far below their high (Schmalfeld, 2021) .

Since intellectual property theft takes on so many different forms, the types of regulations that this problem might attract could take many forms. A law firm

specializing in IP law wrote a blog post theorizing that if the original creator of an NFT was found, who was not the creator of the original artwork, that a law might mandate that the creator forfeit all ownership to the owner (Karana, 2021). This seems like a clear and obvious remedy, but it is not currently a law that exists. Perhaps a law might require that all persons or entities minting new NFTs on a blockchain submit legal identification, in case such a copyright violation takes place. Tracking down original creators of NFTs can often be very difficult. Other laws might require virtual environments (such as Roblox) to verify that user-created content does not violate existing copyright laws, or perhaps respond to take-down notices in the same way that YouTube or Twitch does today, when a company or user files a petition declaring themselves the owner of the original intellectual property that a virtual world or game is based on.

### **Cyberstalking/Sexual Assault**

People's digital avatars are very important to them for a number of reasons. Recent research suggests that users of virtual environments and gamers psychologically adapt the persona and identity of their digital avatar (Ducheneaut et al., 2009). Events which may cause harm or difficulty for their avatar often prompt a user to experience the symptoms of physical stress. Research shows that a digital avatar doesn't even have to look especially like the actual person for these phenomena to occur (van Gisbergen et al., 2020). Transgender people experience a relief in their gender dysphoria when they are able to adopt an avatar of the opposite gender (Morgan et al., 2020). A gaming company is undertaking an effort to create a standard in the gaming and social media industries, to



allow users to create one avatar which can be used across multiple platforms, and raised \$13 million in funding (Pierce, 2021). Users in games like Fortnite or VR Chat often go to great lengths to customize their avatars in very specific and deeply desired ways, sometimes even spending hundreds of dollars on custom, one-off digital art. It is no wonder then, when people's avatars are digitally "assaulted", or have their space invaded, that people take it very personally and feel very upset. Clearly avatars are an extension of the "self"; people deeply want their avatars to reflect who they believe themselves to be, and will spend time and money doing so.

In late 2021, the company formerly known as Facebook changed their company name to "Meta" in a bid to steer the company more toward Virtual Reality. CEO Mark Zuckerberg has given numerous interviews on his vision of the future of the technology, comparing to the hit book, "Ready Player One" where users could play games and socialize in one giant unified virtual world. Meta has begun creation of their "metaverse", and have begun beta testing it, for eventual deployment to users. In December 2021, a beta tester for the Meta (formerly Facebook) VR Universe Horizon Worlds complained that she was "virtually groped" (Sparks, 2021) while testing the functionality of the world and playing a game with other users. "Sexual harassment is no joke on the regular internet, but being in VR adds another layer that makes the event more intense. Not only was I groped last night, but there were people who supported the behavior, which made me feel isolated in [the virtual central gaming space]." A 2020 Pew Research poll indicates that 40% of Americans have suffered online harassment, 25 percentage points

of which have experienced “severe harassment”, which includes physical threats, stalking, or sustained harassment. (Vogels, 2021)

In 2016 in the VR game Quivr, a user named Jordan Belamire was hunting zombies and demons with a group of other players, when another player extended his virtual hands and grabbed her virtual crotch and breasts. She yelled for him to stop, but it only seemed to goad him on. He continued to make grabbing and pinching motions. She stood helpless as her husband and brother-in-law watched the event play out on the TV screen in their living room in real life, feeling embarrassed and horrified and scared, emphasizing how real the experience felt. She wrote about her experience in a medium post (Belamire, 2016). She is one of many online voices who speculate that their online attacks were triggered by their attacker hearing their female voice.

Often VR games such as Meta’s Horizon Worlds and Quivr will implement software features in response to stories such as these. Meta has a setting within their menus that makes other players “disappear” once they get too close to your avatar, essentially making your character untouchable. Quivr implemented a “power gesture” where a user could cross their arms, signaling for a moderator to intervene.

In a follow up video to his initial YouTube report of the Roblox platform exploiting child labor, Quintin Smith of People Make Games cataloged a series of sexually explicit messages being directed at young child software developers by older males who were managing their development teams. He describes in detail how after Roblox became aware of the sexually explicit nature of the messages sent to a 12-year old, they banned his account, but did not then prevent him from creating a new one.

Neither did they demonetize the games he owned and had created on the Roblox platform. The older male user who sent the sexually explicit messages was observed soon after on a streaming channel, discussing his new games being published on the Roblox platform (People Make Games, 2021). The report has prompted some users to call for his banning, or stronger protections generally from Roblox for young software developers, but so far no change in policy has resulted.

EchoVr is a relatively new VR game on the Oculus, where players are represented with a full body avatar as they fly around a space arena trying to get a virtual Frisbee into a goal on the other team's side of the map. There are obstacles to fly around and bounce the Frisbee off of, and teamwork is rewarded, the game is one of the more popular ones on the Oculus. The Reddit subreddit for EchoVR is full of women reporting that they were virtually harassed. Women complain of other players placing their head between the woman's legs, virtual "fingering", and virtual groping. Often these reports by women are met with other players advising them to "mute their microphones" in an attempt to cover their identity so as to not attract the attention of the harassers. Many women are saying that women generally do not feel welcome in virtual spaces because of the pervasive nature of this problem.

The tradition of "teabagging" a vanquished opponent became popular in the game Halo in the early 2000s. This is where the avatar of one player crouches down over the face of another player that has been killed, mocking their death. This is supposed to be synonymous with a taunt, humiliating your opponent in a sexual manner. This has been reported as widely unpleasant for the recipient (Meers, 2020).

Final Fantasy XIV players took to message boards to ask its game developers for a stronger ability to stop cyberstalking. In the game, once a friend is added to a player's friends list, the friend can always see where a player is in the game: on what server and in what area, as well as character appearance – there is no way to turn off this feature. Users can also be matched for parties with other players whom they have blacklisted. A reddit post from the community outlining these issues garnered over 6200 upvotes. Players also complained that the owner of a virtual house in the game couldn't eject other players from it, they could only wait until they log off, or get kicked out for server maintenance. (ItsTracer, 2021)

Regulation in this arena may take the form of universal procedures or practices for avatars. A law might require that a moderator be immediately available to intervene on behalf of a victim, or perhaps at the minimum a reporting system is available so that bad behavior can be adjudicated with a potential ban when the mods are available to review the report. Social credit systems have been suggested, where players rate one another on their sportsmanship, where muting, temporary and permanent bans are the consequences of harassing other players.

### **Data/Privacy Management**

There are loud voices across the internet already calling for regulation of tech companies with respect to user's private information. Companies frequently lose control of user's personal information, credit card information, or entire credit histories, such as in the infamous 2017 Equifax hacks by the Chinese government. Social media collects a

tremendous amount of information on its users, which can be used to facilitate a number of other crimes. Identity theft, harassment, “swatting” (the act of calling a police SWAT team on a person whom you dislike), assault, etc. Social media websites often use information collected on its users to fine-tune advertisements shown to that person, this particular use is a multibillion dollar industry. Many people express concern over this practice, or outright object to it. Many articles are already appearing calling for the regulation of the use of private user data in virtual spaces. Major news outlets are already publishing articles calling for virtual environments to be regulated. A Washington Post article discusses how users’ bodies could become a data source for tech companies, tracking movements within the VR experience. These body movements could be used by employers to track alertness to tasks, or productivity. The author worries that governments could misuse the extra data provided by VR (although he doesn’t say how), but that it might lead to greater psychological manipulation. VR companies have filed patents to use eye-tracking technology to know where to render higher-resolution textures, and where to place ad space (Hamilton, 2022). The tracking of a person’s real-life facial expressions while using VR would allow a person to potentially be served “adapted media content” according to their mood (Zilber, 2022).

A recent bill entitled the “Children’s Online Privacy Protection Act” (COPPA) demonstrates the willingness of legislators to act on concerns of child safety, and it is sure to continue to be a concern as it applies to virtual reality, web 3.0, and virtual environments. Facebook has discussed plans in the last few years for “platforms for children”, but those plans must satisfy privacy concerns, or Facebook will surely face

regulation doing it for them. The new law bans ads targeted specifically at children, provide ways for parents to remove personal information supplied by children, and prohibits companies from collecting personal information on children who are under the age of 15. It is easy to imagine that these same rules and laws could be applied to virtual cities (Kaye, 2021).

A group called the “Extended Reality Safety Initiative” has been created and has its own oversight panel which intends to issue guidance to legislators on the dangers of Virtual Reality and its privacy risks. It is likely that more organizations and coalitions will form to advocate for various types of legislation regarding virtual reality as it becomes more ubiquitous and valuable.

## **Fraud**

Gavin, age 11, while playing the explosively popular game Fortnite (in creative mode), was offered a trade by another player for a rare weapon he was carrying. Since there is no in-game, dedicated screen to facilitate or enforce trades, the traditional way to perform these trades is to drop items on the ground and then pick up what your trade partner dropped. Gavin walked onto a platform the other player had built, and dropped his weapon. The other player then edited the platform so Gavin would fall, replaced the floor and took Gavin’s weapon without trading anything, and went on his way. (G. Cripps, personal communication, June 10, 2021)

The BBC issued a scam warning to children playing on Roblox’s most popular game, “Adopt Me!”, where unscrupulous users conduct scams by pretending to be a

famous YouTube star, offering things that cannot be done (such as duplicating pets or making pets rideable, or making pets fly), asking to borrow something (and then not giving it back), or lying to gain sympathy from other users in an attempt to gain money or pets. (“Roblox Scams,” 2020) The article advises knowledge, caution, and skepticism, but acknowledges that these are not enough to stop scammers from trying and succeeding.

Sometimes regulators are concerned about a software company’s behavior toward users - not just players scamming each other on various virtual platforms, but the game creators and designers cheating the players out of their money as well. Legislators in the United Kingdom, United States, Japan, China, the Netherlands, Belgium and others have written laws of various types regarding “loot boxes”, some declaring them tantamount to gambling, and contributing to addiction. (Straub, 2020) Some commentators have compared Roblox’s item market as essentially a “stock market”, where prices increase and decrease over time, tempting children to gamble and invest, concepts that children often do not fully grasp. Regulators continuing these same regulations into web 3.0 and virtual environments is extremely likely as the technology develops and more environments of these types develop microtransactions.

### **Virtual Slavery**

Virtual slavery seems like a strange idea – physical, real slavery is forced by controlling person’s body, with restraints or threats. If a person is virtually enslaved, why can’t they leave or logout? Yet it has happened several times.

In 2017, EVE Online launched a free to play mode in an attempt to draw new users into its game. Normally \$15 per month, the new mode limited player's access to only certain ships and skills, but developers said in interviews that they wanted a way for new players to try out the game, and to give veterans a way back in without fully committing. When the new players began flooding in after the software update, corporations began recruiting them en masse. A player who went by the handle Scottmw15 had nefarious plans for the new players, however. He promised them mentorship and riches in his corporation named Standing United, but what happened instead was that he took them into a far-away region of space, where only he and people in the corporation spoke English. The rest of the people in the sector spoke Russian, so the new recruits were isolated and cut off from any other players and hope of help.

Here Scottmw15 made the new recruits "rat", or repeatedly kill pirate ships that respawned. Scottmw15 would charge a very high corporate tax rate, forcing the new recruits to hand over the majority of their grinded earnings to him. If the pirates dropped any loot, he forced the recruits to sell him the loot at a deeply discounted price. He would yell at players for doing anything other than ratting. On the corporation's discord server, he would make public examples out of players, humiliating them. He also forced them to click on links to spam websites he owned so he would earn revenue from their clicks. Anyone who resisted or complained were ejected from the corporation, left alone in a sector of space far away from anyone who could help them, probably to die at the hands at the hands of the nearby Russians. This was much more akin to a forced labor camp than a corporation.



Through a series of alliances and espionage (as is very typical in EVE Online), two corporations called the Goonberets and the Sword of Damocles warped in an enormous fleet of ships to liberate the Standing United new recruits who had been virtually enslaved. The two rescuing alliances showered virtual money on the players, brought them out of Russian game space safely, and offered them membership in KarmaFleet, Goonswarm's new player Corporation. 25 players were liberated. (Messner, 2017)

In a report for Wired magazine on alt-right recruitment in Roblox, journalist Cecilia D'Anastasio wrote about how a group she discovered has a highly regimented hierarchy, and that players trying to earn their way into the group start out by adopting the title of "slave". Players desiring to become part of an expansive social group inside a large, professionally architected Roblox game where the players roleplay as "Romans" and "barbarians" begin their careers outside the city walls, labeled as "outsiders", and told to run in repeated virtual circles for hours and hours. They are only allowed to speak when spoken to, and only then allowed to say, "YES", "NO", or "SIR". The owner of the server made a player who in real-life was Jewish, wear an identifying toga so people would know in-game that he was Jewish. (D'Anastasio, 2021)

Slavery per se is involuntary, but certainly voluntary slavery in pursuit of membership into a group warrants a place in the discussion of weird, shocking, and potentially harmful online behaviors, especially as online spaces become more entangled with the real-world economy, and real-world money becomes more and more involved.

Groups such as this roman city server become more like cults, demanding more and more from their users/players.

In 2011 in China, prisoners were forced to grind World of Warcraft to earn virtual gold, so they could sell the gold to other players for money, which their guards kept for themselves. Being forced to play in 12-hour shifts at gunpoint, prisoners could earn \$470-\$570 per day. Prisoners who fell behind on their quotas told a harrowing story of punishment. Prisoner Liu Dali said, "If I couldn't complete my work quota, they would punish me physically. They would make me stand with my hands raised in the air and after I returned to my dormitory they would beat me with plastic pipes. We kept playing until we could barely see things," In addition to being forced to play World of Warcraft, he was forced to perform intense physical labor mining, carving chopsticks and toothpicks out of planks until his hands bled, and he also assembled car seat covers that the prison exported. (Vincent, 2011)

Regulation in this space might possibly make criminal offenses out of making another person use their virtual avatar in a way they don't fully agree to.

### **The Political Economy of Virtual Regulations**

With such a vast and vital array of human activity is moving online, and in such unprecedented numbers, this paper postulates that as both the number of human activities and the number of humans that migrate into online spaces increase, that so does the demand for government intervention, management, and law in virtual spaces. As people own virtual items and virtual property, they will become more invested in universal,

predictable, fair rules for handling title transfer, dispute resolution, consumer protection, moving virtual assets or money between virtual worlds or removing money into the real world.

Today the vast majority of virtual spaces are privately managed. Social media, chat clients, virtual worlds, online marketplaces, etc., are all mostly run by private companies. Virtual spaces each have their own audiences and range from crude hangouts of intentionally provocative teenagers (4Chan) to places where carefully curated lifestyles, messages, and art appeal to calm suburban housewives (Pinterest). In this, one could say that online spaces of all kinds have performed under a virtual self-sorting Tiebout model, wherein the customers and users of these virtual spaces self-select into places that best suit them, in both content, moderation and management policy. Those who crave confrontational, suggestive, or racist comment migrate to places like 4Chan or other places where racist or bigoted content is not only not actively moderated, but participants in the online community call themselves by homophobic slurs (on 4Chan, community members call each other “f-gg-ts”). Those who object to that type of material obviously stay away from message boards of that nature. Other platforms are intended to facilitate civil political or philosophical discourse, and are structured to enforce those rules and norms, like [debateisland.com](http://debateisland.com), which is coded in such a way that forces users to respond to each point their debate opponent is making, and has filters for spam and harassment, and a community rating system for users.

For many years Virtual Environments have existed in the same way, each with its own culture, norms, rules, communities, customs, slang, moderation systems, and

content. Players who want a more serious, dedicated, hard core gaming experience would tend to gravitate more toward something like EVE Online (where players often describe playing as a “second job”), or Entropia Universe, which uses real money as its in-game currency. Players looking for a much more curated, friendly atmosphere might gravitate toward more curated experiences like Animal Crossing or Roblox.

In each of the above examples, there are some laws and regulations that must be followed in each instance, but with both Web 3.0 and Virtual Environments, the ability to own virtual items significantly raises the stakes regarding how wealth and money are handled and managed. As players enter worlds and purchase ownership of virtual items with their real money attached to their real names, their personal investment in the virtual environment increases. They are less likely to migrate to other worlds if they discover or decide that the culture of the current world of game is no longer fitting for them. They become less mobile and less able to take their assets elsewhere if their environment or situation changes.

As companies continue to invest in virtual spaces to create places for their employees to work, specialization will likely occur where virtual centers form that attract people of like-talent or industry, like Hollywood attracts actors, Silicon Valley attracts software developers, or Detroit attracts car manufacturers. This dynamic makes people less mobile and more invested in certain virtual locations. As people become rooted or invested in one place, game, server, town, the more likely they become to want to change the rules of the existing, invested-in environment to cater to their tastes, rather than moving between environments. As more people find ways to make their living online in

virtual environments (through entertainment, art, teaching, counseling, etc.), they will desire that the environments they operate within are predictable, stable, reliable, and just. If the people who eventually work within virtual environments disagree with the rule and property enforcement of software developers who created the environment, they will likely seek redress to government. People are already very used to government creating and enforcing rules surrounding property and personal interaction. Government management would also have the added benefit of adding standardization to virtual environments, which some virtual property owners and workers in virtual spaces would prefer.

As the demand for government legislation or regulation increases, the benefits to government actors will increase. First movers may realize the gains or a positive reputation among voters, in either gaining or maintaining political office.

In some cases it's easy to imagine what form government management may take, but in other cases it's much more difficult, since human ownership of digital goods is still such a new concept. NFTs are a very recent development, and its many technological applications are still in the idea phase. Infrastructure is still being built, risk-averse people and institutions are increasingly entering the "metaverse" by buying virtual land and making investments, but actual use cases are still developing. In some cases regulations may be more obvious, but over time more problems, issues, and needs will be discovered.

## **The Difficulty With Online Regulation**

If and when the demand for government intervention in virtual spaces exceeds the costs of implanting them, there are various difficulties that will have to be overcome.

Virtual environments evolve very quickly, and gamers are famous for bending and breaking rules, finding ways around things to work things to their advantage, and are very good at discovering unpredictable outcomes. It is reasonable to assume that platforms which manage and track property will have to be robust and trustworthy, but users are famous for doing things developers never anticipated. Sir Richard Garriott, creator of one of the first online MMOs, Ultima Online, confronted a user for repeatedly robbing other players and stealing their virtual items. He became frustrated after he heard the complaints of the players who kept repeatedly being killed, saying the game was becoming unfun, and that they might leave. Upon angrily confronting the player, the player declared that he was well within his rights to behave as he was, being that his character's occupation was "thief", and that he was only doing as a thief would do. Sir Garriott was surprised at this answer, because he did not account for the fact that a player would view the game in such a fundamentally different way, playing his roleplaying his character to the hilt even if it upset those he was interacting with.

There is an entire genre of YouTube videos where software developers are recorded reacting to players/users doing things with their software that was never expected by the software developers. Often these include "speedruns", where users discover strange glitches, or interact with the virtual environment in ways that are

normally nonsensical or unexpected. While being recorded, these software developers often say that they will be immediately patching or modifying their games.

Virtual environments and software companies can be physically located anywhere in the world, which creates problems for governmental rule creation and enforcement. These barriers are not insurmountable, laws surrounding web 2.0 have increasingly been negotiated across borders. Laws such as the Digital Millennium Copyright Act implemented two 1996 treaties of the World Intellectual Property Organization, an entity dedicated to worldwide protection of intellectual property. The difficulty is not insurmountable for multinational agreements which may eventually assist in the governance of the ownership of virtual property, but the level of coordination and the bar required to do so is most definitely higher.

There are vastly different types of cultures and governance structures in current online spaces. Enacting legislation that will be both relevant and successful in various types of virtual spaces will be a difficult task.

### **EVE Online (Autocracy)**

EVE Online is an online environment that is famously hand-off by the developers. It's meant to be a player-run sandbox, with rules set up by CCP, and then the players make of it what they will. EVE is very much a place where the developers set the rules, and then move out of the way. If a player loses a large amount of money or prestige or property due to fraud, the developers do not step in to take any particular action. They say the things that happen within the games rules are all fair game when it comes to disputes,

player agreements, factions, politics, and in-game crime. The players, as a result, form voluntary governance structures that are based on reputation markets, informal and formal contracts, alliances, guilds, mutual cooperation and mutual aid.

Players create their own jobs by looking at resources, needs, and opportunities. There are no character classes, and no professions. Players can advertise their services as security guards, fuel sellers, farmers, pilots, or equipment manufacturers. PvP is always active, with the exception of a few “safe” areas.

EVE Online is notoriously difficult for new players. The learning curve is so steep that players banded together to create a more new-user friendly experience themselves, since the game engine was so cryptic to new users. One user, when suggesting this solution, said he would “rail against” any actions by CCP to make the game easier, but that the players themselves should organize to help (Poetic Stanziel, 2012). One new user chimed in to say that he had heard the EVE Online motto is, “As a new player, I was told that the eve motto was: Here's a ship, F\*\*\* you”, that he took that to heart and expected no assistance from either the game or the game developers. A review written by user “desius” for the game written on Common Sense Media calls the game “unethical” because it does so little to help out new players. (desius, 2019)

The developers don’t typically discuss in-game matters with the player base, or accept feedback from them. EVE Online Executive Producer Andie Nordgren stated in an interview regarding new content, “We’re just setting it loose and we really don’t know what people will do with (the citadels).” She also said that when an unintended consequence appears in the economy, that they intentionally wait to see if the problem



sorts itself out first. “Sometimes we see some really unintended obvious consequences that we can kind of fix up right away. But, we also want to give it time because all the consequences aren’t immediately obvious. Even if something looks very broken, we hold back a little bit and say ‘Okay, let’s not rush to a reaction. Let’s see if the system can figure itself out.’ Sometimes someone comes up with something that’s really overpowered, but after a while people come up with effective counters for it. If we had rushed in to nerf something right away, we don’t let the system play out like it’s supposed to.” (Makedonski, 2016a)

In a game where in-game assets take a tremendous amount of real-world time to accumulate, harvest, and build, the developers recently introduced new content into the game where the non-players characters began indiscriminately attacking players and destroying their hard-earned ships, space stations, and manufacturing plants, setting off a firestorm of discussion among the players. A YouTube video entitled, “Has EVE Online Just Screwed All Its Players?!”, Pretty Good Gaming discusses how the developers had to know this decision would cause the players to become quite upset and shocked, ensuring a controversy (Pretty Good Gaming, 2019).

When new players begin EVE Online, they frequently do not stick around because of the steep learning curve and the unwelcoming, harsh user experience. In 2016, 1.5 million new players signed up to try EVE Online, but the overwhelming majority of them quit after only two hours (Makedonski, 2016b). In 2019, 600,000 new players signed up for only 10% of those played it for longer than seven days (Messner, 2019). The developers are very aware of this issue, the subject keeps coming up at the EVE

Online Fanfest conventions, and game producer Andie Nordgren said, “It’s super depressing”, but despite this, are not significantly changing any of the rules or tools for players to make things easier on them. They like their players to be dedicated and involved, structuring the game in such a way that it can be compared to the way cults attract followers, only attracting the very most dedicated followers, willing to sacrifice to be a part of the experience (Iannaccone, 1992).

### **Final Fantasy XIV (Democracy)**

When Final Fantasy XIV came online in 2010, the players had an extreme negative reaction. The game developers were extremely alarmed by this and took the game offline for another three years of additional development time to address the mass of user complaints (Huren, 2021). Upon rerelease in 2013, game producer Naoki Yoshida stated that he was so grateful for the user feedback which allowed him to improve the game that he cried at the announcement event. (Chan, 2013) This has created a culture in the MMORPG which has an extreme tendency to cater to its user base. The players often co-produce the rules which govern systems of experience, trade, equipment, and battles. This model works out quite well for them, as of June 2021 they are the MMO with the largest active player base, with 2.49 million active players, compared to World of Warcraft, which has 2.19 million active players (Sabat, 2021). Fans feel so connected and part of the community of this game, that in 2013 they began affectionately calling producer Naoki Yoshida “Yoshi-P”, with the “P” being short for “producer” (user chefdano3, 2013). In both June and December of 2021, the game became so popular and

so inundated with new players, the developers barred new players from entering, making the game unavailable for sale even in digital form, as the developers worked to upgrade game servers and infrastructure to handle all the new players (Steiner, 2021), (Maher, 2021).

In December of 2021, posted an update to Twitter regarding the development of Final Fantasy XVI, that was discussed in a reddit thread, in which players highly praised his leadership style and transparency, saying things like, “I really appreciate YoshiP bringing the transparency strategy from XIV to XVI's development”, and “After playing FFXIV, I have nothing but faith that XVI will come good. YoshiP's passion for the franchise is just plain for all to see.”, and “YoshiP the king can take his time.” Clearly his style of communication and passion have won him a tremendous amount of goodwill among the players and fans of the game.

The Square Enix team treats the development of the Final Fantasy MMO more like a democracy, actively soliciting feedback and incorporating the feedback regularly into the game, and communicating very openly with players. The developers have held contests for players to design their own in-class weapons, both aesthetically and with in-game properties and statistics (Baird, 2021). A few years ago a contest was held to help design in-game furniture (Lefebvre, 2017). The game designers changed a character icon because players voiced concerns over trypophobia (being disturbed by patterned clusters of holes close together) (Leblanc, 2021). When a new race called the “Viera” were added to the game in the *Shadowbringers* expansion in 2019, the race was exclusively female. Fans poured their requests in the Square Enix, asking for male Viera to also be playable,

complete with the bunny ears. The ability was finally included in November 2021 when the *Endwalker* expansion was released, with credit given to the fan requests (Viegas, 2021).

Implementing regulations in an environment that is well-known for being a near democracy may come with difficulties. The way laws are implemented or enforced may be debated among the userbase, or cause the community to dramatically shift its size or demographics if the rules are implemented in a way that is not welcomed.

### **Minecraft 2b2t (Anarchy)**

Another online space which uses yet another governance structure is Minecraft Anarchy servers. Players can play Minecraft in the normal way, exploring, building, crafting, killing monsters, mining and harvesting – but there are many others players on the same server, and there are few, if any rules on the anarchy servers. One of the oldest running Minecraft servers of any type is an anarchy server called 2builders2tools (2b2t), which went online in 2010. It's still so popular as of this writing in 2021 that there are still queues to get onto the server. Some very highly watched Youtube streamers such as FitMC with over 2.22 million channel subscribers and Salc1 with over 669 thousand channel subscribers dedicate their streams to playing on the server and capturing the politics, culture, current projects, news, and antics of the players (*FitMC - YouTube*, 2022), (*SalC1 - YouTube*, 2022, p. 1).

Youtube is full of videos regarding how to survive on 2b2t, due to its own culture and social norms. Various videos entitled, “I Survived 24 Hours in 2b2t”, where YouTuber

TapL spends 30 minutes on a documentary-like excursion for his followers, where some 2b2t players help him, and then he is later killed in a war. The comments say things like, “This feels like a documentary from a reporter that got into a foreign tribe,” due to the caution he has to take in social interactions where other players may kill him and take his items at any time (TapL, 2020). Other videos entitled, “How I Survived the Most Dangerous Server in Minecraft” and, “I survived the MOST TOXIC Server in Minecraft (2B2T Solo Survival)” demonstrate the widely-held notion that it is very easy to become prey to the other players since there are no rules preventing attack, and there are no safe areas (Welyn, 2021), and “the History of 2b2t’s Most Severe Grievs” demonstrate the playerbase’s affinity for trolling other players (FitMC, 2019).

The person who runs the server for 2b2t, Hausemaster, is barely present, he only logs in very occasionally, so he’s not available for users even if they did have requests for ways the server should be changed. He pays the \$90 per month fee for the server to operate, and does periodic maintenance to ensure the server doesn’t lag, but does not actively manage the player base or perform any moderation duties. The only rule that he openly has declared is that no game-breaking tools which make the game unfair may be used. He has added code to ensure that no player can move faster than intended, or fly (a user will be automatically kicked from the server for doing so), duplicate items, etc. Often when a new glitch is discovered among the playerbase he takes a long time patching it, and doesn’t remove illegally gained items, allowing players to gain from their hacking/cheating before outlawing it for future players. There have been a few hacks such as the case where players could cause a monster to drop thousands of items at once.

One backdoor event on the server succeeded, making powerful and extremely destructive thunder items. Hausemaster turned the thunder function off which temporarily fixed part of the problem, and when he deleted all of the thunder items, he accidentally deleted some other legitimate items called sharp axes. Managing this environment has proven to be a very difficult and imprecise exercise.

Hausemaster at one point implemented a queue system for logging onto the server to help with lagging problems, but turned the control of it over to the player who suggested and designed it, Rusher. Paying players (\$20/month) were moved to the top of the queue, but a player who had upset Rusher was removed from the list (even though he was a paying player), causing a stir on the server. What had once been a fair and impartial process had become corrupt and used to further personal ends and agendas.

In another instance of corruption, a backdoor instance caused the “nether roof glitch”, causing players to travel much faster than other players. A player named iTristan gave Hausemaster some code which fixed the glitch, but iTristan snuck some code into the solution which allowed himself and a friend to continue using the glitch, and also allowed him to change the properties of an item or duplicate it, if the item was given a certain name. Hausemaster eventually fixed these bugs, but allowed iTristan to keep the duplicated items, causing cries of corruption again among the playerbase (*Hausemaster*, 2022).

The uniform management of virtual items will be very difficult if places such as this continue to exist in the virtual world. Many players in this virtual environment pride

themselves on finding exploits, hacks, and unintended uses for items. Additionally, the creator of the server is barely present to implement any mandated laws, should they arise.

### **Conclusion**

Unsavory and criminal activity have always occurred online in virtual spaces. Those spaces have never been as popular, nor as high-stakes as they are today, due to the new technology of virtual ownership. Because of this popularity and increased stake, demand for what users see as predictable, universal, and fair rules of governance surrounding their property will increase. Despite the difficulty associated with implementing universal government regulation and management of virtual spaces, users will very likely get what they will demand.

## REFERENCES

24 Best Vrchat Services To Buy Online | Fiverr. (2020). Fiverr.Com.

<https://www.fiverr.com/gigs/vrchat>

Abram, C., & Brangan, M. (2018, May 22). *This game combines the internet's favorite things: Cats and cryptocurrency*. Axiom Zen.

<https://www.axiomzen.co/news/article/this-game-combines-the-internets-favorite-things-cats-and-cryptocurrency>

Abumrad, J., & Krulwich, R. (2019). *Tit for Tat | Radiolab*. WNYC Studios.

<https://www.wnycstudios.org/podcasts/radiolab/segments/104010-one-good-deed-deserves-another>

Adroit Market Research. (2019). *Virtual Goods Market Size by Types & Application, Forecast 2018-2025*. <https://www.adroitmarketresearch.com/press-release/virtual-goods-market>

Agner, E., & Loewenstein, G. (2012). Behavioral Economics. In *Handbook of the philosophy of science* (pp. 641–689). Elsevier.

Allen, E., & Seaman, J. (2014). *Grade Change: Tracking Online Education in the United States* (p. 45). BABSON Survey Research Group.

<http://www.onlinelearningsurvey.com/reports/gradechange.pdf>

Andrew, S. (2020). *Elijah Wood visited a stranger on “Animal Crossing” to sell turnips and make friends*. CNN. <https://www.cnn.com/2020/04/24/culture/elijah-wood-animal-crossing-trnd/index.html>



- Au, W. J. (2019). *30% of VRChat's Daily Users Wear HMDs—That's About 40,000-100,000 Monthly VR Users, Which Would Make VRChat the Most-Used VR Game!* New World Notes. <https://nwn.blogs.com/nwn/2019/02/vrchat-users-hours-stats.html>
- Axelrod, R., & Dawkins, R. (2006). *The Evolution of Cooperation: Revised Edition* (Revised edition). Basic Books.
- Baird, S. (2021, August 30). *FFXIV Contest Asks Players To Design Their Own Class Weapons*. ScreenRant. <https://screenrant.com/ffxiv-weapon-job-contest-art/>
- Balicer, R. D. (2007). Modeling Infectious Diseases Dissemination Through Online Role-Playing Games. *Epidemiology*, *18*(2), 260–261.  
<https://doi.org/10.1097/01.ede.0000254692.80550.60>
- Banks, M. (2007). *IBM faces Second Life strike*.  
[https://www.theregister.com/2007/08/24/ibm\\_italy\\_strike/](https://www.theregister.com/2007/08/24/ibm_italy_strike/)
- Barry, E. (2021, August 26). *Why OnlyFans Suddenly Reversed its Decision to Ban Sexual Content*. Time. <https://time.com/6092947/onlyfans-sexual-content-ban/>
- Baszucki, D. (2020). *UNITED STATES SECURITIES AND EXCHANGE COMMISSION FORM S-1 REGISTRATION STATEMENT for Roblox Corporation*. Roblox Corporation.  
<https://www.sec.gov/Archives/edgar/data/1315098/000119312520298230/d87104ds1.htm>
- Batchelor, J. (2005, August 20). *IGN Entertainment Reports Massively-Multiplayer Online (MMO) Gamers Spend More Than 25 Hours Per Week Playing And*

*Talking About MMO Games.* GamesIndustry.Biz.

<https://www.gamesindustry.biz/articles/ign-entertainment-reports-massively-multiplayer-online-mmo-gamers-spend-more-than-25-hours-per-week-playing-and-talking-about-mmo-games>

Beck, J. (2015, December 7). *Why Do So Many People on YouTube Sound the Same?*

The Atlantic. <https://www.theatlantic.com/technology/archive/2015/12/the-linguistics-of-youtube-voice/418962/>

Beedle, M., van Bennekum, A., Cockburn, A., & Cunningham, W. (2001). *Principles*

*behind the Agile Manifesto.* <https://agilemanifesto.org/principles.html>

Belamire, J. (2016, October 22). My First Virtual Reality Groping. *Athena Talks.*

<https://medium.com/athena-talks/my-first-virtual-reality-sexual-assault-2330410b62ee>

Blodgett, B., & Tapia, A. (2011). Do avatars dream of electronic picket lines?: The

blurring of work and play in virtual environments. *Information Technology & People*, 24(1), 26–45. <https://doi.org/10.1108/09593841111109404>

Booty, M. (2021, April 29). *Continuing Our PC Gaming Journey in 2021 and Beyond.*

Xbox Wire. <https://news.xbox.com/en-us/2021/04/29/continuing-our-pc-gaming-journey-in-2021-and-beyond/>

Bretan, J. (2020, August 8). How Teachers In Poland Used Half-Life: Alyx And VR For

Remote Teaching. *UploadVR.* <https://uploadvr.com/teachers-poland-half-life-alyx-vr/>

- Brown, F. (2019, October 28). Class warfare has come to Fallout 76. *PC Gamer*.  
<https://www.pcgamer.com/class-warfare-has-come-to-fallout-76/>
- Browne, R. (2020, May 7). *Nintendo profits surge as “Animal Crossing” game becomes fastest-selling title on the Switch*. CNBC.  
<https://www.cnbc.com/2020/05/07/animal-crossing-is-now-fastest-selling-game-on-the-nintendo-switch.html>
- Browne, R. (2021, February 25). *Crypto collectibles are selling for thousands—And celebrities like Mark Cuban are cashing in*. CNBC.  
<https://www.cnbc.com/2021/02/25/nfts-why-digital-art-and-sports-collectibles-are-suddenly-so-popular.html>
- Cape*. (2020). Minecraft Wiki. <https://minecraft.gamepedia.com/Cape>
- Carpenter, N. (2020, April 28). *You can now hire someone to pull weeds in Animal Crossing*. Polygon. <https://www.polygon.com/2020/4/28/21239684/animal-crossing-new-horizons-weed-pulling-service-hired>
- Castronova, E. (2001). Virtual Worlds: A First-Hand Account of Market and Society on the Cyberian Frontier. *Gruter Institute Working Papers on Law, Economics, and Evolutionary Biology*, 2.
- Castronova, E. (2003). On Virtual Economies. *The International Journal of Computer Game Research*, 3(2). <http://www.gamestudies.org/0302/castronova/>
- Castronova, E. (2006). *Synthetic Worlds: The Business and Culture of Online Games*. University of Chicago Press.

- Castronova, E. (2015). *Wildcat Currency: How the Virtual Money Revolution Is Transforming the Economy*. Yale University Press.
- Castronova, E., Williams, D., Shen, C., Ratan, R., Xiong, L., Huang, Y., & Keegan, B. (2009). As real as real? Macroeconomic behavior in a large-scale virtual world. *New Media & Society*, *11*(5), 685–707.  
<https://doi.org/10.1177/1461444809105346>
- Cavender, R. S. (2015). *The Economics of Self-Governance in Online Virtual Societies*.
- CCP. (2020). *Buy PLEX / Trade for ISK, SKINs, Omega, HyperCores, etc.*  
<https://secure.eveonline.com/plex>
- Chan, A. (2013, August 28). *Producer/Director Naoki Yoshida's Emotional Closing Speech at #FFXIV Launch Event—Eng Sub.*  
<https://www.youtube.com/watch?v=JE9G3ByXKIE>
- chefdano3. (2013, August 9). *How did Naoki Yoshida become Yoshi-P?* [Reddit Post].  
R/ffxiv.  
[www.reddit.com/r/ffxiv/comments/1k23k6/how\\_did\\_naoki\\_yoshida\\_become\\_yoshi-p/](http://www.reddit.com/r/ffxiv/comments/1k23k6/how_did_naoki_yoshida_become_yoshi-p/)
- Chribba. (2017). [Discord].
- Christensen, G. S. (2016). *Transparency, Reproducibility, and the Credibility of Economics Research*. 94.
- Clement, J. (2020). *Facebook users in U.S.* Statista.  
<https://www.statista.com/statistics/408971/number-of-us-facebook-users/>

- Clement, J. (2021, February 8). *Game beta players 2017*. Statista.  
<https://www.statista.com/statistics/546492/number-players-beta-games-worldwide/>
- Collins-Laflamme, S. (2020). *Simon @ Hypixel on Twitter: "We just hit 18,000,000 unique players on the Hypixel Minecraft server! That means about 52% of people who bought Minecraft java edition manually typed the address and logged on the server 😊 Thank you all for this opportunity, I am still working hard like day 1. Love you all ❤️"* / Twitter. Twitter.  
[https://twitter.com/Simon\\_Hypixel/status/1247368318018883584](https://twitter.com/Simon_Hypixel/status/1247368318018883584)
- Conti, R. (2021, April 29). *What You Need To Know About Non-Fungible Tokens (NFTs)*. Forbes Advisor. <https://www.forbes.com/advisor/investing/nft-non-fungible-token/>
- Crecente, B. (2018, September 11). *Nearly 70% of Americans Play Video Games, Mostly on Smartphones (Study)*. *Variety*. <https://variety.com/2018/gaming/news/how-many-people-play-games-in-the-u-s-1202936332/>
- Cripps, G. (2021, June 10). *A Trade Gone Wrong* [Personal communication].
- Cripps, J. (2020, July). *Job Markets and Property Rights in Minecraft* [Oral].
- Cuevas, E. (2020). *An agent-based model to evaluate the COVID-19 transmission risks in facilities*. *Computers in Biology and Medicine*, *121*, 103827.  
<https://doi.org/10.1016/j.combiomed.2020.103827>
- Curry, D. (2020, September 1). *Roblox Revenue and Usage Statistics (2021)*. Business of Apps. <https://www.businessofapps.com/data/roblox-statistics/>

- D’Anastasio, C. (2021, June 10). How “Roblox” Became a Playground for Virtual Fascists. *Wired*. <https://www.wired.com/story/roblox-online-games-irl-fascism-roman-empire/>
- De Soto, H. (2002). *The Other Path: The Economic Answer to Terrorism*. Basic Books.
- Delaney, J. (2020). *About*. Blockworks. <https://www.blockworks.uk/about>
- Demsetz, H. (1967). Toward a Theory of Property Rights. *The American Economic Review*, 57(2), 347–359.
- Deneubourg, J.-L., Goss, S., Franks, N., & Pasteels, J. (1989). The blind leading the blind: Modeling chemically mediated army ant raid patterns. *Journal of Insect Behavior*, 2, 719–725. <https://doi.org/10.1007/BF01065789>
- desius. (2019, March 27). *Parent reviews for EVE Online | Common Sense Media*. <https://www.common sense media.org/game-reviews/eve-online/user-reviews>
- Developer Economics*. (2021, June 30). <https://developer.roblox.com/en-us/articles/developer-economics>
- Dickson, E. J. (2021, September 12). Inside the Underground Strip-Club Scene on Kid-Friendly Gaming Site Roblox. *Rolling Stone*. <https://www.rollingstone.com/culture/culture-features/roblox-virtual-strip-clubs-condo-games-sex-1197237/>
- Donovan, T. (2010). *Replay: The History of Video Games*. Yellow Ant.
- Ducheneaut, N., Wen, M.-H., Yee, N., & Wadley, G. (2009). Body and mind: A study of avatar personalization in three virtual worlds. *Proceedings of the SIGCHI*

*Conference on Human Factors in Computing Systems*, 1151–1160.

<https://doi.org/10.1145/1518701.1518877>

Duranske, B. (2007). Bragg V. Linden Lab | Virtually Blind | Virtual Law. *Virtually Blind*. <http://virtuallyblind.com/category/lawsuits/bragg-v-linden-lab/>

Earle, P. C. (2020a). *Computer Models Can't Substitute for Real Life – AIER*. AIER. <https://www.aier.org/article/computer-models-cant-substitute-for-real-life/>

Earle, P. C. (2020b, May 28). *World of Warcraft's Corrupted Blood Outbreak is Not a Model for COVID-19 – AIER*. AIER. <https://www.aier.org/article/world-of-warcrafts-corrupted-blood-outbreak-is-not-a-model-for-covid-19/>

Elster. (2008). *The Cement of Society*. Cambridge University Press.

*Entropia Universe—Withdrawal FAQ*. (2022). Entropia Universe Withdrawal FAQ. <https://account.entropiauniverse.com/support-faq/deposits-and-withdrawals/withdrawal-faq/index.xml>

Fahey, M. (2016, April 3). *Never Forget Your Horse Armor*. Kotaku. <https://kotaku.com/never-forget-your-horse-armor-1768813271>

Favis, E. (2020). Hackers are putting star fragment trees in Animal Crossing, but planting them is a big risk. *Washington Post*. <https://www.washingtonpost.com/video-games/2020/05/19/hackers-are-putting-star-fragment-trees-animal-crossing-planting-them-is-big-risk/>

FitMC. (2019, October 12). *The History of 2b2t's Most Severe Griefs*. <https://www.youtube.com/watch?v=bP0MSDKvWPY>

*FitMC - YouTube*. (2022, January 1). <https://www.youtube.com/c/FitMC/featured>

- Forte. (2019, December 4). <https://www.forte.io/>
- Francis, B. (2015, July 14). *7 crafting systems game designers should study*. Gamasutra. [/view/news/247908/7\\_crafting\\_systems\\_game\\_designers\\_should\\_study.php](https://www.gamasutra.com/view/news/247908/7_crafting_systems_game_designers_should_study.php)
- Fuchs, B., & Thurner, S. (2014). Behavioral and Network Origins of Wealth Inequality: Insights from a Virtual World. *PLOS ONE*, 9(8), e103503. <https://doi.org/10.1371/journal.pone.0103503>
- G, A. (2018, June 27). *Diablo III's failed Auction House: Why true ownership won't save your game*. Medium. <https://blog.hoard.exchange/diablo-iiiis-failed-auction-house-why-true-ownership-won-t-save-your-game-c6d692b9de1>
- Garlick, M. (2005). PLAYER, PIRATE OR CONDUCTER? A CONSIDERATION OF THE RIGHTS OF ONLINE GAMERS | Yale Journal of Law & Technology. *Yale Journal of Law & Technology*, 7. <https://yjolt.org/player-pirate-or-conducer-consideration-rights-online-gamers>
- Gintis, H. (2001). The contribution of game theory to experimental design in the behavioral sciences. *The Behavioral and Brain Sciences*, 24(3), 411–412. <https://doi.org/10.1017/S0140525X01314140>
- Goldmark, A., & Smith, R. (2018). *Episode 844: Nice Game*. NPR.Org. <https://www.npr.org/sections/money/2018/05/30/615622421/episode-844-nice-game>
- Gough, C. (2019). *Number of gamers worldwide 2021*. Statista. <https://www.statista.com/statistics/748044/number-video-gamers-world/>



- Grayson, N. (2021, March 12). *Game Artists Not Happy That Developer Is Selling Their Nearly Decade-Old Work As NFTs*. Kotaku. <https://kotaku.com/game-artists-not-happy-that-developer-is-selling-their-1846465316>
- Griep, M. (2021, February 26). *WotC Makes More Money than Hasbro's Toy Business*. <https://icv2.com/articles/news/view/47698/wotc-makes-more-money-hasbros-toy-business>
- Hagi. (2017, March 28). *The Rise of 'YouTube Voice' and Why Vloggers Want It to Stop*. <https://www.vice.com/sv/article/aepn94/the-rise-of-youtube-voice-and-why-vloggers-want-it-to-stop>
- Haig, S. (2020, December 2). *NFT representing 5% of Monaco F1 Delta Time track auctioned for \$220K*. Cointelegraph. <https://cointelegraph.com/news/nft-representing-5-of-monaco-f1-delta-time-track-auctioned-for-220k>
- Haigh, T., Priestley, M., & Rope, C. (2016). *ENIAC in Action: Making and Remaking the Modern Computer* (W. Aspray, Ed.). The MIT Press.
- Hall, C. (2015, March 4). *Oblivion dev is sorry, not sorry for horse armor*. Polygon. <https://www.polygon.com/2015/3/4/8148565/dlc-horse-armor-elder-scrolls-oblivion-mod>
- Hall, C. (2021, April 27). *Hasbro CEO says NFTs are being considered for Magic: The Gathering, other franchises*. Polygon. <https://www.polygon.com/22406490/magic-the-gathering-nft-tokens-hasbro-ceo-quarterly-earnings>

- Hamilton, I. A. (2022, January 18). *Meta wants to track your eye movements and facial expressions as you roam the metaverse, patents suggest*. Business Insider.  
<https://www.businessinsider.com/meta-metaverse-patents-track-eye-movement-facial-expressions-facebook-zuckerberg-2022-1>
- Hausemaster*. (2022, January 6). 2b2t Wiki. <https://2b2t.miraheze.org/wiki/Hausemaster>
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *The Behavioral and Brain Sciences*, 33(2–3), 61–83.  
<https://doi.org/10.1017/s0140525x0999152x>
- Hernandez, P. (2019a, September 26). *Fallout 76 fans are holding a trial against an actual raider*. Polygon. <https://www.polygon.com/2019/9/26/20885650/fallout-76-vulture-trial-five-0-role-play-event-bethesda>
- Hernandez, P. (2019b, November 6). *Fallout 76's aristocrats are fighting against 'peasants' without a subscription*. Polygon.  
<https://www.polygon.com/2019/11/6/20950122/fallout-76-apocalyptic-aristocracy-peasants-class-war-bethesda-subscription-1st>
- Hibby. (2020). *Offering—The Best High Quality Models For a reasonable Price~!* [Open]. VRChat: Community-Run VRChat Forums.  
<http://www.vrcat.club/threads/the-best-high-quality-models-for-a-reasonable-price-open.1115/>
- Hirschman, A. O. (1970). *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*.

- Hobson, A. (2020). *Phantoms, Crashers, and Harassers: Emergent Governance of Social Spaces in Virtual Reality*. 19.
- Holt, C. A., & Laury, S. K. (2002). Risk Aversion and Incentive Effects. *The American Economic Review*, 92(5), 1644–1655.  
<https://doi.org/10.1257/000282802762024700>
- How much money did people generally make from the RMAH in Diablo 3?* (2019).  
 Reddit.  
[https://www.reddit.com/r/Diablo/comments/dkg6io/how\\_much\\_money\\_did\\_people\\_generally\\_make\\_from\\_the/](https://www.reddit.com/r/Diablo/comments/dkg6io/how_much_money_did_people_generally_make_from_the/)
- Huren, C. (2021, September 27). The Forbidden Comparison: EVE Against Conventional MMOs. *INN*. <https://imperium.news/the-forbidden-comparison-eve-against-conventional-mmos/>
- Hwang, K. (2020, July 17). *Animal Crossing: New Horizons and the Limits of Today's Game Economies - Forte*. Forte. <https://techcrunch.com/2020/07/17/animal-crossing-new-horizons-and-the-limits-of-todays-game-economies/>
- Iannaccone, L. R. (1992). Sacrifice and Stigma: Reducing Free-Riding in Cults, Communes, and Other Collectives. *Journal of Political Economy*, 100(2), 271–291.
- ILD - Our Origins*. (2015). Institute for Liberty and Democracy. <https://ild.org.pe/about-us/history/our-origins>
- Introducing the WoW Token*. (2015). World of Warcraft. <https://worldofwarcraft.com/en-us/news/18141101/introducing-the-wow-token>

- ItsTracer. (2021, September 23). *Every social feature in XIV is enabling stalking and harassment and I think this should be a bigger deal.* [Reddit Post]. R/Ffxiv. [www.reddit.com/r/ffxiv/comments/ptspr6/every\\_social\\_feature\\_in\\_xiv\\_is\\_enabling\\_stalking/](https://www.reddit.com/r/ffxiv/comments/ptspr6/every_social_feature_in_xiv_is_enabling_stalking/)
- I've made \$10,000+ legitimately from the D3 market.* AMAA. (2013). Reddit. [https://www.reddit.com/r/Diablo/comments/xqv2r/ive\\_made\\_10000\\_legitimately\\_from\\_the\\_d3\\_market/](https://www.reddit.com/r/Diablo/comments/xqv2r/ive_made_10000_legitimately_from_the_d3_market/)
- Jack, P. (2015). *The Virtual Economist.* <https://web.uri.edu/quadrangles/the-virtual-economist/>
- Jackson, J. (2020, July 30). *William Shatner Makes History on the WAX Blockchain!* PR Newswire. <https://www.prnewswire.com/news-releases/william-shatner-makes-history-on-the-wax-blockchain-301103510.html>
- James E. Parco, Amnon Rapoport, & William E. Stein. (2002). Effects of Financial Incentives on the Breakdown of Mutual Trust. *Psychological Science*, 13(3), 292–297. <https://doi.org/10.1111/1467-9280.00454>
- Jargon, J. (2021, April 17). Roblox Struggles With Sexual Content. It Hopes a Ratings System Will Address the Problem. *Wall Street Journal.* <https://www.wsj.com/articles/roblox-struggles-with-sexual-content-it-hopes-a-ratings-system-will-address-the-problem-11618660801>
- Karana. (2021, September 1). DMCA & NFTs: Are Decentralized Takedowns Even Possible? *Karana IP Law.* <https://karanaip.com/dmca-nfts-are-decentralized-takedowns-even-possible/>

- Kaye, Kate. (2021, May 12). Children's privacy law update adds pressure against Facebook's Instagram for kids plan. *Digiday*. <https://digiday.com/media/cheat-sheet-childrens-privacy-law-update-adds-pressure-against-facebooks-instagram-for-kids-plan/>
- Kelly, S. (2014, January 29). Eve Online virtual war "costs \$300,000" in damage. *BBC News*. <https://www.bbc.com/news/technology-25944837>
- Kent, S. L. (2001). *The Ultimate History of Video Games: From Pong to Pokemon--The Story Behind the Craze That Touched Our Lives and Changed the World* (1 edition). Three Rivers Press.
- Kirithkodachi. (2017). [Discord].
- Koensayr77. (2020, November 29). Should I Play EVE?: A Vet Replies. *INN*. <https://imperium.news/should-i-play-eve-a-vet-replies/>
- Kristof, N. (2020, December 4). Opinion | The Children of Pornhub. *The New York Times*. <https://www.nytimes.com/2020/12/04/opinion/sunday/pornhub-rape-trafficking.html>
- Lang, B. (2020, April 22). Social VR App "VRChat" is Seeing Record Usage Amidst the Pandemic. *Road to VR*. <https://www.roadtovr.com/vrchat-record-users-coronavirus/>
- Leblanc, W. (2021, November 1). *Final Fantasy 14 Changes Sage Class Icon Because of Trypophobia Concerns*. IGN. <https://www.ign.com/articles/final-fantasy-14-changes-sage-class-icon-trypophobia-concerns>

- Leeson, P. T. (2011). *The Invisible Hook: The Hidden Economics of Pirates*. Princeton University Press.
- Lefebvre, E. (2017, August 2). *Final Fantasy XIV asks players to help design some new furniture | Massively Overpowered*. <https://massivelyop.com/2017/08/02/final-fantasy-xiv-asks-players-to-help-design-some-new-furniture/>
- Lento, T. (2020, August 22). *Pokemon Breeding Guide—Pokemon Sword and Shield Wiki Guide—IGN*. IGN. [https://www.ign.com/wikis/pokemon-sword-shield/Pokemon\\_Breeding\\_Guide](https://www.ign.com/wikis/pokemon-sword-shield/Pokemon_Breeding_Guide)
- Lewis, P. H. (1994, August 12). Attention Shoppers: Internet Is Open. *The New York Times*. <https://www.nytimes.com/1994/08/12/business/attention-shoppers-internet-is-open.html>
- Liao, S. (2020). *People are holding video game weddings and graduation ceremonies*. CNN. <https://www.cnn.com/2020/03/27/tech/animal-crossing-wedding-half-life-alyx-school/index.html>
- Linden Labs. (2019). *Second Life Pricing List*. <https://secondlife.com/corporate/pricing.php>
- Lister, K. (2020). Work-at-Home After Covid-19—Our Forecast. *Global Workplace Analytics*. <https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast>
- Locke, J. (2018). *Second Treatise of Government*.

- Lofgren, E. T., & Fefferman, N. H. (2007). The untapped potential of virtual game worlds to shed light on real world epidemics. *The Lancet Infectious Diseases*, 7(9), 625–629. [https://doi.org/10.1016/S1473-3099\(07\)70212-8](https://doi.org/10.1016/S1473-3099(07)70212-8)
- Lyman, J. (2003, December 19). *Gamer Wins Lawsuit in Chinese Court Over Stolen Virtual Winnings* / Entertainment / TechNewsWorld [News]. Tech News World. <https://www.technewsworld.com/story/32441.html>
- Maher, C. (2021, December 16). Final Fantasy 14 has paused sales because it's too popular. *For The Win*. <https://ftw.usatoday.com/2021/12/final-fantasy-14-endwalker-sales-suspended>
- Makedonski, B. (2016a, April 29). EVE Online developer has the right attitude about making sandbox games. *Destructoid*. <https://www.destructoid.com/eve-online-developer-has-the-right-attitude-about-making-sandbox-games/>
- Makedonski, B. (2016b, May 2). EVE Online has no problem getting new players, but retaining them is a hell of an issue. *Destructoid*. <https://www.destructoid.com/eve-online-has-no-problem-getting-new-players-but-retaining-them-is-a-hell-of-an-issue/>
- Manenti, L., Manzoni, S., Vizzari, G., Ohtsuka, K., & Shimura, K. (2012). An Agent-Based Proxemic Model for Pedestrian and Group Dynamics: Motivations and First Experiments. In D. Villatoro, J. Sabater-Mir, & J. S. Sichman (Eds.), *Multi-Agent-Based Simulation XII* (pp. 74–89). Springer. [https://doi.org/10.1007/978-3-642-28400-7\\_6](https://doi.org/10.1007/978-3-642-28400-7_6)

- Markoff, J. (2006). *What the Dormouse Said: How the Sixties Counterculture Shaped the Personal Computer Industry* (Reprint edition). Penguin Books.
- Marshall, C. (2018, April 25). *Sea of Thieves fans are setting their own rules in the pirate sandbox*. Polygon. <https://www.polygon.com/2018/4/25/17258750/sea-of-thieves-community-rules-agreements-parley>
- Martell, D. (2019, December 5). *The Future of Retail “Arming the Rebels!” with Tobi Lütke @ Shopify.com—Escape Velocity Show #16*. Escape Velocity. <https://www.youtube.com/watch?v=-PZ0uDwpIYQ>
- Meers, W. (2020, March 22). *Everything You Never Wanted To Know About Teabagging In Video Games*. TheGamer. <https://www.thegamer.com/teabagging-video-games/>
- Meisenzahl, M. (2020). *These Japanese elementary school students organized their own graduation ceremony in 'Minecraft'—Here's what happened*. Business Insider. <https://www.businessinsider.com/japanese-students-organize-minecraft-virtual-graduation-2020-3>
- Mell-Taylor, A. (2020, June 30). *The Slavery In Eve Online*. Medium. <https://medium.com/@alexhasopinions/the-slavery-in-eve-online-90a03e0f1a77>
- Messner, S. (2017, April 7). *How a scam in EVE Online turned into its greatest rescue mission*. PC Gamer. <https://www.pcgamer.com/how-a-scam-in-eve-online-turned-into-its-greatest-rescue-mission/>
- Messner, S. (2019, September 5). *EVE Online to implement grief counselling when new players lose their first ship*. PC Gamer. <https://www.pcgamer.com/eve-online-to-implement-grief-counselling-when-new-players-lose-their-first-ship/>



- Mike. (2019, December 19). *Shopify: A StarCraft Inspired Business Strategy*. Nongaap.  
<https://nongaap.substack.com/p/shopify-a-starcraft-inspired-business>
- Mildenberger, C. D. (2015). Virtual world order: The economics and organizations of virtual pirates. *Public Choice*, 164(3), 401–421. <https://doi.org/10.1007/s11127-015-0284-5>
- Minetrack Data*. (2020). Minetrack. <https://data.minetrack.me/>
- Mistral, P. (2007, March 7). *Stroker's Bed Heads to Court | The Alphaville Herald* [News]. The Alphaville Herald. <http://alphavilleherald.com/2007/07/virtual-sex-bed.html>
- Monthly Economic Report* (EVE Developer Blogs, p. 23). (2020). EVE Economic Council. <https://www.eveonline.com/article/qdxvxn/monthly-economic-report-june-2020>
- Morgan, H., O'Donovan, A., Almeida, R., Lin, A., & Perry, Y. (2020). The Role of the Avatar in Gaming for Trans and Gender Diverse Young People. *International Journal of Environmental Research and Public Health*, 17(22), 8617.  
<https://doi.org/10.3390/ijerph17228617>
- Needleman, A. S. and S. E. (2021, June 10). WSJ News Exclusive | Music Publishers Sue Roblox for Letting Game Creators Use Unlicensed Songs. *Wall Street Journal*.  
<https://www.wsj.com/articles/music-publishers-sue-roblox-for-letting-game-creators-use-songs-11623271976>
- New words list June 2014*. (2014). Oxford English Dictionary.  
<https://public.oed.com/updates/new-words-list-june-2014/>

- Office of the Federal Register, N. A. and R. A. (2018, April 11). *Public Law 115—164—  
Allow States and Victims to Fight Online Sex Trafficking Act of 2017*  
[Government]. Govinfo.Gov; U.S. Government Publishing Office.  
<https://www.govinfo.gov/app/details/https%3A%2F%2Fwww.govinfo.gov%2Fapp%2Fdetails%2FPLAW-115publ164>
- Oloman, J. (2020). *Teacher Uses Half-Life: Alyx To Deliver Math Lesson In VR - IGN*.  
<https://www.ign.com/articles/teacher-uses-half-life-alyx-to-deliver-math-lesson-in-vr>
- Pagliery, J. (2014, September 15). *Microsoft buys Minecraft video game maker for \$2.5 billion*. CNNMoney. <https://money.cnn.com/2014/09/15/technology/minecraft-microsoft/index.html>
- Pan, D. (2021, March 3). *Controversial Dapps Test Binance Smart Chain's Decentralization*. <https://www.yahoo.com/now/controversial-dapps-test-binance-smart-233029970.html>
- Park, G. (2020). Alexandria Ocasio-Cortez is now playing Animal Crossing. And she's visiting her followers. *Washington Post*. <https://www.washingtonpost.com/video-games/2020/05/07/alexandria-ocasio-cortez-is-now-playing-animal-crossing-shes-visiting-her-followers/>
- Parker, S. (2000, October 10). Verant Q&A. *GameSpot*.  
<https://www.gamespot.com/articles/verant-qanda/1100-2638977/>
- Paul, K. (2021, April 3). *NFTs are helping artists solve a vital problem: Who owns digital artwork?* The Guardian.

<http://www.theguardian.com/artanddesign/2021/apr/03/non-fungible-tokens-digital-art-artists>

People Make Games. (2021, December 13). *Roblox Pressured Us to Delete Our Video. So We Dug Deeper*. <https://www.youtube.com/watch?v=vTMF6xEiAaY>

Perez, M. (2020). *Top-Earning Video Gamers: The Ten Highest-Paid Players Pocketed More Than \$120 Million In 2019*. Forbes.

<https://www.forbes.com/sites/mattperez/2020/01/29/top-earning-video-gamers-the-ten-highest-paid-players-pocketed-more-than-120-million-in-2019/>

Perez, S. (2019). Skype publicly launches screen sharing on iOS and Android.

*TechCrunch*. <https://social.techcrunch.com/2019/06/05/skype-publicly-launches-screen-sharing-on-ios-and-android/>

Pierce, R. J. (2021, December 28). *Ready Player Me Metaverse Avatar Company Raises \$13 Million In Latest Funding Run*. Tech Times.

<https://www.techtimes.com/articles/269838/20211228/metaverse-avatar-startup-ready-player-closes-up-13-million-funding.htm>

Pilieci, V. (2009). Gamers' plague offers real-world lessons; Many Warcraft players ignored quarantine. *Edmonton Journal*, A.2.

Poetic Stanziel. (2012, November 23). *Protecting Our Newbies—EVE New Citizens Q&A - EVE Online Forums*. <https://forums-archive.eveonline.com/topic/174998/>

Pretty Good Gaming. (2019, July 10). *Has EVE Online Just Screwed All Its Players!?* <https://www.youtube.com/watch?v=6ZfHRlMMkLk>

*Process Credit (Withdrawal) Requests.* (2020, June 9). Linden Lab.

<https://lindenlab.freshdesk.com/support/solutions/articles/31000135224-process-credit-withdrawal-requests>

Putze, E. (2021, July 8). *How mobile game devs are evolving test and launch strategies.*

GamesIndustry.Biz. <https://www.gamesindustry.biz/articles/2018-02-07-how-mobile-game-devs-are-evolving-test-and-launch-strategies>

*RMAH - Diablo Wiki.* (2014). <https://www.diablowiki.net/RMAH>

Robba. (2020). *The WoW Farmer's Guild* [Discord].

Roberts, R. (2020, July 13). *Josh Williams on Online Gaming, Blockchain, and Forte.*

Econlib. <http://www.econtalk.org/josh-williams-on-online-gaming-blockchain-and-forte/>

Roblox: How to spot and avoid scammers in Adopt Me! - CBBC Newsround. (2020, July

3). *BBC News.* <https://www.bbc.co.uk/newsround/52907809>

Rosenburg, A. (2011, April 10). *Minecraft to leave beta, get a final release on November*

*11.* Digital Trends. <https://www.digitaltrends.com/gaming/minecraft-to-leave-beta-get-a-final-release-on-november-11/>

Rosewater, M. (2017). *Magic 25th Anniversary Page Facts and Figures.* MAGIC: THE

GATHERING. <https://magic.wizards.com/en/content/magic-25th-anniversary-page-facts-and-figures>

Ruhl, A., & Cooke, R. (2020, March 29). Guest Editorial: We Need To Talk About The

Ethics Of VR Now, Before It's Too Late. *UploadVR.* <https://uploadvr.com/guest-editorial-ethics-vr-discussion/>

- Ryan, C. (2018). *Computer and Internet Use in the United States: 2016*. 14.
- Sabat, S. (2021, June 10). *Final Fantasy 14: A realm reborn is now the MMO having most active players*. Republic World. <https://www.republicworld.com/technology-news/gaming/final-fantasy-14-a-realm-reborn-is-now-the-mmo-having-most-active-players.html>
- SalCI—YouTube*. (2022, January 1).  
[https://www.youtube.com/channel/UCIY084mbGLK\\_SLIOfgizjow](https://www.youtube.com/channel/UCIY084mbGLK_SLIOfgizjow)
- Salter, A. W., & Stein, S. (2014). Endogenous currency formation in an online environment: The case of *Diablo II*. *The Review of Austrian Economics*, 29(1), 53–66. <https://doi.org/10.1007/s11138-014-0289-1>
- Schmalfeld, J. (2021, August 4). *Commentary: How copyright violations can crash your NFT party*. Fortune. <https://fortune.com/2021/08/04/nfts-copyright-violations-penalties-non-fungible-tokens-collectibles-nfttorney-jonathan-schmalfeld/>
- Schneider, A. (2021, April 30). “*Disaster Girl*,” *The Stuff Of Memes*, Sells For Nearly \$500,000 As NFT. NPR.Org.  
<https://www.npr.org/2021/04/30/992383825/disaster-girl-the-stuff-of-memes-sells-for-nearly-500-000-as-nft>
- Schultz, R. (2018, April 27). *UPDATED: Earning Money Creating Custom Avatars in VRChat: An Interview with Ghoster*. Ryan Schultz.  
<https://ryanschultz.com/2018/04/27/vrchat/>
- Schultz, R. (2019, August 24). *VRChat Is Planning for a Virtual Economy, Currency, and a Marketplace for User Generated Content*. Ryan Schultz.

<https://ryanschultz.com/2019/08/23/vrchat-is-planning-for-a-virtual-economy-currency-and-a-marketplace-for-user-generated-content/>

Shadwell, L. (2020, July 2). *Roblox MAU growth slows in June 2020, with 158M active users* /. <https://blog.rtrack.live/index.php/2020/07/02/roblox-mau-growth-slows-in-june-2020-with-158m-active-users/>

Shankland, S. (2018, February 8). *Forget cryptokitties. You can buy digital celebrity cards for Elon Musk and Jennifer Lawrence*. CNET.

<https://www.cnet.com/news/cryptocurrency-now-you-lets-collect-digital-cards-for-celebrities/>

Siemaszko, C. (2008, October 23). *Woman kills husband's video game avatar in virtual murderous rage*. Nydailynews.Com.

<https://www.nydailynews.com/news/world/woman-kills-husband-video-game-avatar-virtual-murderous-rage-article-1.304126>

Sillytuna. (2017, March 18). *Cryptoproperty: 6 Reasons The Blockchain Will Revolutionise Game Content*. Medium.

<https://medium.com/ownage/cryptoproperty-6-reasons-the-blockchain-will-revolutionise-game-content-37b249556200>

Sillytuna. (2021, March 10). *HERE IS THE ARTICLE YOU CAN SEND TO PEOPLE WHEN THEY SAY "BUT CRYPTOART IS BAD FOR THE ENVIRONMENT...."*

Medium. <https://sillytuna.medium.com/here-is-the-article-you-can-send-to-people-when-they-say-but-cryptoart-is-bad-for-the-environment-116ccba3c268>

- Skrebels, J. (2021, December 10). *Game Developer Accuses Real-Life Weapons Manufacturer of Stealing Its Gun Design... Twice*. IGN.  
<https://www.ign.com/articles/stolen-gun-kalashnikov-oceanic-mp-155-ultimate-ward-b>
- Smedley. (2006, February 16). *Virtual Jail* [Blog]. Station.  
<https://web.archive.org/web/20100716085300/http://stationblog.wordpress.com/2006/02/16/virtual-jail/>
- Smith, V. (2018). *A Life of Experimental Economics, Volume II The Next Fifty Years* (1st ed., Vol. 2). Cham : Springer International Publishing : Imprint: Palgrave Macmillan.
- Sommerfeld, S. (2020). Welcome to T-Pain's Animal Crossing island. *Washington Post*.  
<https://www.washingtonpost.com/video-games/2020/05/29/welcome-t-pains-animal-crossing-island/>
- Sparks, H. (2021, December 17). *Woman claims she was virtually 'groped' in Meta VR Metaverse*. NY Post. <https://nypost.com/2021/12/17/woman-claims-she-was-virtually-groped-in-meta-vr-metaverse/>
- Statista. (2014). *Time spent playing World of Warcraft 2013*. Statista.  
<https://www.statista.com/statistics/327295/time-spent-playing-world-of-warcraft/>
- Steam: Steamworks Development :: New Revenue Share Tiers and other updates to the Steam Distribution Agreement*. (2018, November 30).  
<https://store.steampowered.com/news/group/4145017/view/>

- Steiner, D. (2021, July 12). *Final Fantasy 14 Is So Popular It's "Sold Out" Even Online*. Esports Talk. <https://www.esportstalk.com/news/final-fantasy-14-is-so-popular-its-sold-out-even-online/>
- Straub, N. (2020, October 5). *Every Country With Laws Against Loot Boxes (& What The Rules Are)*. ScreenRant. <https://screenrant.com/lootbox-gambling-microtransactions-illegal-japan-china-belgium-netherlands/>
- Stubbs, M. (2019, July 3). How Artifact became Valve's biggest failure. *Eurogamer*. <https://www.eurogamer.net/articles/2019-07-03-how-artifact-became-valves-biggest-failure>
- Sweeny, T. (2018, December 4). *Announcing the Epic Games Store*. Unreal Engine. <https://www.unrealengine.com/en-US/blog/announcing-the-epic-games-store>
- Tan, S., & Fox, J. (2020, June 10). *Animal Crossing's massive popularity has made it less like paradise and more like Wall Street*. Washington Post. <https://www.washingtonpost.com/graphics/2020/video-games/animal-crossing-power-players/>
- TapL. (2020, February 15). *I Survived 24 Hours in 2b2t*. <https://www.youtube.com/watch?v=akbvTyD147c>
- Taylor, T. L. (2002). "Whose Game Is This Anyway?": Negotiating Corporate Ownership in a Virtual World. *Proceedings of Computer Games and Digital Cultures Conference*, 16.



- TechCrunch. (2010). The Year In Virtual Goods By The Numbers. *TechCrunch*.  
<http://social.techcrunch.com/2010/12/31/the-year-in-virtual-goods-by-the-numbers/>
- Tepper, F. (2017, December 3). People have spent over \$1M buying virtual cats on the Ethereum blockchain. *TechCrunch*.  
<https://social.techcrunch.com/2017/12/03/people-have-spent-over-1m-buying-virtual-cats-on-the-ethereum-blockchain/>
- Terms and Conditions / Linden Lab*. (2017, July 31). Second Life Terms and Conditions.  
<https://www.lindenlab.com/legal/second-life-terms-and-conditions>
- THE REVUNKOLUTION. (2016, March 30). *ReVUNKolution*.  
<http://freemyvunk2.poppylanephotography.com/the-revunkolution/>
- Twitch Affiliate Partner Program—Reviews, News and Ratings*. (2020). Business of Apps. <https://www.businessofapps.com/affiliate/twitch/>
- Vaičiulaitytė, G. (2020). This Editorial Team Ditches Zoom And Instead Starts Using Red Dead Redemption For Meetings, Here’s How It Goes For Them. *Bored Panda*. <https://www.boredpanda.com/red-dead-redemption-work-team-meeting/>
- Value Added Tax | Second Life*. (2020). <https://secondlife.com/corporate/vat.php>
- van Gisbergen, M. S., Sensagir, I., & Relouw, J. (2020). How Real Do You See Yourself in VR? The Effect of User-Avatar Resemblance on Virtual Reality Experiences and Behaviour. In *Augmented Reality and Virtual Reality* (pp. 401–409). Springer International Publishing. [https://doi.org/10.1007/978-3-030-37869-1\\_32](https://doi.org/10.1007/978-3-030-37869-1_32)

- Varoufakis, Y. (2014). *It all Began With a Strange Email*.  
<https://blogs.valvesoftware.com/economics/it-all-began-with-a-strange-email/>
- Viegas, D. (2021, May 15). *Final Fantasy 14: Bunny Boys Trends After New Male Viera Race Revealed*. Game Rant. <https://gamerant.com/final-fantasy-14-bunny-boys-trends-new-male-viera-race-revealed/>
- Vincent, D. (2011, May 25). China used prisoners in lucrative internet gaming work. *The Guardian*. <https://www.theguardian.com/world/2011/may/25/china-prisoners-internet-gaming-scam>
- Virtual Currencies | Internal Revenue Service*. (2019, October 12). IRS.  
<https://web.archive.org/web/20191012012751/https://www.irs.gov/businesses/small-businesses-self-employed/virtual-currencies>
- Virtual property market booming. (2005, November 9). *BBC*.  
<http://news.bbc.co.uk/2/hi/science/nature/4421496.stm>
- Vogels, E. a. (2021, January 13). The State of Online Harassment. *Pew Research Center: Internet, Science & Tech*. <https://www.pewresearch.org/internet/2021/01/13/the-state-of-online-harassment/>
- Wages and the Fair Labor Standards Act | U.S. Department of Labor, 29 USC Ch. 8 § 8 (1938). <https://www.dol.gov/agencies/whd/flsa>
- Wang, J. (2020). *How Much Do Twitch Streamers Make in 2020? Best Wallet Hacks*.  
<https://wallethacks.com/how-much-do-twitch-streamers-make/>
- Warren, T. (2020, April 23). *Zoom grows to 300 million meeting participants despite security backlash*. The Verge.

<https://www.theverge.com/2020/4/23/21232401/zoom-300-million-users-growth-coronavirus-pandemic-security-privacy-concerns-response>

Watson, A. (2019). *Global box office revenue 2018*. Statista.

<https://www.statista.com/statistics/271856/global-box-office-revenue/>

Webb, K. (2018, December 8). *With more than 35 million players worldwide, Magic the Gathering is giving back to its community with a brand new game and \$10 million in esports prize money*. Business Insider. <https://www.businessinsider.com/magic-the-gathering-announces-10-million-esports-program-for-2019-2018-12>

Weinberger, M. (2019). *A video game you've never heard of has turned three teens into multimillionaires—And it's just getting started*. Business Insider.

<https://www.businessinsider.com/roblox-how-teenage-developers-are-making-millions-2017-7>

*Welcome to Second Life Land Auctions*. (2020). Second Llife.

<https://places.secondlife.com/auctions#2>

Welyn. (2021, May 13). *HOW I SURVIVED THE MOST DANGEROUS SERVER IN MINECRAFT (2B2T Solo Survival)*.

<https://www.youtube.com/watch?v=xEfvhVbEDr0>

Wigglesworth, R., & Lewis, L. (2020, April 28). *Virtual rate cut forces Nintendo gamers into riskier assets | Free to read*. [https://www.ft.com/content/68f96d24-02f0-](https://www.ft.com/content/68f96d24-02f0-42fd-b132-aba0acba777f)

[42fd-b132-aba0acba777f](https://www.ft.com/content/68f96d24-02f0-42fd-b132-aba0acba777f)

- Williamson, J. (1989). What Washington Means by Policy Reform. In *Latin American Readjustment: How Much has Happened*. Peterson Institute for International Economics.
- Wong, S. (2017, March 21). *How Roblox Is Discovering Future Game Developers And Entrepreneurs*. AList. <https://www.alistdaily.com/strategy/roblox-discovering-future-game-developers-entrepreneurs/>
- World, T. V. (2019, October 4). Therebucks Payment Processing Options. *Therevirtualworld*. <https://there.blog/2019/10/04/therebucks-payment-processing-options/>
- Yancy, L. (2017, April 6). *How EVE Players Trashed \$17,000 Worth of Ships In Just Three Easy Steps*. Kotaku. <https://kotaku.com/how-eve-players-trashed-17-000-worth-of-ships-in-just-1794053391>
- Yee, N. (2004). *The Daedalus Project: Hours of Play per Week*. The Daedalus Project. <http://www.nickyee.com/daedalus/archives/000758.php>
- York, M. M. M. is an intern for N. N. based in N. (2021, March 11). *Digital artwork sells for record \$69 million at Christie's first NFT auction*. NBC News. <https://www.nbcnews.com/business/business-news/digital-artwork-sells-record-60-million-christie-s-first-nft-n1260544>
- Zilber, A. (2022, January 19). Meta wants to track people's facial expressions in metaverse. *New York Post*. <https://nypost.com/2022/01/19/meta-wants-to-track-peoples-facial-expressions-in-metaverse/>

Zizzo, D. J. (2009). Experimenter demand effects in economic experiments.

*Experimental Economics : A Journal of the Economic Science Association*, 13(1),

75–98. <https://doi.org/10.1007/s10683-009-9230-z>

## **BIOGRAPHY**

Robert B Cripps graduated from Cedar City High School, Cedar City, Utah, in 1997. He received his Bachelor of Science from Westminster College in 2002 and was commissioned as a Naval officer, serving until 2008. He earned his Master's degree in Systems Engineering in 2014 from The George Washington University in 2014. She was employed as a teacher in Fairfax County for two years and received her Master of Arts in English from George Mason University in 1987.